

U.S. Grains – Commodity Overview, Production Cycles and Descriptions

Cereal grains are small, hard, dry seeds that are harvested for human or animal consumption. They are commonly milled for food or feed, with a germ that can be pressed for oil.

Grains

Grain has played a critical role in human civilization for more than 10,000 years. While there are hundreds of grain species, wheat, rice, maize, barley, sorghum, oats and rye comprise the vast majority of grain produced in modern times.

In scientific classification, cereal grains are caryopses - the seeds of plants in the grass family, with or without an attached hull or fruit layer. In business and commerce, seeds or fruits from other plant families are called grains if they resemble caryopses.

Grains are well suited to modern industrial agriculture. They are high yielding and can be mechanically harvested. After being harvested and dried, grains are extremely durable. They can be easily warehoused and stored for long periods of time, as well as transported by road, rail or ship. These valuable characteristics have allowed the development of today's modern global commodity markets.

This manual focuses on three widely traded grains: maize (corn) (*Zea mays*), barley (*Hordeum vulgare*), and grain sorghum (milo) (*Sorghum bicolor*).

MAIZE (CORN) (*Zea mays*)

Maize, also known in North American as “corn”, is a cereal grain first domesticated by indigenous peoples of the Americas about 10,000 years ago from teosinte (“grain of the gods”).ⁱ All corn varieties, from

Corn

heirloom multi-colored strains to the latest hybrids developed using CRISPrⁱⁱ are variants of this ancient grass.

Most historians believed maize was domesticated in the Tehuacán Valley of Mexico. However, research conducted in the early 21st century has led many experts to identify the adjacent Balsas River Valley of south-central Mexico as the center of domestication.ⁱⁱⁱ

Modern varieties of maize are cultigens, i.e. plants that requires human intervention to successfully propagate. Whether or not seed kernels fell off the plant to propagate naturally or were collected and sown later (by man) is a key piece of evidence archaeologists use to distinguish domesticated maize from its teosinte ancestor.^{iv}

There are six major types of maize: 1) Dent corn, 2) Flint corn, 3) Pod corn, 4) Popcorn, 5) Flour corn, and 6) Sweet corn.



Reid's Yellow Dent Corn Monument – Delavan, Illinois^v

Most of today's hybrid corn varieties and cultivars are derived from Dent corn (*Zea mays var. indentata*). Dent corn received its name because of

Yellow Dent Corn

the small indentation, or "dent", at the crown of each ripe dry kernel of corn. This type of field corn is noted for its high soft starch content.^{vi}

All dent corn varieties today can be traced back to "Reid's Yellow Dent," a variety developed by central Illinois farmer James L. Reid and his father, Robert Reid in the late 19th Century. They moved from Brown County, Ohio to Tazewell County, Illinois in 1846, bringing with them a red corn variety known as "Johnny Hopkins". They crossed it with (local?) varieties of flint corn and flour corn, and were able to capture attributes of each. This new variety not only won a prize at the 1893 World's Fair in Chicago, Illinois,^{vii} but created the foundation for the proliferation of other dent varieties through the present day.

Dent corn is typically cultivated and grown as a commercial row crop for grain and fodder. These commercial cultivars are either single- or double-cross hybrids bred for specific growing areas, soils, or climatic conditions. The plant has an adventitious, dense, fibrous root system that develops aerial roots at nodes near the soil surface. It is a fast-growing, vertically erect, short-lived annual plant, commonly growing to a height of 6 – 9 feet (2 - 3 meters).

In 2021/22 world production of corn exceeded 1,200 million metric tons (mmts), with the United States accounting for more than 380 mmts, or more than 30%.^{viii}

While used overwhelmingly for feed, dent corn is the main variety used in food manufacturing as the base ingredient for various products, including cornmeal flour (for cornbread), corn chips, tortillas, and taco shells. In addition, its high starch content also makes dent corn a preferred variety for producing fructose and high-fructose corn syrup - a sweetener used in many processed foods and beverages.

Maize (which in the U.S. is interchangeably referred to as corn) is indigenous to the Americas. Due to its productivity and profitability, it has become the most widely grown cultivated crop throughout the U.S. No other country can match its productivity as each year U.S. farmers devote more than 1 in 4 planted acres to its production. In addition, U.S. has long led the world in corn yields, as well as total production. As a result, this has helped U.S. become a world leader in production of animal feed stuffs and ethanol. The U.S. livestock industry is the world's most efficient due to the availability of inexpensive, energy-efficient, and sustainable corn.

In addition, the extensive waterway system which runs throughout the grain producing areas of North America provides a natural and dependable transportation network, which provides the basis of a world

class bulk handling and export supply chain making the U.S. the a top exporter of corn.

As the demand from new and traditional sources is expected to continue to increase in the coming years, vast productive capacity remains untapped in the United States. Improved hybrid strains, along with more efficient and ecologically sound farm practices will likely enable the U.S. to meet expanding demand through the 21st century.

CORN PRODUCTION CYCLE: SEASONAL FACTORS

The versatile corn plant can thrive in climates as diverse as the arid desert plains of the southwestern United States to the high Andean mountain plains of Ecuador and Peru. But it is in the temperate plains of the U. S. Corn Belt (Iowa, Illinois, Nebraska, Minnesota, Indiana and Ohio) where corn yields continue to astonish the agricultural world. It is at these attitudes that corn flourishes.

Throughout the growing season, the corn plant undergoes a series of developmental stages as it grows from a seed at planting to a tall plant with an ear at harvest. The following information highlights various stages of growth and development of corn throughout the growing season and various problems during planting and germination.

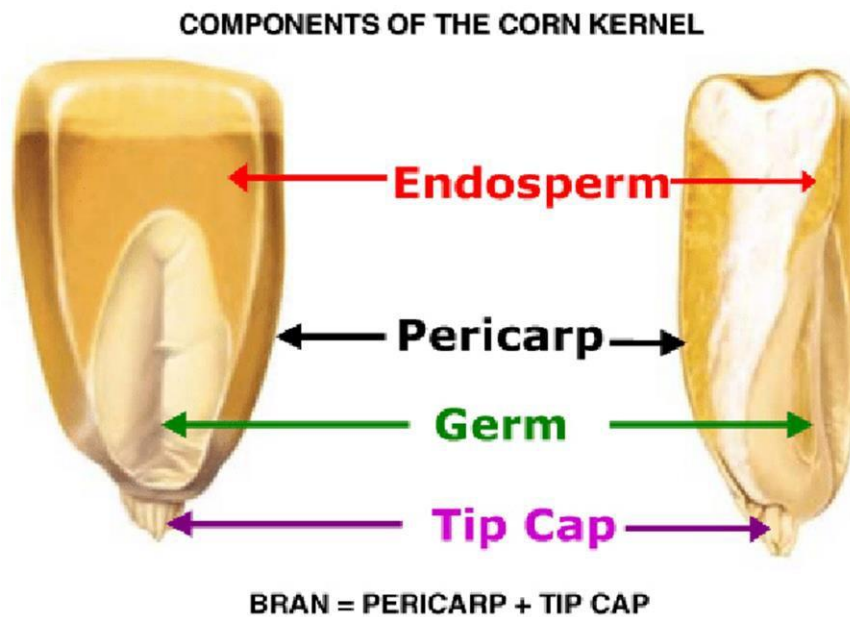
As we try to understand why yields are greater or less than expected, we must start when the seed is planted and end when the ear this is successfully harvested and the grain delivered into store. Understanding how the corn plant grows, develops, and produces grain, we have a better chance of knowing what will affect plant growth and consequently how to manage the crop for best production.

Generally, higher yields are strongly correlated with a longer growing season, and hybrids with 110 days or more until maturity are typically planted in the United States. However, let's consider the age of the corn in terms of plant development rather than in days. A corn plant requires a certain number of growing degree units (GDUs) to reach maturity, regardless of the number of calendar days it takes to accumulate. The relationship of GDU accumulation and corn development, along with utilizing the estimated number of days to reach a certain growth stage, can help predict when important growth stages will occur.

Before planting, considerable planning and preparation goes into corn production. The crop is dependent on the genetic and environmental characteristics in which the plant was grown. Quality seed that has a

viable embryo that contains sufficient stored energy to get the plant established, and that has an intact seed coat to prevent attack by disease organisms.

Let's start with the seed. Corn seed is made up of three primary parts (the Figure below): the embryo from which the new plant will develop; the endosperm or starchy part, the energy source for germination and emergence until the plant can function on its own; and the pericarp, or seed coat, which protects both the endosperm and the embryo.



Generally, seed is planted in soil moist and warm 12.5 degrees Celsius (mid-50 degrees Fahrenheit) or higher, enough to allow rapid germination and emergence. With increased adoption of no-tillage and reduced tillage farming, planting dates are earlier, on average, than on plowed fields.

Germination and seedling establishment follow quickly upon planting. The practice of early planting, which generally results in higher yields, allows for more intensified and potentially profitable cropping systems. As a result of planting early, however, corn seed is often planted in very cool soils where the 2-inch depth temperature is often closer to the minimally acceptable for germination (10 degrees Celsius) than the optimum (12.5 degrees Celsius or greater). Colder soil temperatures result in an extended time period to achieve emergence, but does not generally adversely impact yields, while the opportunity for a longer growing season will typically add additional yield.

If the soil is too dry, the seed may not germinate or the seedling may not take root.

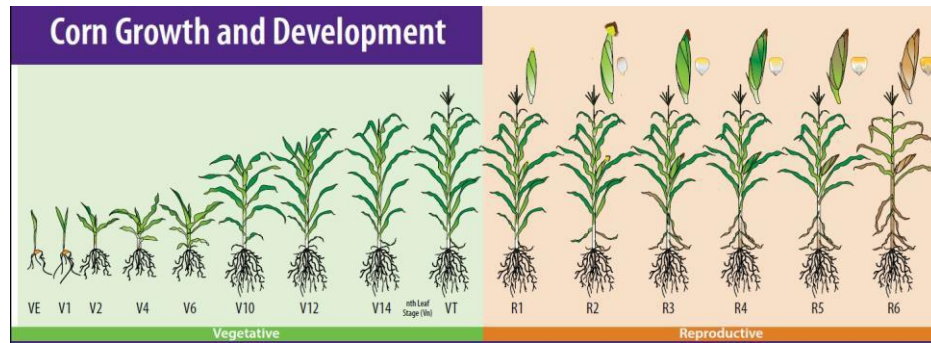
Surprisingly, the soil moisture content at planting time supplies from 50% to 70% of the plant's moisture needs. No amount of rain in the later stages of the growing season will counteract an early loss of a plant population during the germination period. Consequently, moisture conditions heading into the spring, when corn is planted in the United States, are very important to potential yield. Crop forecasters base their initial crop predictions on a formula derived from soil moisture levels before the farmers set out to seed their fields.

It is extremely unusual for high levels of precipitation or soil moisture to adversely affect corn production. Hence the old saying; "***Rain makes grain!***" However, wet soils can delay planting and slow maturity. This will expose the plant to additional risk during the pollination period. But standing water or the complete saturation of the soil provides benefits that generally outweigh any risk.

Once established, the corn plant is very strong. As the plant grows it develops through a number of vegetative and reproduction stages. Corn growth stage development will vary according to corn maturity, as an early maturing variety may produce fewer leaves or develop through growth stages faster than a later maturing variety. It is important to remember development corn is determined by temperature and GDUs.

Generally, this most critical period of the growing season for corn is during the pollination period which occurs with tasseling (VT) and silking (R1). Across the U.S. Corn Belt this usually encompasses the entire month of July. This period also coincides with some of the hottest temperatures of summer that can put added stress on the developing crop. Extreme hot temperatures or drought can prevent pollen from fertilizing individual silks, resulting in fewer kernels on each ear. Hot temperatures during this period can inflict much greater harm on the crop than heat in August and September.

Early frosts have a marginal effect on yields, cutting short the kernel filling and drying stages (R4 thru R6). Temperatures below 0 degrees Centigrade at this late stage in the crop's development are more likely to effect quality than final yields.



Source: Kansas State University Agricultural Experiment Station and Cooperative Extension Service MF3305 June 2016 Ignacio A. Ciampitti, Crop Production and Cropping Systems Specialist, Department of Agronomy, Kansas State University^{ix}

VE – Emergence: Emergence occurs when the first leaves, called the spike or the coleoptile, appear above the soil surface. The seed absorbs water (about 30% of its weight) and oxygen for germination. The radicle root quickly emerges near the tip of the kernel, depending on soil moisture and temperature conditions. The coleoptile emerges from the embryo side of the kernel and is pushed to the soil surface by mesocotyl elongation. The mesocotyl encloses the plumule leaves that open as the structure approaches the soil surface.

Management - Ideal soil temperatures (50 to 55 degrees Fahrenheit) and moisture conditions promote rapid emergence (5 to 7 days). Optimum seed placement varies from 1 to 2 inches deep. Appropriate planting depth is critical for optimal emergence. Cold, dry, and deep planting can delay emergence for several days.

V1 – First-Leaf: One leaf with collar visible (structure found at the base of the leaf). The first leaf in corn has a rounded tip. From this point until flowering (R1 stage), leaf stages are defined by the uppermost leaf with visible collars. The growing point is located below the surface until the late V5 stage.

Management - Scout for proper emergence (e.g., 30 plants in 17 1/2 feet for 30-inch row spacing = 30,000 plants per acre), early season weeds, insects, diseases, and other production issues.

V2 – Second-Leaf: Nodal roots begin to emerge below ground. Seminal roots begin to senesce. Frost is unlikely to damage corn seedling, unless it is extremely cold or the corn was shallowly planted.

V4 – Fourth-Leaf: Nodal roots are dominant, occupying more soil volume than seminal roots. Leaves still developing on apical meristem (primary growth of the plant).

V6 – Sixth-Leaf: Six leaves with collar visible. The first leaf with the rounded tip is senescent; consider this point when counting leaves. The growing point emerges above the soil surface. All plant parts are

initiated. Sometime between V6 and V10, the potential number of rows (ear girth) is determined. Potential row

Number is affected by genetics and environment and is reduced by stress conditions. The plant increases in height due to stalk elongation; nodal roots are established in the lowest, below-ground nodes of the plant.

Management - Scout for weeds, insects, and diseases. Rapid nutrient uptake begins at this stage. Timing nutrient applications to match this uptake enhances the potential for greater nutrient use efficiency, particularly for mobile nutrients such as nitrogen.

V10 – Tenth-Leaf: Brace roots begin to develop in the lower above-ground nodes of the plants. Until this stage, rate of leaf development is approximately 2 to 3 days per leaf.

Management - Nutrient (potassium = K > nitrogen = N > phosphorous = P) and water (0.25 inch per day) demands for the crop are high. Heat, drought, and nutrient deficiencies will affect potential number of kernels and ear size. Scout for root lodging issues and diseases (e.g., common rust, brown spot). Weed control is critical since corn does not tolerate early-season competition for water, nutrients, and radiation well.

V14 – Fourteen-Leaf: Rapid growth. This stage occurs approximately two weeks before flowering. Highly sensitive to heat and drought stress. Four to six extra leaves will expand from this stage until VT.

Management - Scout for root lodging issues, green-snap (likely to occur from V10 to VT) and diseases (e.g., common rust, brown spot). Abnormal corn ears can occur and be obvious from this time until flowering.

VT – Tassel: Potential kernels per row is set, final potential grain number (number of ovules), and potential ear size are being determined. Last branch of the tassel is visible at the top of the plant. Silks may or may not have emerged. The plant is almost at its maximum height.

Management - Nutrient (K > N > P) and water (0.30 inch per day) demands for the crop are close to maximum. Heat and drought will affect potential number of kernels. Scout for insects (e.g., corn leaf aphid, western bean cutworm, corn earworm, fall armyworm) and diseases (e.g., gray leaf spot, southern rust, northern leaf blight). Total leaf defoliation severely affects final yields.

R1 – Silking: Flowering begins when a silk is visible outside the husks. The first silks to emerge from the husk leaves are those attached to potential kernels near the base of the ear. Silks remain active until pollinated. Pollen falls from the tassel to the silks, fertilizing the ovule to produce an embryo. Potential kernel number is determined. Maximum plant height is achieved. Following fertilization, cell division is occurring within the embryo.

Management - Nutrient (N and P accumulation is still progressing, K is almost complete) and water (0.33 inch per day) demands are at the peak. Heat and drought will affect pollination and final grain number. Defoliation by hail or other factors such as insects will produce a large yield loss.

R2 – Blister: Silks darken and begin to dry out (approximately 12 days after R1). Kernels are white and blister-like in shape and contain a clear fluid. Kernels are approximately 85% moisture; embryos develop in each kernel. Cell division is complete. Grain filling commences.

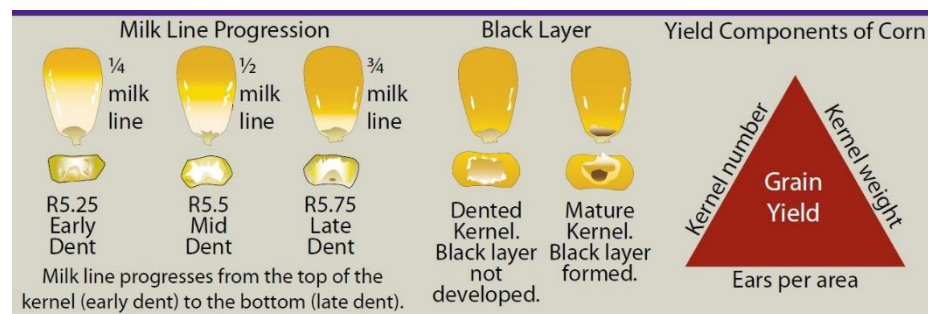
Management - Stress can reduce yield potential by reducing final number of kernels due to abortion.

R3 – Milk: Silks dry out (approximately 20 days after R1). Kernels are yellow, and a milk-like fluid can be squeezed out of the kernels when crushed between fingers. This fluid is the result of the starch accumulation process.

Management - Stress will still cause kernel abortion, initially from the ear tip.

R4 – Dough: Starchy material within the kernels has dough-like consistency (approximately 26 to 30 days after R1). Rapid accumulation of starch and nutrients occurs; kernels have 70% moisture and begin to dent on the top. Material squeezed out of the kernel has dough-like consistency.

Management - Stress can produce unfilled or shallow kernels and “chaffy” ears. Impact of frost on grain quality can be severe when it occurs at this stage (25 to 40% yield loss from light to killing frost, respectively).



Source: Kansas State University Agricultural Experiment Station and Cooperative Extension Service MF3305 June 2016 Ignacio A. Ciampitti, Crop Production and Cropping Systems Specialist, Department of Agronomy, Kansas State University^x

R5 – Dent: Most of the kernels are dented. Kernel moisture declines to approximately 55% (38 to 42 days after R1) as the starch content increases.

Management - Stress can reduce kernel weight. Silage harvest is approaching (at around 50% kernel milk).

R6 – Maturity: A black layer forms at the base of the kernel, blocking movement of dry matter and nutrients from the plant to the kernel (50 to 60 days after R1). Kernels achieve maximum dry weight (30 to 35% moisture) and are physiologically mature.

Management - Grain is not ready for safe storage. Frost or any biotic or abiotic stress does not impact yields after this development stage. Lodging from disease, insect damage, or hail can result in physical loss of yield. Harvest can proceed, but recommended moisture for long-term storage is 14.5%. Scout fields for ear-drop due to things such as European corn borer damage.

CORN USAGE

FEED

Historically, the major use for corn has been as the primary feed grain for animal and livestock production. Corn can supply all the energy and a large percentage of the protein in an animal's diet. Its low cost, high palatability, availability, storability and consistent nutrient content make it the feed ingredient of choice by livestock producers of every kind. This includes major sectors of beef, dairy, pork, and poultry.

In the United States, corn, barley, grain sorghum and oats all compete as feed grains that go into various livestock rations. However, corn makes up the vast majority of the final ration and represents up to 86% of the grain used as feed in the U.S. In addition, a number of other feed stuffs that are a co-product of the milling process, such as Distillers Grains, Corn Gluten Meal and Corn Gluten Feed also compete as ingredients into these feed rations.

Currently (2021/22) United States corn consumption as animal feed has averaged over 712 mmts over the last five years.^{xi} In 2021/22 world feed and residual demand is forecast to exceed 750 mmts, or about 62% of total production.^{xii} Projected growth of world demand for animal protein is expected to propel a growing need for corn well into the future.

ENERGY & INDUSTRIAL

While corn has been a valuable food and feed grain for thousands of years, its use as a widespread industrial product is much more recent.

Through the process of wet or dry milling, corn can be processed into a range of industrial products, primarily ethanol and its co-products. Since the early 2000's, rocketing demand for ethanol has introduced the energy sector as a strong market competitor for corn.

Through the milling process, each corn kernel is separated into three component parts: 1) **starch**, 2) the **germ**; and 3) the **hull**.

Products made from corn **starch** range from ethanol, high fructose corn syrup, as a stiffener for paper, textiles and food, paint, make-up, coatings, films and adhesives.

The primary industrial uses for corn starch are for ethanol (ethyl alcohol), fructose and industrial starch. As a common food ingredient, such as dextrose, corn becomes the principal ingredient of many processed foods, such as; peanut butter, hot dogs and baby food. In the textile industry it finds use, aside from starch, in absorbents, dyes and sizing. The packing industry uses biodegradable corn "peanuts," while ecologically friendly garbage bags are making their way into U.S. households.

Corn oil is extracted from the **germ** of the corn kernel, and has a variety of uses in cooking and non-cooking applications. For example, corn oil is used as an industrial cleaner and lubricant, as well as blended into fuels to power gasoline and diesel-powered engines. Other uses include corn oil in many cosmetic products, liquid soaps, and shampoos.

The **hull**, or bran, is combined with residue from these extraction processes to become corn gluten feed or corn gluten meal, which are both prized additions to livestock feed.

FOOD

Today, despite its predominant use for feed energy and industrial use, corn is still a staple food in many parts of the world. Corn is also processed into corn starch, dextrose, syrups, sweeteners, corn oil, beverages and alcohol for direct human consumption.

Sugar-rich varieties called sweet corn are usually grown for human consumption as kernels, while field corn varieties are used for animal feed, various corn-based human food uses (including grinding into cornmeal or masa, pressing into corn oil, and fermentation and distillation into alcoholic beverages like bourbon whiskey), and as chemical feedstocks.

Corn has already made significant inroads into every facet of U.S. leisure and business life. Extensive, ongoing research at the governmental, institutional, academic, and corporate levels ensures that the limitless resources of corn will continue to astound us in the future. This marvelous plant, which has been domesticated for 7,000 years, has only begun to demonstrate the broad range of applications it has in our daily lives.

For further information contact:

National Corn Growers Association

632 Cepi Drive

Chesterfield, MO 63005 U.S.A.

Phone: (636) 733-9004

Fax: (636) 733-9005

Email: corninfo@ncga.com

Website: www.ncga.com

BARLEY (*Hordeum vulgare*)

Barley, *Hordeum vulgare*, is a member of the grass family and is a major cereal grain grown in temperate climates globally. After corn, wheat and rice, barley is the fourth largest grain crop produced in world. Barley is generally produced in areas where the growing season is relatively short and climatic conditions are cool and dry.

Barley was one of the first cultivated grains, particularly in Eurasia as early as 10,000 years ago. It has been used as animal feed and fodder, and as a source of fermentable grains in the production of beer and whisky. As a food grain, it has been used bread flours, portages, soups and stews of various cultures.

Barley

World average annual production of barley averages around 150 mmts, with 2020/21 world production estimated at 160 mmts.^{xiii} Major producers of barley are Europe, the United Kingdom, Russia, the Ukraine, Australia, Canada, Argentina, Turkey and Iran.

Barley production in the United States is concentrated in the Northern Plains and the Pacific Northwest. Since reaching peak production in the United States in the mid 1980's of over 12.5 mmts, production has declined to less than 4 mmts.^{xiv}

Both two-row and six-row barley is produced in the United States. Roughly 65% of the U.S. acreage is planted to six-row barley in the Northern Plains and Pacific Coast states. The balance, 35%, is planted to two-row barley in the Rocky Mountain states. Universities in the Northern Plains states maintain aggressive breeding programs that continue to produce new varieties that improve the agronomic, feed and malting qualities of U.S. barley.

Two-row barley, sometimes considered a separate species, *Hordeum distichon*, generally has a lower protein content than six-row barley. Preferably, malting barley has a lower protein content and a more fermentable sugar content making it more suitable for malting. High-protein barley is best suited for animal feed. Protein in the malt extract that can make beer cloudy. Malting barley also has a more uniform germination specification, which results in a shorter and more uniform steeping time.

U.S. barley producers are committed to improving the quality of barley production in the United States. Each practices strict varietal purity, preserving the identity of each different variety during seeding, harvest, storage and handling. This combination of innovation and efficiency

enables the U.S. barley industry to satisfy the needs of any barley consumer, whether they are a livestock feeder, maltster or food retailer.

BARLEY PRODUCTION CYCLE: SEASONAL FACTORS

Barley is a widely adaptable cereal crop and is an important food and feed grain in many areas of the world not typically suited for maize production, especially in northern climates in northern and eastern Europe. Currently, it is a popular in temperate areas where it is grown as a summer crop and tropical areas where it is sown as a winter crop.

Barley grows under cool conditions, but is not particularly winter hardy, and is not as cold tolerant as the winter wheats, fall rye, or winter triticale. It can be found sown as a winter crop in warmer areas of Australia and Great Britain.

Barley is more tolerant of soil salinity than wheat, which might explain the increase of barley cultivation in Mesopotamia from the second millennium BCE onwards.

Barley has a short growing season and is also relatively drought tolerant. Its germination time is one to three days. For spring barley, the seed matures three to five months after planting.

Growth of the barley plant is not restricted to the development of a single main stem, as with maize. Like most other small cereals grains, such as wheat and rice, barley produces several additional secondary stems known as tillers. These emerge from the crown of the primary stem a few weeks after emergence. The number of tillers that develop varies by variety and climatic conditions.

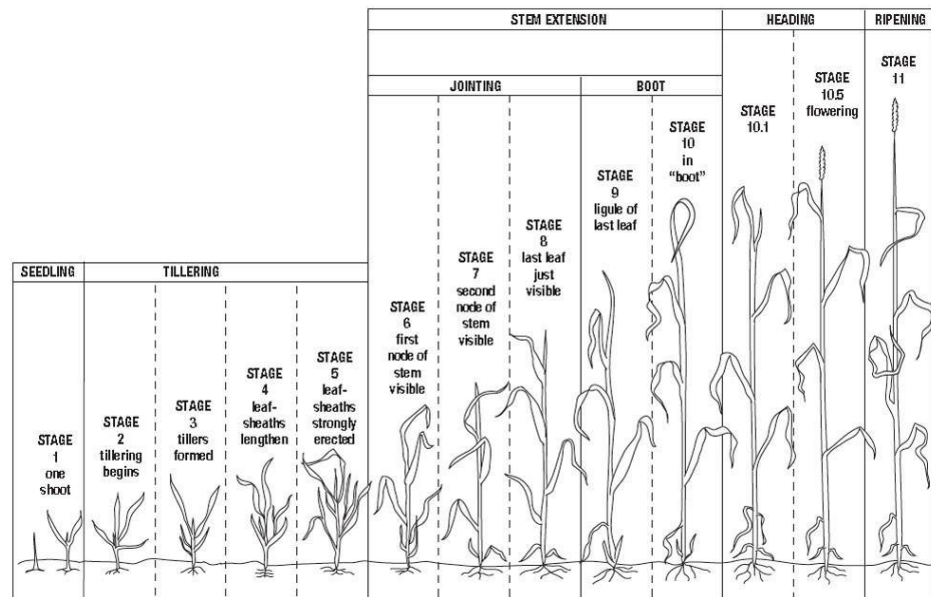
Barley is also classed by its requirement for cold temperatures. Winter barley seedlings must be exposed to cold temperatures (vernalization), which enables it to normally produce heads and grain later.

Winter barley is usually sown in the fall for exposure to low temperatures during the winter. It then completes development the following spring and summer. Spring barley doesn't require exposure to winter temperatures and can be sown in spring. Winter types usually mature somewhat earlier than spring types.

Understanding crop staging helps in identifying various stages of crop development and to visually identify vegetative and reproductive stages

in a crop's life cycle, as well as to understand what conditions can impact yields and productivity of the crop.

When staging barley and other cereal grains two common scales are used, the Zadoks^{xv} scale and Feekes^{xvi} scale. Both scales measure the maturity of the plant through vegetative and reproductive stages but differ slightly in their metric quantification. For this manual, and the following figure, the Feekes scale will be referenced.



Source: Anheuser-Busch "Smart Barley" ^{xvii}

1 Emergence: Seedlings have germinated and begin breaking through the soil crust. During this time, it is important to check for uniformity across the plant stand and determine if it is necessary for future application of herbicides for control of weeds. The main shoot and early leaves are present during this stage.

2-3 Tillering: Stages two and three describe a plant which has begun to tiller, meaning the plant is putting auxiliary or side shoots. At the end of stage three the plant will have completed tillering. During this time, it is important to continue to monitor for disease and pest pressures and to take precautionary action as needed. Early fungicides sprays may also be needed at this time.

4-5 Green Up: During the "green up" phases the plant begins to grow upright gaining plant mass above and below ground.

6-7 Jointing: At Feekes stage six, the first node a, swollen bump will be visible at the base of the shoot. Nodes are areas of active cell division from which leaves and tillers arise. In Feekes stage seven, a second and

possibly a third node will be visible approximately six inches above the soil surface.

8 Flag Leaf: Approximately five to ten days after the plant has reached Feekes stage seven the flag leaf will emerge signifying that it has transitioned to Feekes stage eight. The flag leaf is the last leaf to emerge and signals the change between vegetative and reproductive growth.

9-10 Boot: At Feekes stage nine the flag leaf's ligule is visible. The ligule is a membrane on the inside of the leaf that connects the leaf to the sheath. During this stage, the flag leaf is fully emerged.

During this time, the head will still be encased in the sheath and will begin to swell. Once the head is visible in the leaf sheath directly below the flag leaf the plant has entered Feekes stage ten. Feekes stage ten uses a decimal scale within the stage to describe milestone developments within the boot stage. These subdivisions should be assigned when approximately 50% of the field has reached the decimal designation.

10.1 awns visible, heads emerging

10.3 heading half complete

10.5 heading complete, flowering has taken place in the boot

Optimum timing for fungicides to protect against Fusarium Head Blight is in the early stages of Feekes stage ten.

11 Ripening: Once flowering begins, pollination will be completed in four or five days. When pollination is complete ripening will begin. Again, in this stage a decimal system is used to distinguish milestone developments.

11 formation of kernels, early milk

11.1 kernels full size, medium milk

11.2 kernel content starchy and readily crushed, leaves drying, glumes yellowing

11.3 kernels semi-hard, leaves dry, nodes yellow

11.4 kernels hard, plant dry

As barley enters its reproductive phase, the stems of some of the tillers, called culms, elongate upward. Barley's flowering structure is known as the spike, ear, or head. It is borne upward, emerging from the "boot," which is the sheath of the uppermost "flag" leaf on the culm. The spike consists of a large number of individual flowers called florets, which are present in individual spikelets that are attached to a central stemlike structure called the rachis. Spikelets are attached in groups of three on opposite sides of the rachis. Barley is predominantly self-pollinating producing between twenty-five and sixty seeds per spike.

The barley “type” can be distinguished by its differences in the head as it is classified based upon the fertility of the florets on the spike. In a six-rowed barley, three kernels form at each node of the head, while in a two-rowed type, only a single kernel forms at each node. In six-row barleys, all of the florets are fertile, leading to six vertical rows of seeds on the spike. Six-row barley is predominately used for feed. In two-row types only the central floret of the three at each node is fertile, and thus just two rows of seeds develop on opposite sides of the rachis. Two-row barley is predominately used for malting.

The barley seed consists of the embryo, a series of outer layers of cells called the pericarp, and the endosperm. The principal compound found in the endosperm is starch, which represents about 65% of the mass of the seed. This starch serves as an energy source for the seedling. The second largest component of the barley endosperm is protein. The amount of protein present is generally inversely proportional to the amount of starch. This protein provides a source of amino acids that can be used for protein synthesis by the seedling. The amount of protein present in a seed is positively correlated with the amount of nitrogen fertilizer applied when the parent plant is being grown.

When the barley crop is mature, harvesting is facilitated by either direct combining, or by first swathing and then harvesting. Technology for harvesting ranges from a simple sickle in developing countries to sophisticated mechanical combines or headers that cut the culms above the soil, move the harvested plants between a concave and a rotating cylinder to dislodge grain; it then passes over a set of screens, separating the grain from the straw and chaff, and collecting the grain into a bin. Once the grain is harvested, it may either be stored in bins on the farm, or delivered to a local grain elevator where it is purchased from the producer.

BARLEY USAGE

Barley is a versatile and useful crop with historical applications ranging from feed and food production to beverage manufacturing.

When we analyze current barley usage we break it down into three sectors: 1) Feed, 2) Malting and 3) Food.

FEED

Barley’s primary use is as a feed grain used in animal feed. In Canada, Europe, and in the northern United States, as well as in many areas of the

world that are not suited for maize production barley is an important feed grain. Over half of barley production is used as livestock feed.

Though barley is not as efficient an energy converter as corn, it does have a higher protein content which reduces the need for protein supplements in a compound feed. Consequently, barley competes very effectively with both corn, sorghum and other cereals as a feed grain.

MALTING

The most noted barley product consumed by humans is beer. Beer is produced and drunk in large quantities worldwide. Although a variety of grains can be used for brewing and malting, barley has become the preferred grain for beer and malting. The malting process creates certain enzymes required for modifying starches into sugars.

The decline in barely production in the United States has now left the largest portion of barley production now contracted for malting purposes. Barley that does not meet quality specifications for malting is subsequently used as livestock feed.

The production of malt beverages in the United States has stabilized over the past decade. The brewing industry uses a mixture of two-row and six-row barley in the production of malt beverages. Two-row barley should be a minimum of 85 percent plump, a maximum of 3 percent thin and 11.5 to 13.5 percent protein. U.S. maltsters prefer six-row barley with a minimum of 70 percent plump, a maximum of 3 percent thin and protein levels of 12 to 14 percent. Germination is very important and that of U.S. barley is consistently high. The efficient U.S. handling system ensures that skinned and broken kernels, which reduce germination counts and malt yield, are kept low.

Though two-row varieties are higher in test weight and kernel production plumpness, six-row barley has superior enzyme systems which are crucial to the value of malt in beverage production. Brewers evaluate malt on the basis of total protein, soluble protein extract, fine/coarse difference, diastatic power and alpha amylase. The very high diastatic power and alpha amylase levels in six-row barley make U.S. malt very efficient in the brew house.

FOOD

In some regions of the world, where other grains do not grow well, barley has been historically grown for human consumption. Today, only a minor volume of barley is actually consumed for human food consumption. It

can be used in soups, as an extender for vegetable proteins and is occasionally milled into flour.

When the barley grain is consumed directly for food, it is generally used in the absence of the hull to make it more palatable. “Pearled Barley” has had the outer hull and layers of the seed mechanically removed, followed by processing to produce small, rounded, pieces of the endosperm. Barley can also be dehulled, milled, and polished to remove the bran layers, to produce a rice-like product. Pearled and polished barley are used in porridges and soups and as rice substitutes.

Other food uses include barley flakes, flour for baking purposes to produce breads and crackers, grits, breakfast cereals, pilaf, noodles, and baby foods.

Lastly, some barley is used for the production of distilled spirits such as whiskey, vodka, and gin, and for making vinegar and malted beverages.

For further information contact:

National Barley Growers Association
600 Pennsylvania Avenue, S.E., Suite 410
Washington D.C. U.S.A. 20003
Phone: (202) 548-0734
Fax: (202) 969-7036

GRAIN SORGHUM (Milo) (*Sorghum bicolor*)

Grain Sorghum

Sorghum is in the subfamily *Panicoideae* and the tribe *Andropogoneae* (This is the same tribe as big bluestem and sugarcane). Within the genus of *Sorghum* is about 25 species of flowering plants in the grass family *Poaceae*. Some of these species are grown as cereals for human consumption and some in pastures for animals.

One species, *Sorghum bicolor*, was originally domesticated in Africa and has since spread throughout the globe.^{xviii} The earliest known record of sorghum comes from an archaeological dig at Nabta Playa, near the Egyptian-Sudanese border and had been dated at 8,000 B.C. From here, domestic cultivation spread throughout Africa. Along the way, the underlying genetic diversity of sorghum allowed the crop to adapt to a wide range of environments, from the highlands of Ethiopia to the semi-arid Sahel.^{xix}

The spread of five different races of sorghum can, in many cases, be attributed to the movement of various tribal groups in Africa. Sorghum then spread to India and China and eventually worked its way to Australia.

Sorghum is justly renowned for its ability to survive on limited moisture and on marginal land subject to lower rainfall and periods of drought. Versatility as a food and feed grain, underpin its importance in the lives of millions of people throughout the world.

The first known record of sorghum in the United States comes from Ben Franklin in 1757, who wrote about its application in producing brooms.

“Because of its versatility and adaptation, “sorghum is one of the really indispensable crops” required for the survival of humankind.” – Jack Harlan, 1971

The hybridization of sorghum commenced much later than other crops such as maize. It was not until the 1950’s when a hybridized variety of sorghum of uniform, short stem height became commercially available.

Currently there are no genetically modified (GM) varieties of grain sorghum, making it attractive to consumers who prefer that trait.

Sorghum promises a steady, less spectacular return than corn for feed grains producers. Consequently, it is grown primarily in arid areas of the plains where corn production must be irrigated to be profitable.

Currently, U.S. sorghum production is concentrated in drier cropping areas of the Central and Southern Plains. The states of Kansas, Texas, Nebraska and Missouri produce approximately 80 percent of the U.S. crop.

SORGHUM PRODUCTION CYCLE: SEASONAL FACTORS

Sorghum's growth habit is similar to that of maize, but with more side shoots and a more extensively branched root system. The root system is very fibrous, and can extend to a depth of up to 1.2 m. The plant finds 75% of its water in the top meter of soil, and because of this, in dry areas, the plant's production can be severely affected by the water holding capacity of the soil. The plants require up to 70–100 mm of moisture every 10 days in early stages of growth, and as sorghum progresses through growth stages and the roots penetrate more deeply into the soil to tap into hidden water reserves, the plant needs progressively less water. By the time the seed heads are filling, optimum water conditions are down to about 50 mm every 10 days. Compacted soil or shallow topsoil can limit the plant's ability to deal with drought by limiting its root system. Since these plants have evolved to grow in hot, dry areas, it is essential to keep the soil from compacting and to grow on land with ample cultivated topsoil.

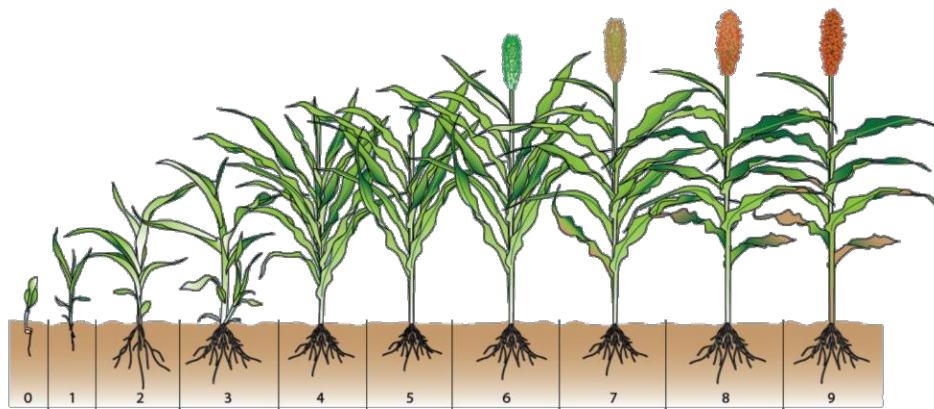
Sorghum requires an average temperature of at least 25 °C to produce maximum grain yields in a given year. Maximum photosynthesis is achieved at daytime temperatures of at least 30 °C. Night time temperatures below 13 °C for more than a few days can severely reduce the plants' potential grain production. Sorghum cannot be planted until soil temperatures have reached 17 °C. The long growing season, usually 90–120 days, causes yields to be severely decreased if plants are not in the ground early enough.

Wild species of sorghum tend to grow to a height of 1.5–2 m; however, due to problems this height created when the grain was being harvested, in recent years, cultivars with genes for dwarfism have been selected, resulting in sorghum that grows to between 60 and 120 cm tall.

Grain sorghum is usually planted with a commercial corn seeder at a depth of 2 to 5 cm, depending on the soil type. The objective is to achieve a plant population of 50,000 to 300,000 plants per hectare. With an expected average emergence rate of 75%, sorghum should be planted at a rate of 2 to 12 kg of seed per hectare.

Yields have been found to be boosted by 10–15% when optimum use of moisture and sunlight are available, by planting in 25 cm rows instead of the conventional 1-meter rows.

Sorghum, in general, is a very competitive crop, and does well in competition with weeds in narrow rows. Sorghum produces a chemical compound called sorgoleone, which the plant uses to combat weeds. The chemical is so effective in preventing the growth of weeds it sometime prohibits the growth of other crops harvested on the same field. To address this problem, researchers at the Agricultural Research Service found two gene sequences believed to be responsible for the enzymes that secrete the chemical compound sorgoleone.^{xx} The discovery of these gene sequences will help researchers one day in developing sorghum varieties that cause less soil toxicity and potentially target gene sequences in other crops to increase their natural pesticide capabilities, as well.^{xxi}



Sorghum Development Stages

Source: Kansas State University Agricultural Experiment Station and Cooperative Extension Service MF3234 October 2015 Ignacio A. Ciampitti, Crop Production and Cropping Systems Specialist, Department of Agronomy, Kansas State University^{xxii}

Stage 0 Emergence: The plant breaks through the soil surface; early growth usually is slow. The time between planting and emergence depends on soil temperature, residue cover and distribution, soil moisture, planting depth, and seed vigor. Adjust planting time so emergence occurs in favorable conditions.

Stage 1 Three-leaf stage: Three leaves are fully expanded with a visible collar (leaf tissue at the junction of the leaf blade and sheath). The growing point is under the soil surface. This stage occurs 10 to 20 days after emergence, depending on soil temperature and moisture.

Stage 2 Five-leaf stage: Five leaves are fully expanded with a visible collar. The growing point is below the soil surface. The plant begins a rapid growth and nutrient accumulation phase. The root system is expanding rapidly. Minimize weed competition from planting through this growth stage. This stage occurs 20 to 25 days after emergence.

Stage 3 Growing point differentiation: Potential leaf number is defined 30 to 40 days after emergence. Maximum plant growth and nutrient uptake rates are achieved. The growing point is above the surface and changes from producing leaves to forming heads.

Stage 4 Flag leaf visible: Rapid stem elongation and increases in leaf area occur at this stage. The final leaf, the “flag leaf,” is visible in the whorl. Potassium uptake is >40%, nitrogen >30%, phosphorus >20%, and total growth is about 20% complete relative to final nutrient content.

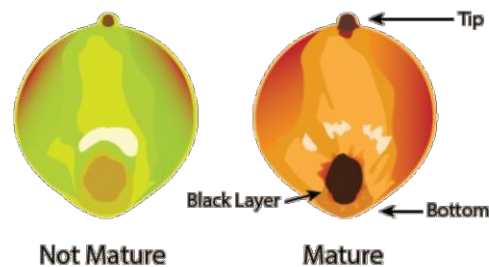
Stage 5 Boot stage: Maximum leaf area has been achieved. Maximum potential head size and seed number has been set. The upper stalk, known as the “peduncle,” begins to elongate. Final size of the peduncle varies with the genotype. This stage occurs 50 to 60 days after emergence.

Stage 6 Half-bloom: Full exertion of the head occurs at this stage and 50% of the plants in the field are in some stage of bloom. For an individual plant, this stage is when the flowering reaches 50% of the head. Total growth is 50% complete. Compared to final nutrient content, nutrient accumulation is 60% for phosphorus, 70% for nitrogen, and >80% for potassium.

Stage 7 Soft-dough: Grain formation begins immediately after flowering and the grain fills rapidly (50% of dry weight). The stem loses weight due to a remobilization process (from stem to grain). Grains are the main priority for the plant; thus, without a good balance between leaves (source) and grain (sink), the duration of grain filling can be shortened. A severe stress at this growth stage can produce lighter and chaffy grains.

Stage 9 Physiological maturity: Grain achieves its maximum dry weight. Mature grain is identified by looking for the dark spot, the black layer, on the bottom of the kernel.

Grain moisture ranges from 25 to 35%. The time to harvest depends on the environmental conditions. Artificial drying can be promoted by the use of desiccants without affecting yield when applied after maturity.^{xxiii}



Insect and diseases are not prevalent in sorghum crops. Birds, however, can be a major source of yield loss. Hybrids with higher tannin content and growing the crop in large field blocks are solutions used to combat the

birds. The crop may also be attacked by corn earworms, aphids, and some Lepidoptera larvae, including turnip moths.

Sorghum demands high amounts of nitrogen. An average hectare producing 6.3 tonnes of grain yield requires 110 kg of nitrogen, but relatively small amounts of phosphorus and potassium (15 kg of each).

Sorghum's yields are not affected by short periods of drought as severely as other crops such as maize, because it develops its seed heads over longer periods of time, and short periods of water stress do not usually have the ability to prevent kernel development. Even in a long drought severe enough to hamper sorghum production, it will still usually produce some seed on smaller and fewer seed heads. Rarely will one find a kernelless season for sorghum, even under the most adverse water conditions. Sorghum's ability to thrive with less water than maize may be due to its ability to hold water in its foliage better than maize. Sorghum has a waxy coating on its leaves and stems which helps to keep water in the plant, even in intense heat.

GRAIN SORGHUM USAGE

Grain sorghum has multiple uses as feed, fodder, fuel and food. In addition to these, many other industrial applications such as health, pharmaceutical diagnosis, packing, synthesis of organic molecules, and utility items have been in place.

Sorghum has a very hard kernel. This makes it resistant to disease and damage but also requires further processing to enhance its feeding efficiency. Sorghum is ground, cracked, steam flaked, roasted, micronized or reconstituted. Such processing will enhance the nutritional value of sorghum by 12 to 14 percent.

An important component global sorghum usage is in the production of Chinese Baijiu. Baijiu is a clear liquid usually distilled from fermented sorghum that is between 35% and 60% alcohol by volume. Each type of baijiu uses a distinct type of fermentation unique to the distillery for the distinct and characteristic flavor profile.

A resurgence in global demand for sorghum began to increase dramatically between 2014 and 2016, when China began purchasing US sorghum crops to use in both Baijiu production, as well as livestock feed. It is the demand for Chinese Baijiu production that frequently adds a significant premium to the market price.

FEED

Sorghum is a competitive feed ingredient in many feed rations. In the United States, Mexico, South America and Australia, grain sorghum is a principal feed ingredient for both cattle and poultry rations. Due to a number of its unique characteristics, grain sorghum is also included in the formulation of pet feed for dogs, fish, etc.

In the U.S., the swine industry is not a significant consumer of grain sorghum as the production of pigs is geographically located closer to the major corn producing areas of the Corn Belt.

Historically, sorghum was prized for its tannin content because high-tannin sorghum is not palatable to wild birds. Tannin, an acidic complex found in sorghum, can affect both the palatability and nutritional value. Such sorghum may still be grown in areas of the world where birds are a threat to the crop. However, in the United States, sorghum has long been bred to reduce the tannin content. Today, tannin content in U.S. grain sorghum is no longer a concern.

ENERGY AND INDUSTRIAL

Sorghum can also be utilized in the energy and industrial sectors, being processed into ethanol and related co-products. Sorghum is directly substituted for corn as a feed stock in the milling process.

Depending on relative price relationships to corn, grain sorghum will often price itself into the ethanol grind for many corn processors.

See the following section on the Milling Process for more information...

FOOD

Sorghum is an important food crop, especially for subsistence farmers in arid, less developed regions of the world. It can be used to make such foods as sorghum flour, couscous, porridge and molasses.

Popcorn (for size comparison) left, and popped sorghum seeds, right
In South Africa, sorghum meal is often eaten as a stiff porridge much like pap. In Ethiopia, sorghum is fermented to make injera flatbread, and in Sudan it is fermented to make kisra^{xxiv}. In India, dosa^{xxv} is sometimes made with a sorghum-grain mixture. In Arab cuisine, the unmilled grain is often cooked to make couscous, porridges, soups, and cakes.

Sorghum is a non-GMO, gluten free, ancient grain that is gaining popularity as a food grain for people residing in Asia and Africa. Because of

sorghum's gluten free properties, it has become a whole grain alternative for those who deal with gluten intolerance or celiac disease.

As there are currently no genetically modified (GM) varieties of grain sorghum, the grain has become increasingly attractive to consumers who prefer these traits.

A major use of grain sorghum can be found in China, where sorghum is an important ingredient for the production of distilled beverages, such as baijiu, maotai and kaoliang wine.

Baijiu (Chinese: 白酒), also known as shaojiu, is a colorless white liquor usually distilled from fermented sorghum, although other grains may be used. The liquor is typically between 35% and 60% alcohol by volume.
xxvi

Baijiu is comparable to whisky in terms of variation, complexity of flavor and sensation. Each type of baijiu uses a distinct type of "qū" (曲/麴) (*a type of East Asian dried fermentation starter grown on a solid medium and used in the production of traditional Chinese alcoholic beverages*) for fermentation that produces distinct characteristics and a unique flavor profile. The qū starter culture used in the production of baijiu is usually made from pulverized grain.^{xxvii}

PRODUCTS OF THE MILLING PROCESS

Both dry-milling and wet-milling processing methods can be used in the production of ethanol, resulting in a variety of economically valuable coproducts. Three important animal feed products coming from the corn milling process include:

- Distillers Grains
- Corn Gluten Meal
- Corn Gluten Feed

Distillers Grains – Cereal byproducts of the distillation process. Their resulting feed values and quality analysis is influenced by the type of feed stock, whether that be corn, barley, grain sorghum, rice or wheat, or other grains, as well as the underlying milling process. The products are created by the milling process of distillation, and are subsequently sold for a variety of purposes, usually as a feed stuff for the livestock sector, especially ruminants.

There are two main sources of these grains. The traditional sources were from brewers. Brewer's spent grain usually refers to barley produced as a byproduct of brewing. More recently, the ethanol biofuel industry is now the primary source of these products as a byproduct of corn and/or grain sorghum. The mash left over from the process contains nutrients, such as protein, fiber, germ, vitamins, and minerals.

Corn-based distillers grains from the ethanol industry are commonly sold as a high protein livestock feed that increases efficiency and lowers the risk of subacute acidosis in beef cattle.

Wet Distillers Grains (WDG) – contains primarily unfermented grain residues (protein, fiber, fat and up to 70% moisture). Quality and analysis can vary significantly by supplier. WDG has a shelf life of four to five days. Due to the water content, WDG transport is usually economically viable within 200 km of the ethanol production facility.

Dried Distillers Grains with Solubles (DDGS) – is WDG that has been dried with the concentrated thin stillage to 10–12% moisture. Quality and analysis can vary significantly by supplier. DDGS have an almost indefinite shelf life and may be shipped to any market regardless of its proximity to an ethanol plant. Drying is costly, as it requires further energy input. In the US, it is packaged and traded as a commodity that competes with other protein feed stuffs.

Corn Gluten Meal – is a byproduct of corn processing that has historically been used as an animal feed. Despite the name, corn gluten does not contain true gluten, which is formed by the interaction of gliadin and gluten in proteins. The meal is a combination of bran fibers and the corn oil cake left from the extraction of corn oil, has protein content in excess of 60% and is a low-cost alternative to soybean meal or other expensive protein sources.

Corn gluten meal is commonly used as livestock feed containing about 65% crude protein. It can be a source of protein, energy, and pigments for livestock, and is used in pet foods for digestibility.^{xxviii} Quality and analysis can vary significantly by supplier.

Poultry feeders particularly value corn gluten meal because of the presence of xanthophyll, a pro-vitamin which determines corn's pigmentation and enriches the yellow color in a chicken's skin and eggs.

Corn Gluten Feed – is a result of gluten, removed from the heavier starch, being combined with bran from the hull to make a feed ingredient that dairy cattle and sheep find particularly palatable.

Corn gluten feed has approximately 22% crude protein and is a mixture of bran, steep liquor, and maize germ oil from the milling process. Quality and analysis can vary significantly by supplier.

For further information contact:

National Grain Sorghum Producers

P.O. Box 5309

4201 North Interstate 27

Lubbock, TX 79403 U.S.A.

Phone: (806) 749-3478

Fax: (806) 749-9002

Email: info@sorghumgrowers.com

Website: www.sorghumgrowers.com

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Philip Shull
Senior Diplomat (Ret)
U.S. Department of Agriculture

ⁱ ["The Evolution of Corn"](http://learn.genetics.utah.edu/content/evolution/corn). University of Utah Health Sciences
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^x Kansas State University Agricultural Experiment Station and Cooperative Extension Service MF3305 June 2016 Ignacio A. Ciampitti, Crop Production and Cropping Systems Specialist, Department of Agronomy, Kansas State University

^{xi} USDA FAS PS&D Online "Production, Supply & Demand" Market and Trade Data Website: <https://apps.fas.usda.gov/psdonline/app/index.html#/app/compositeViz> Accessed 31 December 2021

^{xiii} USDA FAS PS&D Online "Production, Supply & Demand" Market and Trade Data Website: <https://apps.fas.usda.gov/psdonline/app/index.html#/app/compositeViz> Accessed 31 December 2021

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- xiii USDA FAS PS&D Online “Production, Supply & Demand” Market and Trade Data Website: <https://apps.fas.usda.gov/psdonline/app/index.html#/app/compositeViz> Accessed 31 December 2021
- xiv USDA FAS PS&D Online “Production, Supply & Demand” Market and Trade Data Website: <https://apps.fas.usda.gov/psdonline/app/index.html#/app/compositeViz> Accessed 31 December 2021
- xv The Zadoks Growth Scale is a 0-99 scale of development that is recognized internationally for research, advisory work and farm practice, particularly to time the application of chemicals and fertilizers.
- xvi The Feekes Growth Scale is a numbering system 1 through 11 with each number representative of a new growth event in cereal grains. Each number may be further divided by using decimals to further describe a given stage.
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- xxi "[Tapping into Sorghum's Weed Fighting Capabilities to Give Growers More Options : USDA ARS](#)". *www.ars.usda.gov*. Retrieved 2021-07-27. Accessed 29 December 2021
- xxii Kansas State University Agricultural Experiment Station and Cooperative Extension Service MF3234 October 2015 Ignacio A. Ciampitti, Crop Production and Cropping Systems Specialist, Department of Agronomy, Kansas State University
- xxiii Kansas State University Agricultural Experiment Station and Cooperative Extension Service MF3234 October 2015 Ignacio A. Ciampitti, Crop Production and Cropping Systems Specialist, Department of Agronomy, Kansas State University
- xxiv Kisra is a popular thin fermented bread made in Chad, Sudan and South Sudan. There are two different forms of kisra: thin baked sheets, known as kisra rhaheefa, which is similar to injera; and a porridge known as kisra aseeda or aceda.
- xxv A dosa is a thin pancake or crepe originating from South India, made from a fermented batter predominantly consisting of lentils and rice. It is somewhat similar to a crepe in appearance, although savoury flavours are generally emphasized
- xxvi "[The World's Most Consumed Alcohol Is One You Might Not Have Tried. But It's Coming to a Bar Near You](#)" Accessed 20 January 2022

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Food, Seed and Industrial Uses for Grains

Man has been harvesting grain for centuries. Beyond the geographic diversity inherent in the production and distribution of whole grains across the agricultural supply chain lies a wide and expanding variety of grain-based consumer products. While it only long been a basis for human food and livestock feed, there is a wide range of products that continues to expand to this day. These range from food products, vegetable oils, starch derived products, to biofuels, such as ethanol, gasohol, and biodiesel, along with alcoholic beverages, including beer and whiskey. There are well over 1,000 grain-based products that can be found in the local supermarket, in addition to a broader range of grain-based products that can be found in the industrial sector.

The current list of uses for grain is long and wide and varied. This broad and evolving variety of grain-based products all contribute to market demand and the subsequent price of grains. Thus, it is essential for anyone working in the grain trade to develop a basic understanding of how the many uses for grain drive demand. Analysts typically divide demand for grain into the broad categories of:

- **Food, Seed and Industrial (FSI)** – Currently, FSI uses of grains in the U.S. account for about one-third of total domestic use.
- **Feed** – Feed use includes food consumed by animals. Coarse grains, (corn, barley, sorghum, oats, millet, triticale, and other cereal grains), are a major component of livestock feed. Demand is closely related to the number and types of animals (beef cattle, dairy cattle, swine, poultry, aquiculture, and companion animals) consuming feed within the livestock sector. The volume and type of grain and feed stuffs used that make up a feed ration greatly depends on their specific use, as well as their relative price relationships.

Quantifying feed demand can be a challenge for market analysts. Feed use is a derived demand, as the lack of detailed data makes it is

*Current
Food,
Seed and
Industrial
Uses*

difficult to quantify. As such, the numbers in the data are generally implied.

- **Residual** – Residual use refers to use for “left-over things”. It refers items such as shrink, spoilage and waste, in addition to what remains unaccounted for within the supply chain pipeline.

In many tables and charts showing supply and demand statistics, “Feed and Residual” are combined into a single number as both are implied in the data.

- **Exports / Imports** – Trade, or the combination of exports and imports makes up an important component of market analysis. Trade moves inventories of grain from areas of surplus into deficit areas where demand exceeds available local supply.

Corn is the largest component of global coarse grain trade, and includes corn, sorghum, barley, oats, rye, millet, and mixed grains. Corn generally accounting for about two-thirds of the volume over the past decade.

The United States is the world's largest corn producer and exporter, currently exporting between 10 and 20 percent of its annual production, and making up approximately one-third of global corn exports. As such the size of the U.S. harvest has a major impact on global corn prices. Other major corn exporting countries include Brazil, Argentina, and the Ukraine.

In this chapter we are going to take a closer look at the food, seed and industrial uses of grains.

FOOD

The use of grains in the production of food products varies greatly and comprises an important component of demand. Grains are the dominant or essential ingredient in products like flours, noodles, starch, grits, meals, extruded and other breakfasts, dextrose, fructose, corn oil, distilled beverages, and beer, just to name a few.

The proliferation of food products and food ingredients made from corn has combined with population growth to help drive the sharp increase in global corn consumption over the past century. This growth has occurred even in countries where rising incomes have resulted in lower per capita consumption of food grains such as wheat and rice.

As new food uses for corn and other grains multiply, global demand for

these grains is likely to grow.

SEED

Seed use is primarily determined by the intended planted area for the upcoming cropping year. While corn seed is often of very high value and can play a critical role in expanding and maintaining production, corn seed is a very small component of the corn trade volumes. Moreover, year on year demand for corn seed has historically been very stable.

INDUSTRIAL USES

The use of grains in processing and manufacturing for industrial uses makes up a large and important component of demand. By far the largest component of this sector is the fuel ethanol industry, but also includes demand from a wide arrange of products, including starch, and industrial alcohol, along with many other inedible uses.

THE MILLING PROCESS

An industrial milling process will strive to improve the resulting product's functionality, as well as maximizing the yield of product obtained from the original ingredients and inputs.

Milling will use of mechanical energy to break down particles through various mechanical processes, including a grinding media, pegs, rods, pebbles, and screens. As the grain passes through the mill, the mill's mechanical components act on the solid particles in the mixture to tear them apart or crush them, further reducing them in size.

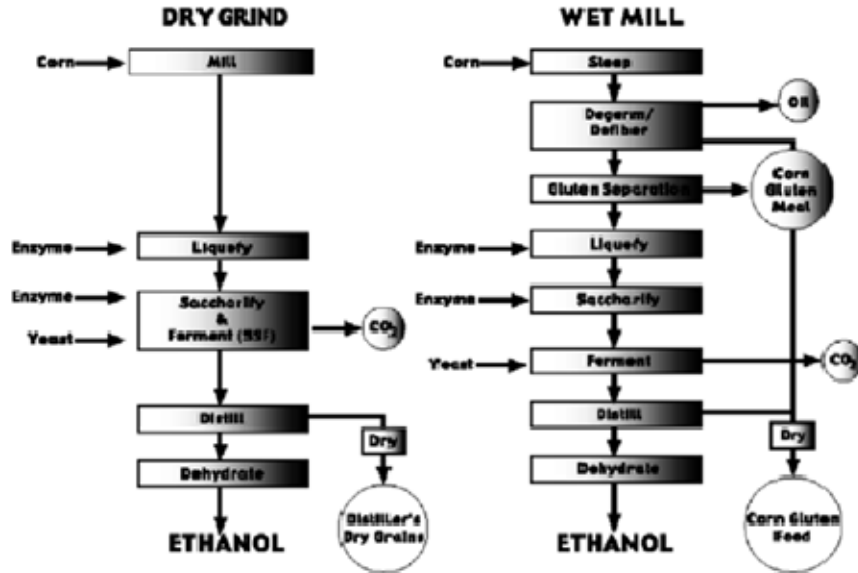
An industrial milling process will strive to improve the resulting product's functionality, as well as maximizing the yield of product obtained from the original ingredients and inputs.

During processing, corn is either dry or wet milled depending on the desired end products:

- **Dry Millers:** Dry milling is essentially a simple grinding procedure that breaks up the whole grain. It is used to process grains into flakes for cereal, corn flour, corn grits, corn meal, and brewers' grits for beer production.
- **Wet Millers:** Wet milling involves dispersing the material in a liquid and using solid, grinding elements to reduce grain size. It is used to

process grains into high fructose corn syrup (HFCS), glucose and dextrose, starch, corn oil, beverage alcohol, industrial alcohol, and fuel ethanol.

Dry Milling vs Wet Milling Processes for Ethanol Production



Source: Bothast and Schlicher, 2005

Products can be broken down through either one of these processes. To understand the difference between the two processes, and the challenges that come with each, we first need to gain an understanding of the basics of milling.

DRY MILLING

Dry milling is essentially a simple grinding procedure that typically uses particle-on-particle contact to reduce materials' size. The grain is cleaned; then, through the use of steam, the moisture content is raised to around 20% to improve the milling process. The germ of the grains are usually removed for oil extraction, and the remaining grain is ground and sieved into many fractions varying in particle size and composition.

Dry milling utilizes no liquid element, and is most frequently used to produce dry materials like powders and granules, or to “de-agglomerate” and “de-lump” bulk materials. Dry milling is a less intensive process, which often makes it the first method considered for milling.

Currently, dry milling is primarily used to produce corn-based products for human and animal consumption, as well as for ethanol production.

This process is widely associated with the development of new bio-based associated by-products.

The primary products are flour, cornmeal and grits (ground corn with a particle size larger than typical cornmeal). Other products include corn bran, corn oil, and feed mixtures. These products are then utilized as ingredients or raw materials to manufacture other consumer and industrial based products.

Characteristics for corn ideally suited for dry milling are readily identifiable. The best corn for dry-milling has larger-sized kernels, low kernel size variability, harder kernel texture, and higher protein content. The harder type dent corns or flint corns have characteristics that are very well suited for dry milling. Harder corn is desired because when a kernel is dry milled it does not easily break (or crumble) like a soft textured corn. This results in larger yields of what is traditionally the highest value product: flaking grits.

Flaking grits are composed of nearly whole kernels of corn (minus the germ or oil fraction) that can subsequently be used to produce corn flakes. The larger the single piece of unbroken corn, the larger (and more desirable) the flake. Breakfast cereal manufacturers pay a premium for this dry-milled fraction.

PROCESS OVERVIEW

Dry Milling

Steps in Dry Milling: The main objective of the dry-milling process is to separate the endosperm, which is mainly composed of starch, from the germ and pericarp fibers. The milling process separates the grain into four distinct physical components: 1) the germ, 2) flour, 3) fine grits, 4) coarse grits. The separated materials are then further processed into food products utilized for human and animal consumption.

Tempering: Tempering is used to help separate the germ from the endosperm (i.e. the rest of the kernel). First, the grain is conveyed into a chamber and mixed with water or steam to hydrate the material for 10 to 30 minutes. This tempering process creates a differential in the moisture content between the germ and the endosperm. The difference in moisture absorption results in different rates of swelling, allowing more efficient separation of these two components due to the differential swelling of germ and endosperm. Another key benefit of tempering is that it makes the germ more flexible and resilient, without causing any movement of material out of kernel.

Degermination: The objective of degermination is to break down kernel to pericarp, endosperm, and germ.

Aspiration: Using air to separate the pericarp from the mixture of endosperm and germ. The process separates the components of a mixture based on differences in “particle terminal velocity,” which is affected by size, shape and density.

Gravity Separation: Separates the germ from the endosperm based on differences in specific weight.

Milling and Sifting: using cylindrical rollers, hammer mill or ball mills for grinding materials. Sifting is then used to adjust the distribution of endosperm particles.

Oil Recovery: There are two methods for oil recovery used in dry milling: 1) Expelling, which is simple and inexpensive, but not commercially used in the U.S. for corn germ oil recovery due to its low oil yield and the presence of residual oil in solid products; 2) Extraction which is most commonly used, although it is more expensive, due to its high oil yield and lower residual oil.

WET MILLING

Wet milling is a complex industrial process, also known as wet grinding. Today, most wet milling facilities have the capacity to process approximately 100,000 bushels (2,250 mts) or more of corn per day. The primary product is starch and starch derived chemicals.

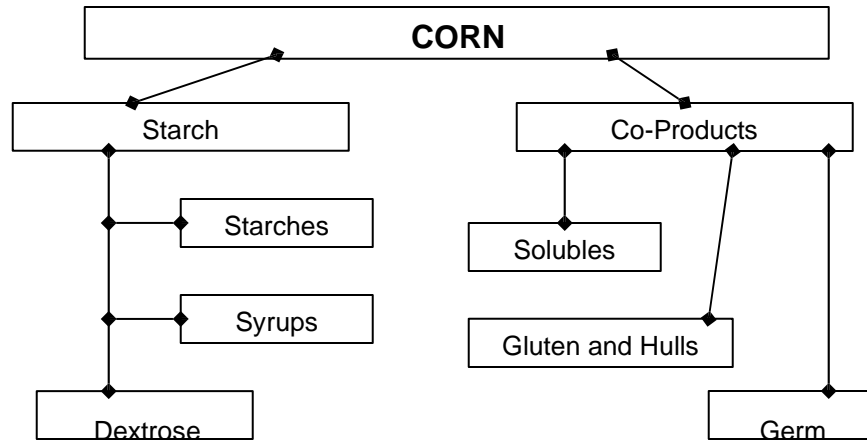
In wet milling, the grain is steeped in water, with or without sulfur dioxide, to soften the seed kernel to help separate the kernel’s various component. Once the particles are suspended in a liquid slurry, they are dispersed in that liquid by shearing or crushing. Once the milling process is complete, these particles are ready for use or can be dried and separated for incorporation into additional products.

Wet milling is more complex than dry milling, due to the addition of a liquid; however, the process can also reduce a product into finer particles. This allows for the production of a greater variety of byproducts and can result in improved physical properties in your final product.

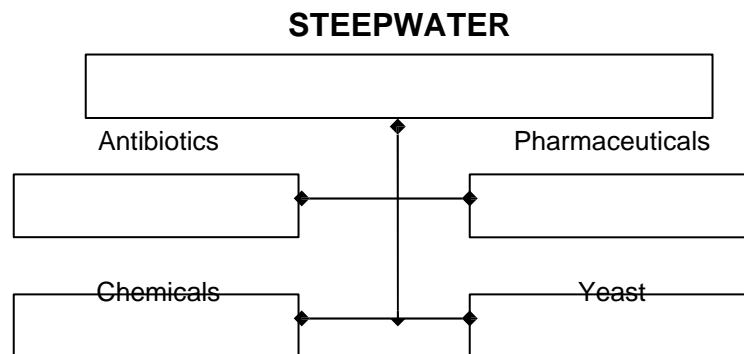
While dry milling is a less intensive process, which often makes it the first method considered, wet milling is the best and most efficient way to get to your preferred particle size if extremely small particles are your goal.

For example, wet-milling plants can separate a 56-pound bushel of corn into more than 31 pounds of cornstarch (which in turn can be converted into corn syrups or corn ethanol), 15 pounds of corn gluten meal for use in animal feed, and nearly 2 pounds of corn oil.

The Wet Milling Process



Upon arriving at a processing plant, each load of corn passes through a cleaner that removes foreign material and other impurities. Then the corn is soaked for 36 to 48 hours in hot water and sulfur dioxide. This process softens the protein (gluten) within the starch matrix while also toughening the germ.

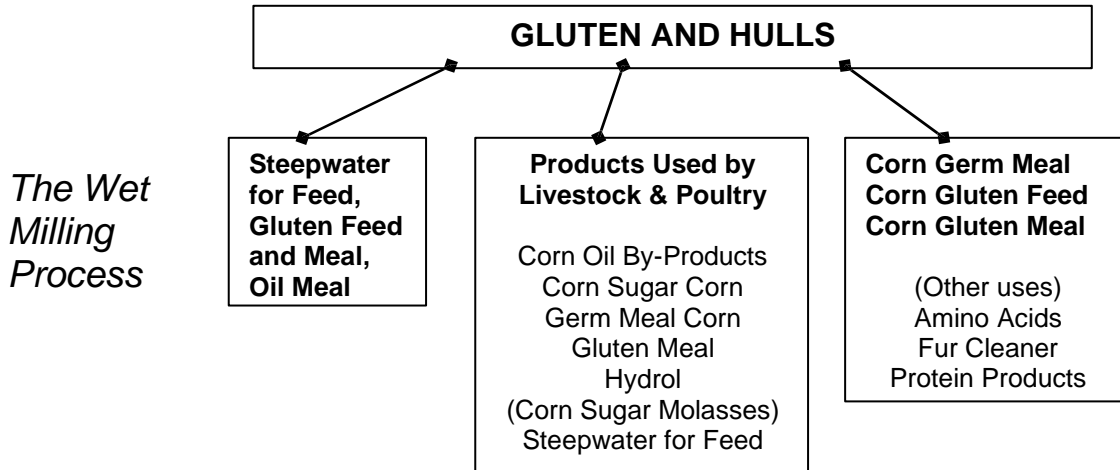


The softened corn kernel moves on to the degerminating mills and the resultant water-based mixture is called steep water. Steep water is highly nutritious and can be further processed for various uses. This additional processing consists of dismembering the weakened kernel and separating the bran. Then, the aqueous mixture of parts moves on to floatation tanks where a centrifugal hydrocyclone separates the heavier parts from the lighter germ.

The lighter germ is then crushed for its oil content. After the oil is removed, the remaining material is called, among other names, “corn oil cake,” and

is ground into meal.

What remains after the germ is removed is first filtered and then returned to a high-speed centrifuge. In the centrifuge, gluten is separated from the mixture and removed. The gluten, as much as 70 percent protein, is mixed with the bran and/or the germ residue to become corn gluten meal or corn gluten feed.



Finally, with the gluten removed, the corn miller is left with the industrial heart of the corn kernel, the starch, or any feed grain that is refined through this process.

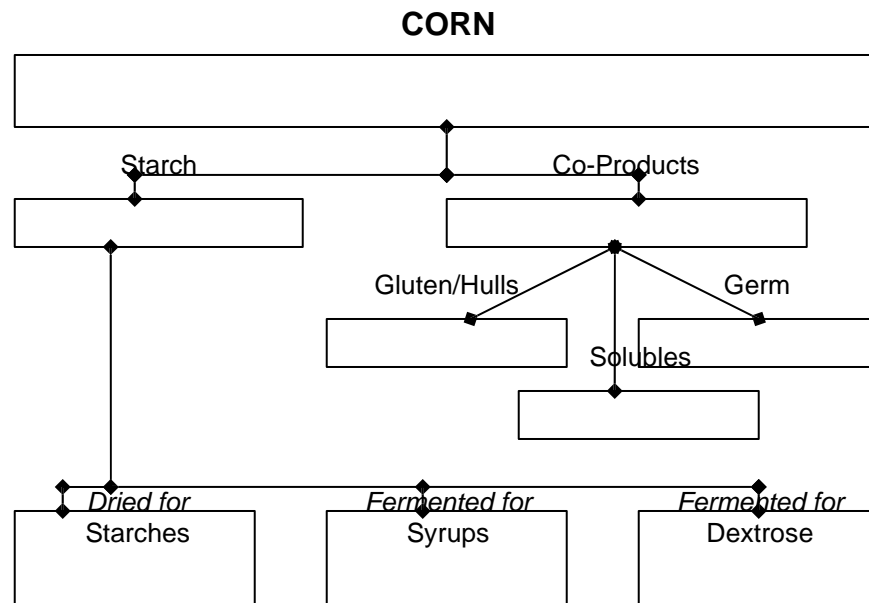
There are few readily identifiable corn traits that directly relate to increased starch yield. Many chemical and physical corn quality tests fail to adequately predict the performance of particular corn hybrids. The only clear corn kernel characteristics that result in higher yields of starch for wet millers are large kernels that are softer (i.e., more "floury") in texture.

THE WONDERS OF STARCH

Derived from the endosperm of grain, starch is the feedstock that yields nearly all current industrial feed grains products. From starch comes the vast array of industrial products created over the years by public and private sector research chemists.

Corn starch, or corn flour, is the starch derived from corn. The starch is obtained from the endosperm of the kernel. Although mostly used for cooking and as a household item, corn starch is used for many purposes in several industries, ranging from its use as a chemical additive for certain products, to medical therapy for certain illnesses.

The Wonders of Starch



In food, corn starch is a common food ingredient, often used to thicken sauces or soups, and to make corn syrup and other sugars.

However, corn starch is versatile and easily modified, which means it has many industrial uses as well; such as adhesives, in paper products, as an anti-sticking agent, and textile manufacturing, just to name a few. Corn starch can be used to manufacture bioplastics which may be used in a variety of plastic goods. In addition, it has medical uses as well, such as supplying glucose to people with glycogen storage disease.

However, like many other products found in fine granule, powder form, corn starch can present a hazard due to its flammability and potentially explosive nature.

ETHANOL

Ethanol is naturally produced through a biological fermentation of sugars by yeasts or via petrochemical processes such as ethylene hydration. Both dry-milling and wet-milling processing methods can be used in the production of ethanol, resulting in a variety of economically valuable coproducts.

A major use of grains, and more specifically corn, in the U.S. is in the production of ethanol (ethyl alcohol) as a first-generation liquid biofuel. It is most often used as a motor fuel, mainly as a biofuel additive with gasoline. Ethanol-blended fuel is widely used in Brazil, the United States, and is rapidly expanding elsewhere.

Most cars on the road in the U.S. today can run on blends of up to 10% ethanol. Ethanol represented 10% of the U.S. gasoline fuel supply derived from domestic sources. In the U.S. corn ethanol is typically blended with gasoline to produce “gasohol,” an automotive fuel that is 10% ethanol. Some flexible-fuel vehicles are able to use up to 100% ethanol.

In addition to its use as a biofuel, there is also a large number of food and industrial uses for ethanol. Ethyl alcohol is the same type of alcohol found in alcoholic beverages, used as fuel. Grain can be fermented into a number of alcoholic beverages, notably bourbon and whiskey. Pure and denatured alcohol are used in the production of flavor extracts and concentrates for soft drinks and food products, distilled white vinegar, personal care products such as mouthwash, hair sprays, astringents, colognes and perfumes, and a wide range of chemical and pharmaceutical intermediates. It can also be used as a chemical solvent and in the synthesis of other organic compounds.

Ethanol

Uses of Grain Ethanol

- ✓ Alcoholic beverages
- ✓ Industrial alcohol
- ✓ Octane enhancer
- ✓ Oxygenate in motor fuels

COPRODUCTS OF THE MILLING PROCESS

Other Grain Co-Products from the Gluten and Hulls Used by Livestock, Poultry and Dairy:

- ✓ Corn germ meal
- ✓ Corn gluten feed
- ✓ Corn gluten meal
- ✓ Corn oil by-products
- ✓ Corn sugar (crude and refined)
- ✓ Hydrol (corn-sugar molasses)
- ✓ Steepwater for feed (condensed fermented corn extractives)
- ✓ Corn Germ Meal, Corn Gluten Feed, Corn Gluten Meal
- ✓ Other Uses
- ✓ Amino acids
- ✓ Fur cleaner
- ✓ Zein and other protein products

Three important animal feed products coming from the corn milling process include:

- Distillers Grains
- Corn Gluten Meal
- Corn Gluten Feed

Distillers Grains – are cereal based byproducts, or coproducts, of the distillation process. The resulting feed values and quality analysis is influenced by the type of feed stock, i.e. corn, barley, grain sorghum, rice or wheat, or other grains, as well as by the underlying milling process. The products are created by the milling process of distillation, and is subsequently sold for a variety of purposes, usually as feed stuffs for the livestock sector, especially ruminants.

There are two main sources of these grains. The traditional sources were from brewers. Brewer's spent grain usually refers to barley produced as a byproduct of brewing. More recently, the ethanol biofuel industry is now the primary source of these products as a byproduct of corn and/or grain sorghum. The mash left over from the process contains nutrients, such as protein, fiber, germ, vitamins, and minerals.

Corn-based distillers grains from the ethanol industry are rich in the protein, fat, minerals, yeast, and vitamins that animals need, making them a very popular feed ingredient for cattle, swine and poultry alike. They are marketed as DDGS, modified distillers grains with solubles (MDGS), wet distillers grains with solubles (WDGS), or condensed distillers solubles (CDS or corn syrup).

In the U.S. cattle account for nearly 80% of DDGs consumption (50% attributed to beef cattle and 30% attributed to dairy cattle) and are a very important customer of this co-product. Cattle producers recognize the product as an economically beneficial, nutritionally valuable source of protein and energy. Research has found that increasing DDGS inclusion rates increases average daily gain and lowers the risk of subacute acidosis.

Increasingly, distillers grain products are being used in swine, poultry, and aquaculture feeds. New products require continuing research and feeding trials to determine nutritional value and performance response. There is much more to come within the next generation feed products. It is important to remember the value of current distillers grains products.

Wet Distillers Grains (WDG) – contains primarily unfermented grain residues (protein, fiber, fat and up to 70% moisture). Quality and analysis can vary significantly by supplier. WDG has a shelf life of four to five

*Coproducts
of the
Milling
Process*

days. Due to the water content, WDG transport is usually economically viable within 200 km of the ethanol production facility.

Dried Distillers Grains with Solubles (**DDGS**) – is WDG that has been dried with the concentrated thin stillage to 10–12% moisture. Drying is costly, as it requires further energy input. Each 56-pound bushel of corn used in dry-mill ethanol production generates approximately 17.4 pounds of DDGS.

It is important to note that due to differing inputs of feedstock, along with differing milling processes in each plant, product quality and analysis can vary significantly by supplier and point of origin. This will subsequently impact the underlying value proposition.

DDGS are currently the most prominent of the coproducts. Its primary use is as a feed ingredient for livestock. In the US, it is packaged and traded as a commodity that competes with other feed stuffs and a source of protein. It is part of the feed ration in both dairy and beef production. However, increasingly larger quantities of DDGS are making their way into swine and poultry feed rations.

Because it is a dry product, DDGS have an almost indefinite shelf life and may be shipped a distance to many markets regardless of its destination's proximity to an ethanol plant. As such, DDGS are well suited for exports to a wide range of destinations around the world.

Corn Gluten Meal – is a byproduct of corn processing that has historically been used as an animal feed. Despite the name, corn gluten does not contain true gluten, which is formed by the interaction of gliadin and gluten in proteins. The meal is a combination of bran fibers and the corn oil cake left from the extraction of corn oil, has protein content in excess of 60% and is a low-cost alternative to soybean meal or other expensive protein sources.

*Coproducts
of the
Milling
Process*

Corn Germ – Corn germ is a dried co-product of the corn wet milling process, and is obtained after the coarse grinding of the corn kernel. During the wet milling process, the germ is isolated from the starch using cyclone separators, washed, and dried. It consists principally of the germs, containing the corn oil

Corn germ has a medium protein level feed stuff and is an excellent energy source. Furthermore it has good hydration and pelleting qualities.

Corn Germ Oil – Corn germ oil is a by-product of the corn oil milling process. The dried germ contains about 50% oil, in which the oil constitutes about 85% of the total amount of oil present in the corn. The

oil is produced by first expelling the germ and then extracting the expeller cake with n-hexane. Crude corn oil can be dark reddish in color. It is refined further by alkali neutralization followed by bleaching, dewaxing, and deodorization or by degumming, bleaching dewaxing and steam refining. The dewaxing step is only necessary when the corn oil is to be sold as salad oil.

Corn Co-Products from the Germ:

Corn Oil, Refined - Food, Drug Uses

- ✓ Carriers for vitamins and other medicinal preparations
- ✓ Cooking oil
- ✓ Margarine
- ✓ Mayonnaise
- ✓ Potato chips
- ✓ Salad dressing
- ✓ Sauces, seasoning
- ✓ Shortening
- ✓ Soups

*Coproducts
of the
Milling
Process*

Corn Oil and Free Fatty Acids - Industrial Uses

- ✓ Chemicals and insecticides
- ✓ Lecithin (for pharmaceuticals, cosmetics, linoleum, printing inks, etc.)
- ✓ Paint and varnish
- ✓ Rubber substitutes
- ✓ Rust preventative (surface coatings)
- ✓ Soap
- ✓ Soluble oil (leather and tanning use)
- ✓ Textiles

FOOD PRODUCTS AND USES OF CORN

Corn is the third largest plant-based food source in the world. It is a major food in many parts of the world. Unlike many other cereal grains, corn flour is gluten-free and cannot be used alone to make rising breads.

In the United States and many other places, sweet corn is boiled or roasted on the cob, creamed, converted into hominy (hulled kernels) or meal, and cooked in corn puddings, mush, polenta, griddle cakes, cornbread, and scrapple. It is also used for popcorn, confections, and various manufactured breakfast cereal preparations. It is widely used in Latin American cuisine to make masa, a kind of dough used in such staple foods as arepas, tamales, and tortillas,

Most corn starch is used in the baking industry to improve the texture and delicacy of cakes. It does this by making the batter harder in nature and accordingly making this starch the most appropriate for use in the planning of cakes. It is also used to thicken sauces, puddings, and flavors. Corn starch powder is known for giving high qualities to ice cream, as well as salad dressings, pastries, and other such sweet food.

Food, Drug or Cosmetic Uses of Corn

(liquid or dried form)

- ✓ Baby foods
- ✓ Baking powder
- ✓ Bakery products (biscuits, bread, crackers, rolls, biscuits, doughnuts, pies, cakes, cookies, pretzels, etc.)
- ✓ Beverages, brewed (beer, ale, etc.)
- ✓ Beverages, carbonated
- ✓ Breakfast foods
- ✓ Caramel color
- ✓ Catsup, chili sauce, tomato sauce
- ✓ Cereals, prepared
- ✓ Cheese spreads and foods
- ✓ Chewing gum
- ✓ Chocolate products
- ✓ Citric acid
- ✓ Citrus juices
- ✓ Coffee whiteners
- ✓ Coloring, pure food mix
- ✓ Condensed milk, sweetened
- ✓ Confectionery
- ✓ Cordials and liqueurs
- ✓ Cream, frozen
- ✓ Dairy products
- ✓ Desserts
- ✓ Doughnuts (cake, yeast)
- ✓ Eggs, frozen or dried
- ✓ Extracts and flavors
- ✓ Fish, pickled
- ✓ Flavoring extracts
- ✓ Flours, prepared (including prepared mixes)
- ✓ Food acids
- ✓ Frostings and icings
- ✓ Fruit butters and juices
- ✓ Fruit drinks
- ✓ Fruits (canned, candied, fillings, frozen, etc.)

*Food
Products
and Uses
of Corn*

*Food
Products
and Uses
of Corn*

- ✓ Gelatin desserts
- ✓ Gravies and sauces
- ✓ Ice cream, water ices and sherbets
- ✓ Infant and Invalid feeding
- ✓ Jams, jellies, marmalades and preserves
- ✓ Lactic Acid
- ✓ Licorice
- ✓ Malted products
- ✓ Marshmallows and related products
- ✓ Meat products (bacon, bologna, ham, sausage, etc.)
- ✓ Medicinal preparations (drugs, pharmaceuticals)
- ✓ foods, pie fillings, toppings, etc.)
- ✓ Peanut butter
- ✓ Peas, canned
- ✓ Pectin, fruit
- ✓ Pickles and pickle products
- ✓ Prepared Mixes (cakes, frosting, icings, infant foods, pie fillings, pudding, etc.)
- ✓ Powders (ice cream, prepared dessert, pudding, summer drink, etc.)
- ✓ Mustard, prepared
- ✓ Pickles and pickle products
- ✓ Pie filling
- ✓ Precooked frozen meals
- ✓ Peanut butter
- ✓ Salad dressing
- ✓ Sauces (Catsup, seasoning, specialty, tomato, etc.)
- ✓ Seafood, frozen
- ✓ Soups, dehydrated
- ✓ Spices and mustard preparations
- ✓ Sugar, powdered
- ✓ Syrups (table, chocolate, cocoa, fruit, medicinal, soda fountain, cordials, etc.)
- ✓ Toppings
- ✓ Vegetables, canned
- ✓ Vinegar
- ✓ Wine
- ✓ Xanthan gums
- ✓ Yeast

Cosmetic, Drug or Personal Care Uses of Corn

(liquid or dried form)

- ✓ Antibiotics
- ✓ Aspirin

- ✓ Dietetic preparations
- ✓ Distillation products
- ✓ Drugs (fermentation process)Food and drug coating
- ✓ Medicinal preparations and intravenous (injections, pills, tablets, drugs, etc.)
- ✓ Mouthwash
- ✓ Toothpaste

Hydrol Corn-sugar molasses

- ✓ Leather tanning
- ✓ Livestock feed
- ✓ Organic acids
- ✓ Organic solvents
- ✓ Tobacco

Corn oil, a valued type of vegetable oil for its bland flavor and light color, is used primarily in the food sector. Corn oil can be converted into margarine by hydrogenation, a process in which the oil is combined with hydrogen at high temperature and pressure in the presence of a catalyst. It is favored as a salad oil and frying oil because it contains little cholesterol.

Corn Oil, Refined – Food and Drug Uses:

- ✓ Carriers for vitamins and other medicinal preparations in capsule form
- ✓ Cooking oil
- ✓ Margarine
- ✓ Mayonnaise
- ✓ Potato chips
- ✓ Salad dressing
- ✓ Sauces, seasoning
- ✓ Shortening
- ✓ Soups

*Food
Products
and Uses
of Corn*

INDUSTRIAL PRODUCTS AND USES OF CORN

The industrial uses for grain make up an import sector of demand. While in the United States, ethanol production makes up the largest component of this sector, there is a wide variety of other industrial uses. Corn starch can be used to manufacture bioplastics, as well in the production of paper and textiles. It may be used as an adhesive in book and paper conservation. Adhesive made from corn starch dry with a slight sheen comparable to wheat starch.

The following is an incomplete list of industrial uses:

Industrial Uses

- ✓ Acids, commercial (lactic, acetic, gluconic, etc.)
- ✓ Adhesives
- ✓ Amino acids
- ✓ Chemicals (calcium, lactate, sodium lactate, etc.)
- ✓ Citric
- ✓ Dyes
- ✓ Electroplating and galvanizing
- ✓ Enzymes
- ✓ Lactic acid polymers
- ✓ Leather tanning
- ✓ Lysine
- ✓ Mannitol
- ✓ Paper manufacturing
- ✓ Rubber (cold process)
- ✓ Sizing materials
- ✓ Sorbitol
- ✓ Textiles, dyeing and finishing
- ✓ Threonine
- ✓ Tryptophan

Industrial Uses - Corn Starch

- ✓ Abrasive paper and cloth
- ✓ Adhesives (glues, mucilages, gums, etc.)
- ✓ Batteries, dry cell
- ✓ Binder or binding agents
- ✓ Board (corrugating, laminating, solid fiberboard, cardboard)
- ✓ Boiler compounds
- ✓ Bookbinding
- ✓ Briquettes Ceramics (as clay binder)
- ✓ Chemicals Cleaners, detergents
- ✓ Coatings on wood, metal and paper
- ✓ Color carrier (in paper and textile printing)
- ✓ Cord polishing, sizing
- ✓ Cork products
- ✓ Crayon and chalk (as a binder)
- ✓ Dispersing and standard-izing agent
- ✓ Dressing, surgical
- ✓ Dyes (as a bodying agent, carrier diluent, etc.)
- ✓ Fermentation processes
- ✓ Fiberglass size

*Industrial
Products
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- ✓ Fireworks
- ✓ Insecticide powders
- ✓ Insulating material (glass wool, rock wool, etc.)
- ✓ Lubricating agents
- ✓ Oilcloth
- ✓ Oil-well drilling (drilling mud)
- ✓ Ore refining (electrolytic reduction process, flotation process, etc.)
- ✓ Paints (cleaning compounds, cold-water and latex paints, poster lacquers, etc.)
- ✓ Paper and paper products manufacture
- ✓ Plastics (molded)
- ✓ Plywood (interior)
- ✓ Printing
- ✓ Protective colloids (emulsions)
- ✓ Soaps and cleaners
- ✓ Textiles (warp sizing and finishing)
- ✓ Tile, ceiling
- ✓ Tires, rubber
- ✓ Wallboard and wallpaper
- ✓ Water recovery, industrial

Industrial Uses – Corn Syrup

- ✓ Adhesives (plasticizing agent)
- ✓ Chemicals
- ✓ Dyes and inks
- ✓ Explosives
- ✓ Leather tanning (chrome process)
- ✓ Metal plating
- ✓ Paper, glassine and parchment
- ✓ Plasticizer
- ✓ Polish, shoe
- ✓ Rayon (viscose process)
- ✓ Textiles, for finishing
- ✓ Theatrical makeup
- ✓ Tobacco and tobacco products

Hydrolyzed Corn-sugar molasses

- ✓ Leather tanning
- ✓ Livestock feed
- ✓ Organic acids
- ✓ Organic solvents
- ✓ Tobacco

Industrial Products and Uses of Corn

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Philip Shull
Senior Diplomat (Ret)
U.S. Department of Agriculture

How to Procure and Purchase U.S. Grains and Grain Co-Products

This chapter will examine some of the key issues and actions an importer needs to consider and take when procuring and purchasing U.S. grains and their co-products.

These issues include the components of a contract, the use of standard contract forms, the use and role of agents and brokers, and the basic documents often required in the international shipment of grain. After studying this chapter you should be better equipped to purchase the best value grains in a competitive environment.

The first step in procuring feed grains from the United States is simple and often overlooked. In order to be able to make an effective value-based comparison between various grains, a potential importer should thoroughly understand and be able to clearly express clearly what type and quality of grain they require for its eventual end use. Next, the importer should have a detailed understanding of the quality characteristics for the grain on offer, along with a working knowledge of the underlying U.S. quality grades and standards that will apply. With this information an importer will be equipped to evaluate the value to them of various grain qualities and prices available from suppliers. The importer then can proceed to the next step of identifying a responsible supplier and making an informed purchasing decision.

FINDING A U.S. GRAIN OR GRAIN CO-PRODUCTS SUPPLIER

There are several ways an importer can discover the names and contacts of potential exporters of U.S. grains.

First, there are always the obvious well-known traders of international grain (such as ADM, Bunge, Cargill, and Louis Dreyfus – i.e. ABDC).

Finding a Supplier

Second, you can inquire with a local or international trade association (such as the North American Export Grain Association or the U.S. Grains Council, both of which are addressed in more detail below) or a local chamber of commerce.

Third, you could contact the U.S. Department of Agriculture (also addressed in more detail below).

Fourth, a broker or local agent can assist you in finding a reputable seller and in facilitating a transaction with them.

When contacting a potential supplier an importer should be prepared to provide commercial references, banking references, a description of the importer's business or international commodity trading experience, and any other information that demonstrates an ability to negotiate and fully execute an international grain purchase.

It is also reasonable for the importer to ask for similar information from the supplier to allow the importer to be comfortable with the supplier's ability to perform.

The following associations are available to assist importers by placing them in contact with interested suppliers:

U.S. GRAINS COUNCIL (USGC)

U.S. Grains Council

20 F Street NW, Suite 900,
Washington, D.C. 20001 U.S.A.
Phone: (202) 789-0789
Fax: (202) 898-0522
Email: grains@grains.org
Website: www.grains.org

The USGC is a private, non-profit organization with the goal of developing and expanding export markets for U.S. produced feed grains and their co-products through an international network of offices. All of these offices can assist importers with the search for a U.S. supplier.

An importer or potential importer can contact the USGC for assistance in either developing the technology to process feed grains for industrial uses or in providing information on the products themselves. The USGC will direct inquiries to one of their many internal experts on trade and utilization or to one of the 100-plus firms and organizations comprising

its membership. The USGC also maintains offices in certain different countries plus consultants in many more to help importers with their feed grains needs.

The Council was founded in 1960 to develop and promote exports of U.S. feed grains and their co-products. It is one of the few organizations whose membership is truly representative of both producers and agribusiness interests. They have successfully coordinated and unified the efforts of both groups into a policy promoting the global expansion for the utilization of feed grains and their co-products. This manual is part of that effort.

USGC membership is comprised of over 140 organizations, including state checkoff boards, agribusinesses, and producer groups, who together form a unique partnership with the goal of building global markets for U.S. grains. Many of these members can be supplier of grain and can assist you in procurement and purchasing.

For more information about USGC members, and contact details, see the membership directory at:

https://grains.org/membership/member-directory/#member_area_of_business=95 .

NORTH AMERICAN EXPORT GRAIN ASSOCIATION (NAEGA)

North American Export Grain Association

1400 Crystal Drive, Suite 260

Arlington, VA 22202 USA

Phone: 202-682-4030

Fax: 202-682-4033

Email: info@naega.org

Website: www.naega.org/

The North American Export Grain Association (NAEGA) is a not-for-profit industry trade association promoting policies, rules and commercial practices that support efficient international trade in grains, oilseeds and their derived products.

NAEGA members are exporters of U.S. grain and oilseeds in international markets. Established in 1912, NAEGA's members include private and publicly owned companies and farmer-owned cooperatives who export agricultural production to customers around the world. Our work benefits consumers, farmers and people working the trade.

NAEGA's mission is to promote and sustain the development of commercial export. Through a reliance on member action and support, NAEGA acts throughout the world to promote policies, rules and commercial practices that support international trade in grains, oilseeds, and their derived products. Providing for competitive, informed, robust, responsive, responsible, reliable, resilient, safe, and secure supply chains for agricultural commodities and food products is the core value of NAEGA.

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) - ATTACHES AND COMMERCIAL OFFICERS

The U.S. Embassy or consular office in most countries will house an agricultural attaché or commercial officer who is the overseas representative of the U.S. Department of Agriculture (USDA) Foreign Agricultural Service (FAS).

The agricultural attaché can offer the local importer a broad range of information regarding U.S. government-assisted export programs as well as assistance in finding a number of U.S. feed grains suppliers.

In addition to the above sources, interested importers might contact their local commercial banker or the branch office of a U.S.-based commercial bank for a list of potential suppliers.

USING AN AGENT OR BROKER

An importer also can utilize an agent or broker to assist securing a supplier and in the negotiation of the contract. Commodities brokers and agents serve as a point of connection between buyers and sellers and can help facilitate the purchase of grain. However, it is important to know the difference.

An “**agent**” is a person or firm is authorized to act on behalf of the party that contracts with the agent; in our case either the supplier or the buyer. As an agent has authority to act they should not be representing both the supplier and buyer, and the party contracting with the agent should set clearly defined limits on, among other things, the agent's authority and territory, compensation, and the time period that the agency arrangement covers. Generally, an agent will have actual or constructive custody of the goods being supplied.

The party (supplier or buyer) that hires the agent is known as the “principal.” Typically a principal will engage with an agent over a period of time, not for a particular potential transaction.

A “**broker**” is a person, firm or electronic trading platform that is engaged on behalf of others, at least partially on a commission basis, to negotiate or facilitate the formation of contracts for goods of which the broker has no actual or constructive custody of the goods being supplied.

The broker identifies potential suppliers and buyers and helps them work towards a contract, has no authority to bind either party or act on their behalf except as a supplier or buyer may give the broker specific instructions from time to time. Further, once the supplier and buyer enter into a contract, or if negotiations fail, neither the buyer nor supplier have any continuing relationship with the broker.

Using and Agent or Broker

It is important to note the difference between a broker of physical cash commodities and a broker of derivatives, futures, options and other exchange traded instruments, which are more highly regulated.

Brokers assist in the negotiation of a contract, working to put together the terms of trade that are agreeable to both parties. Upon the successful completion of negotiating a contract, a broker sends a written confirmation of the agreed contract terms and conditions to both the buyer and the seller. When the broker’s contract confirmation is received, both parties should check the details for accuracy, and raise any omissions or errors with the broker immediately. This is extremely important, as it is the terms and conditions within the brokers contract confirmation that will often prevail or be persuasive in the case of any dispute over the terms or existence of a contract between the supplier and buyer.

Grain brokers may be a sole proprietor or can work at large brokerage firm or exchange. They may work within a locally or regionally defined market. Individual brokers may also be focused on a particular commodity or commodity group.

A grain broker typically takes fee or commission for each deal successfully arranged. This fee may be based on the quantity of the transaction, e.g. “per unit of grain” (i.e. bushels, metric tonnes, etc...), a “flat fee”, or a “percentage fee” based on the value of the transaction. A broker should disclose these fees up front so that buyers and sellers are aware of the terms and whether the fees are acceptable. In most physical cash grain trades it is the seller who will pay brokerage fees.

Brokers who charge high fees may also offer special services as an incentive for parties who might otherwise turn down a relationship with the broker due to cost.

When selecting a broker it is important to use a reputable person or firm with whom a trusted relationship can be developed. Also ensure that they understand and have access to the latest applicable standard contracts and/or trade rules, as well as quality grades and standards.

PURCHASING UNDER DIRECT NEGOTIATION

Most end users and importers like to play an active role in the negotiation of contract terms and conditions for the purchase grain. They engage in direct negotiation with one or more suppliers.

Direct purchasing allows the buyer and the seller to negotiate alternatives that either may find more attractive and can significantly impact price and relative value of the commodity supplied. Importers can actively compare prices and determine the best time and supplier from which to purchase.

For example, an exporter may be able to provide an importer with a discounted price for accepting a shipment period that better suits the exporter's logistical situation.

COMPONENTS OF A CONTACT

Under contract laws in the U.S. the essential requirements of a contract are: 1) an offer, 2) acceptance of that offer, and 3) consideration. The law in most states in the U.S. also requires that contracts for the sale of goods between merchants with a value in excess of \$500 be in writing.

In nearly all cases however this "writing" requirement can be met by any kind of writing; physical or electronic, including an exchange or emails.

"Consideration" is the value exchanged by both parties. In a grain sale the seller gives value in the form of grain, and the buyer gives value in the form of U.S. dollars or other money. While a contract requires some consideration, courts in the U.S. (and most arbitrators) will not look at the value of the consideration or whether it is reasonable. Any consideration will do.

An offer and acceptance can be shown by an exchange of emails or even text messages so long as the exchanges show that the parties have agreed on the basic terms of the transaction, such as price, quantity, quality, delivery terms, and the shipment or delivery period. Agreeing to only these basic terms is not, however, a recommended practice. The parties should agree in detail on the all of terms of their transaction, as described in mor detail below.

Occasionally the parties may dispute the existence of a contract, and its existence (or non-existence) and terms must be proven by evidence. On these occasions, a court or arbitrator(s) may be required to determine whether two parties had, in fact, entered into a contract. It will become the panel's or tribunal's role to make an objective finding of fact based on the evidence presented by the parties, on the balance of probabilities.

In order to avoid such disputes, effective communication and supporting records and evidence need to be maintained.

A more complete list of contract components commonly incorporated into a purchase/sale for agricultural commodities are likely to include:

**Common
Contract
Terms &
Conditions**

- Name and details of Buyer
- Name and details of Seller
- Broker (*if any...*)
- Date and Time of Contract
- Kind and Quality Grade of Commodity
 - Type of Quality Inspection (*at Origin or Destination*)
 - Who does the sampling and grading
(*e.g. U.S. Federal Grain Inspection Service*)
- Quantity
 - Type of Weights (*at Origin or Destination*)
 - Packaging (*Bulk, Bagged, etc...*)
 - Who determines the quantity
(*e.g. U.S. Federal Grain Inspection Service*)
- Delivery or Shipment Period
- Transportation Specification
- Price - Price Basing Point (*e.g. FAS, FOB, CFR, CIF Location*)
- Payment Terms
 - Including who pays taxes, Levies and Statutory Charges
- Certificates and Documents, including who provides the certificates
- Applicable Trade Rules or Standard Form Contract Terms
- Applicable Dispute Resolution & Arbitration Terms
- Other Terms and Conditions specific to the transaction (*e.g. force majeure, circles, extension of delivery*)

Note that if the parties incorporate standard trade rules or a standard form of contract, they often do not have to specifically negotiate many terms of their contract, such as dispute resolution or arbitration, what constitutes an event of default, force majeure or extension of delivery. That's one of the beauties of using standard terms and forms.

COMMON CONTACT TERMS AND CONDITIONS

Counterparties – Buyer / Seller

It is important to note on the written contract confirmation, both the Buyer and the Seller, clearly state the full legal name of the entities, along with complete contact information, including; their full physical address and place of business, telephone, fax, email.

Broker or Agent

If a broker or agent is engaged to facilitate the trade, their legal name, along with their full physical address, telephone, fax, email.

Time

It is also advised to note on the written confirmation the date, as well as the time, that the contract was concluded.

Kind and Quality Grade of Commodity

The contract should clearly state the kind, type or class, and quality of the commodity. For U.S. grain, most parties reference USDA grades. For co-products the contract should state a detailed description of the goods.

Also included here should be the type of inspection, and whether this is to occur at “Origin” or at “Destination”. For all grain exported out of the United States grain quality is determined by an official USDA Inspector working for the Federal Grain Inspection Service (FGIS) according to established U.S. Grades and Standards. These official grades and standards govern the classification and grading of grain based on a number of qualitative factors.

The importer should clearly specify the maximum and/or minimum grade determining factors required and confirmed by an official export grain inspection certificate issued by the FGIS or an FGIS-authorized state agency.

The contract may also specify non-grade determining factors to which the parties have agreed, and identify the sampling, testing and certificate-issuing entity authorized to perform these tests.

Common Contract Terms & Conditions

For example: "U.S. No. 2 or better yellow corn, maximum 15.0% moisture. Aflatoxin maximum 20 parts per billion as determined by independent lab."

The more precise the quality description, the better the chance the importer will be pleased with the quality obtained. However, an overly restrictive quality requirement can lead to a much higher purchase price.

Quantity

The contract must specify the quantity desired and the exact unit of measure; (metric ton, long ton, short ton, hundredweight, etc...).

The quantity term is also likely to include a contract tolerance. For example +/-5% or +/-10% of the stated contract quantity, at the discretion of the seller or buyer. This tolerance allows the buyer (in FAS or FOB contracts) or the seller (in CFR or CIF contracts) the flexibility necessary to charter an appropriately sized vessel for the grain cargo, and to have the cargo loaded to the approval of the captain of the vessel. The contract should also specify the method that will be used to establish the price of the quantity above or below the mean contract amount. In most cases this tolerance is priced at the original contract price.

For example: "50,000 metric tons (5 percent more/less at contract price) at buyer's option"

Also included here should be the type of weight certification that is to occur, and whether this is to occur at "Origin" or at "Destination". Generally, for all grain exported out of the United States weights are determined upon loading by (or under the supervision of) an official USDA FGIS Inspector. The weight certificate is final at load and issued by FGIS or an FGIS-supervised state agency.

Occasionally, the weight determined at discharge will govern. In these rare cases, initial payment is still made for the shipped weight at load port, and an adjustment is made once the discharge weight is known. The discharge weight must be determined under procedures acceptable to the seller such as an independent surveyor. When an importer purchases grain using discharge weights as final, the exporter will usually add a premium to the price that reflects the normal estimated loss of grain in a discharge operation. Selling on discharge weights also raises difficult issues if the goods are lost or damaged, in whole or in part, during the voyage.

Shipment Period

The shipping period (or in some cases, the arrival period) should be clearly stated in the contract terms.

Delays, extensions or charges for late shipment/delivery are covered under the provisions of the NAEGA and Grain and Feed Trade Association (GAFTA) contracts, discussed later in this chapter.

For example: "50,000 metric tons (5 percent more/less at contract price) for shipment September 1 through September 20, 2003."

Transportation or Shipping Terms and Vessel Types

Tied closely with the shipment period and quantity are the shipping terms and the type of vessel that will carry the cargo. In a free on board (FOB) contract the importer provides the freight (i.e. charters the vessel, and the contract should specify:

1. The U.S. port or range of ports where the grain will be delivered, as well as the number of berths within the port from which the seller may deliver the cargo.
2. The type of vessel (a self-trimming bulk carrier, tween decker or tanker, for example) and a rate of loading (sometimes called a load rate guarantee), including a determination of when lay time will commence and how lay time will be counted to determine the total allowed loading time.
3. A statement declaring which party will assume the cost of spout stowing and trimming the cargo.
4. A demurrage/despatch rate.
5. A pre-advice period (the minimum number of days before arrival that the buyer will advise the seller of the vessel's expected arrival).
6. The rate of carrying charges the buyer will pay the seller in the event the buyer's vessel fails to file in the agreed upon period.

Common Contract Terms & Conditions

Many of these details are covered in the standard NAEGA No.2 Export Contract discussed later. The charter party - the contract for the use of the vessel between the importer and the vessel owner - will also cover some of these items.

If the contract requires the seller to provide the freight as a cost included in the purchase – a so-called cost and freight (CFR) - the contract normally includes a daily discharge rate at the destination port in place of the load rate guarantee, and specifies a minimum arrival draft at the discharge port and berth, maximum vessel age and any specific restrictions at the discharge port. The contract may also require the seller to provide insurance covering the cargo against loss or damage during the voyage. This type of sale is called a cost, insurance and freight (CIF) sale. The contract should spell out the minimum requirements for the cargo insurance. The general terms governing these types of shipments are covered in detail in the GAFTA contracts discussed later in this chapter.

For example: "FOB unstowed/untrimmed basis one (1) self-trimming bulk carrier, one (1) safe port/one (1) safe berth U.S. Gulf of Mexico. Load guarantee 5,000 metric tons WWD SHEX EJU with demurrage/despatch \$8,000/\$4,000/day. Buyer to give 10 days pre-advise of vessels probable readiness to load. Carrying charges shall accrue at the rate of 0.20 USD/metric ton per day, inclusive of interest."

Common Contract Terms & Conditions

Price

The contract will state an agreed upon price to be paid per unit of the commodity (e.g. metric ton or mt), usually stated in U.S. dollars.

The contract should also include another term related to the pricing of the quantity tolerance; that is how to handle pricing of the amount above or below the mean contract quantity.

The contract may also allow for component pricing. This is also sometimes referred to as a basis priced contract, or basis pricing. It refers to the separate pricing of the basis (a premium or discount often expressed in cents/bushel) which is used to adjust the price of an identified underlying commodity futures contract at the time the contract is priced. This is discussed at a later point in this manual.

Payment Terms

The most common form of payment is the confirmed, irrevocable, documentary letter of credit payable at sight. Other forms of payment exist, obviously, and depend in part on how financially secure and reputable the counterparties may consider each other to be.

The contract can also address which party is responsible for export and import taxes, levies and any statutory charges, though if the contract

uses Incoterms® as its delivery terms (e.g. FOB, CFR or CIF) the Incoterms® address these issues.

Certificates and Documents

Closely associated with payment are the documents that the seller needs to present to the buyer in order to be paid, as well as which party is responsible for the costs of such documents. Courts have gone so far as to refer to export sales as sales of documents, not goods.

Common Contract Terms & Conditions

For example: "Prices to be quoted in U.S. dollars per metric ton."
"Payment by irrevocable letter of credit payable at sight to be confirmed in the seller's favor by a first class New York bank in time to be in the seller's possession, in good order, 15 days prior to beginning of shipment period or within 10 days of contracting and payable against the following documents:

- Commercial invoice
- Full set of clean, on board ocean bills of lading issued to order of shipper
- Official weight and grain inspection certificates
- Certificate of origin
- Phytosanitary certificate"

A list of these documents and a brief explanation of each is included later in this chapter.

FOREIGN EXCHANGE RISK

A buyer and a seller who are in different countries rarely use the same currency. Payment is usually made in the buyer's or seller's currency or in a third mutually acceptable currency. In the international grain trade payments are normally made in U.S. Dollars.

One of the risks associated with foreign trade is the uncertainty of exchange rates in the future. The relative values of the two currencies could change between the time the trade is concluded and the time payment is made or received. If either the buyer or the seller are not properly protected, a change in the relative value of their local currency against the currency of payment could cause the seller to receive less, or the buyer to pay more, than originally expected.

For example: If the buyer has agreed to pay US\$6,000,000 for a shipment of corn and the euro was valued at US\$1.20 at the time of the transaction; the seller would expect to pay €5,000,000.

If later at the time of payment the euro had decreased in value to US\$1.15, payment under the new rate would be €5,217,391.30, meaning a loss of \$217,319.30 for buyer.

However, if at the time of payment the euro had increased in value to US\$1.25, payment under the new rate would be €4,800,000, and the buyer would realize a discount of €200,000.

Nonetheless, many exporters and importers are not interested in speculating on foreign exchange fluctuations and prefer to avoid risks by adding certainty in the final payment amount.

Foreign Exchange Risk

One of the simplest ways to avoid the risks associated with fluctuations in exchange rates is to quote prices and require payment in U.S. dollars. Then both the burden of exchanging currencies and the risk are placed on the buyer. However, such an approach may result in losing export opportunities to competitors who are willing to accommodate their foreign buyers by selling in the counterparties' local currencies. This approach could also result in nonpayment by a foreign buyer who finds it impossible to meet agreed-upon obligations owing to a significant devaluation of his local currency against the U.S. dollar. While losses due to nonpayment could be covered by, for example, export credit insurance, such "what-if" protection is meaningless if export opportunities are lost in the first place because of a "payment in U.S. dollars only" policy. Selling in foreign currencies, if foreign exchange risk is successfully managed or hedged, can be a viable option for U.S. exporters who wish to enter the global marketplace and remain competitive there.

Importers should also be aware of any problems with potential currency convertibility. Not all currencies are freely or quickly converted into U.S. dollars. The U.S. dollar is widely accepted basis as the international trading currency; and as such, companies most frequently can often secure payment in dollars.

If the buyer asks to make payment in a foreign currency, the seller should consult an international banker before negotiating the sales contract and confirm the currency's convertibility. Banks can offer advice on any foreign exchange risks associated with a particular currency.

The most direct and common methods of hedging foreign exchange risk is a forward contract with an international bank. This enables the exporter to exchange a set amount of foreign currency at a pre-agreed exchange rate with a delivery date at some time in the future. Likewise,

*Foreign
Exchange
Risk*

an importer can also establish a set amount of foreign currency payment at a pre-agreed exchange rate with a delivery date at some time in the future.

Determining a currency forward rate depends on interest rate differentials for the currency pair in question. The mechanism for computing a currency forward rate is straight forward and depends on interest rate differentials for the currency pair (assuming both currencies are freely traded on the forex market).

A currency forward contract is a binding contract traded in forex markets that lock in an exchange rate for a currency pair; i.e locking in an exchange rate for the purchase or sale of a currency on a future date. Currency forward contracts are over-the-counter (OTC) instruments, as they do not trade on a centralized exchange, and are also known as "outright forwards."

Currency forward contract settlement can either be on a cash or a delivery basis, provided that the elected option for settlement is mutually acceptable and has been specified beforehand in the contract.

Unlike exchange-traded currency futures, the other major benefit of an OTC currency forward contract is that its terms are not standardized, and the terms and conditions can be specifically customized and tailored to a notional currency amount, and for any maturity or delivery period. In addition, and unlike listed currency futures and options contracts, currency forwards don't require up-front payments when used by large corporations and banks.

These contracts and financial instruments are generally used for hedging foreign exchange exposure.

U.S. REGULATIONS:

U.S. exporters and all purchasers of goods from the U.S. are subject to regulations which can place restrictions on the export or re-export of commodities to certain people, companies, organizations, governments and destinations. Exporters must present to the carrier or the U.S. Customs service a "shipper's export declaration" which names the ultimate and intermediate destinations of the cargo. The cargo cannot be delivered to any country that is not named on the declaration.

In addition, U.S. laws require that a "destination control statement" be stated on the originals and all copies of the bill of lading and

commercial invoice. This means the importer must agree to accept documents bearing the destination control statement.

For example: The United States law prohibits export and distribution of commodities to Cuba, Iran, North Korea, unless authorized by the U.S. government.

[The list of these countries is subject to change and does often change. All exporters and importers should be aware of these limitations.]

U.S. exporters also are subject to U.S. regulations on restrictive trade practices or boycotts. Exporters may agree with and may be required to specifically reject requests that the exporter to refuse to do business with certain entities or countries, or otherwise participate in a boycott. Most of these prohibited or penalized boycott requests related to the Arab world boycott of Israel and Israeli goods and companies.

STANDARD FORM CONTRACT TERMS AND CONDITIONS

To help facilitate efficient markets and trade, the grain industry has developed several standard form contracts. It is estimated that more than 80% of the world's trade in grain is shipped by contracts which incorporate one of these standard contract forms in whole or in part.

Standard form contracts are commonly a part of any export transaction of U.S. origin commodities. Importers should read and thoroughly understand the terms and conditions within these standard form contracts prior to initiating any discussions with potential trading partners that could incorporate such standard contract forms.

Standard Form Contracts

The two organizations who most commonly provide standard contract forms used in exports of U.S. origin grain are:

NORTH AMERICAN EXPORT GRAIN ASSOCIATION

1400 Crystal Drive, Suite 260

Arlington, VA 22202 USA

Phone: 202-682-4030

Fax: 202-682-4033

Email: info@naega.org

Website: www.naega.org/

We introduced you to NAEGA and what it does earlier in this chapter. NAEGA's standard contract is the so-called No.2 contract, which is an export contract on FOB delivery terms. Most parties that contract with

reference to the NAEGA No. 2 contract also agree to incorporate its Addendum No.1. Addendum No.1 is called a Load Rate Guarantee addendum and so, among other things, specifies load rates and demurrage and dispatch rates. The NAEGA No. 2 contract and its Addendum No.1 are discussed in this chapter in more detail below.

GRAIN AND FEED TRADE ASSOCIATION

9 Lincoln's Inn Fields
London, WC2A 3BP
Phone: +44 20 7814 9666
Fax: +44 20 7814 8383
Email: post@gafta.com
Website: www.gafta.com

The Grain and Feed Trade Association (GAFTA) is an international, London headquartered trade association consisting of traders, brokers, superintendents, analysts, fumigators, arbitrators and other professionals in the international grain trade.

Standard Form Contracts

GAFTA is headquartered in Holborn, London and currently operates four more offices in Beijing, Geneva, Kyiv and Singapore.

GAFTA has many form contracts which are tailored to different trade terms and different origins and destinations. Some of the contracts used most often in the international grain trade include GAFTA contracts 27, 30, 64 and 100. GAFTA contracts 27 and 30 are discussed in this chapter in more detail below.

NAEGA NO. 2 CONTRACT – FREE ON BOARD

NAEGA No. 2 is the standard form contract for bulk grain sold on a Free On Board (FOB) basis from the United States and North America. This is NAEGA's only form contract other than NAEGA's Addendum No.1, which works together with the NAEGA No.2 contract.

See Appendix A for a copy of the NAEGA No. 2 form.

Some important features of the NAEGA 2 contract include:

Weight: Clause 5 states that the quantity is to be final at the port of loading in accordance with the customary weight certificates. In the U.S. these certificates are provided by FGIS, and in Canada by the Canadian Grain Commission (CGC). Note also the weight tolerance of 5% more

**NAEGA
NO. 2**

or less at the buyers option in clause 4, and that the conversion of pounds to kilograms is specifically called out in clause 5.

Quality and condition final: Clause 7 states that the quality and condition are final at the port of loading in accordance with official inspection certificates. Delivery of higher grades of the same type and description is permissible.

Vessel nomination and delivery: Clause 8 states that the buyer is to provide or nominate to the seller the name of the vessel, its capacity and its date of readiness at the load port. This pre-advice must be made prior to the minimum number of days specified in the contract in order to allow the seller to have the cargo available for prompt loading. The pre-advice should be in writing and delivered to the seller by any means of rapid communication as stated in Clause 15. It is also the buyer's responsibility to advise the seller of any change in the vessel's date of readiness.

The buyer may substitute a vessel once if the new vessel is of approximately the same size and type and can be ready around the same time. If the substitute vessel is damaged to the point of incapacitation, this clause allows an additional substitute vessel so long as it is also the same type, of approximately the same size, and in a position agreeable to both parties. Should the vessel arrive before the delivery period begins, the vessel may file its berth application and take its turn in the loading berth's line-up. However, the seller is not obligated to load the vessel before the delivery period begins.

Clause 8 states that delivery shall be made at the discharge end of the loading spout, in other words, FOB unstowed and untrimmed. All export elevators in U.S. loading ports charge fees for facility and/or use of the wharf, based on the vessel's tonnage, the cargo amount and/or the number of days berthed. The rates for facility charges are stated in the elevator's tariff (addressed next), change regularly and may be different for each export facility in a specific port.

Elevator tariff: The first paragraph of Clause 8 of NAEGA 2 states that delivery is subject to the elevator tariff to the extent that the elevator tariff does not conflict with the terms of the contract. When the buyer's vessel files a berth application and is accepted by an elevator, the elevator tariff becomes part of the contract between the elevator and the vessel. Under this contract the vessel owner agrees to abide by the regulations of and pay the charges in the elevator tariff. The vessel's berth application is usually accompanied by documents which include but are not limited to the following:

1. Certification by the USDA that the vessel's cargo holds are clear.

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NO. 2**

2. Certification by the National Cargo Bureau (NCB) of the vessel's readiness in all compartments.
3. Evidence that the vessel has entered at a U.S. custom house.
4. Evidence that the vessel has been tendered to and accepted by the charterer (buyer).
5. Written description of the vessel and the proposed stowage, also known as the stowage plan.

Once the berth application is accepted by the elevator, the vessel is assigned a berth in chronological order in relation to other vessels, based on when the vessel filed. However, the elevator tariff generally states that the elevator can change that order if operating difficulties arise or in order to operate more efficiently.

The elevator can also require continuous loading of a vessel through 24-hour periods, with the overtime expenses charged to the vessel or split between the vessel and the elevator. Under most elevator tariffs if a vessel refuses to work overtime, it can be asked to vacate the berth in favor of the next vessel willing to work overtime.

Price: Clause 10 covers the price. The seller and buyer also need to agree on the load port(s) and berth(s) port/berth options allowed by the importer should be stated here. Clause 10 also addresses the methods used to establish a settlement price for any quantity loaded and shipped above or below the mean quantity but within the tolerance stated in clause 4.

As the quantity tolerance facilitates the vessel loading, many grain contracts simply specify that the tolerance will be settled at the contract price.

Advice of shipment: When the cargo is delivered to the vessel, the seller must advise the buyer of the delivery “without undue delay” as specified in Clause 13. This notice includes the vessel name, bill of lading date(s), quantity and quality. Some people call this notice a tender. In a CFR or CIF contract this notice is sometimes called a vessel appropriation.

Insurance: Clause 14 requires the buyer to purchase marine and war risk insurance with first-class approved companies and/or underwriters. The buyer must then make sure that the insurer provides the seller with confirmation of this coverage at least five days prior to the expected readiness of the vessel. Recall that in clause 8 the buyer must provide the seller with a “preadvice” of the vessel’s probable readiness to load. The

NAEGA
NO. 2

timing of the confirmation of insurance ties into this preadvice. If the insurer does not provide a timely insurance confirmation, the seller may purchase the necessary insurance and charge the cost to the buyer's account.

Buyer's failure to take delivery: Clause 18 specifies that the buyer is in breach of contract if the vessel "fails to file" before the delivery period expires. This reference to filing goes back to the language in the 5th paragraph of clause 8 concerning when a vessel is considered to be filed with the load elevator. If the vessel files late, the seller must hold (or "carries") the grain for a limited period of time though at the buyer's expense. The expenses to hold or "carry" the grain are called "carrying charges." Under NAEGA No.2 carrying charges are calculated as laid out in clause 19.

Carrying charges, normally expressed as a fixed amount per ton or bushel per day, typically represent storage and insurance charges and can be inclusive or exclusive of interest on the delayed payment of the sales. Interest charges are assessed from and including the first day following the last day of the delivery period of the vessel. Charges for storage and insurance are calculated from the first day following the last day of the shipment period on only that portion of the cargo that has not been loaded, as verified on a daily basis by the stevedore's loading log.

Strike clause: The strike clause, Clause 20, applies if the seller cannot supply the commodity at the agreed-upon time due to certain events specifically listed in clause 20(b). To invoke this clause, the seller must promptly notify the buyer of the problem and, if requested by the buyer, provide a certificate from NAEGA certifying that clause 20 is properly invoked, and the duration and existence of the event. The benefit to the seller of invoking clause 20 is that the seller's obligation to deliver is suspended while the event (or "cause" as the term is used in clause 20) preventing or delaying delivery continues.

Arbitration: Clause 30 specifies that settlement of any disputes which may arise from or in connection with the contract should be settled by arbitration in the city of New York under the International Arbitration Rules of the American Arbitration Association (AAA). Each party appoints one arbitrator from the list of grain arbitrators maintained by NAEGA. These two party-appointed arbitrators then select a third arbitrator from NAEGA's list of Special Grain Arbitrators. The arbitration panel's decision is essential final as there is no appeal procedure within the AAA and the right to appeal to the courts is extremely limited.

Load guaranty: Addendum No. 1 loading rate guaranty is an optional part of the standard NAEGA 2 contract, requiring the seller to guarantee delivery to the vessel of an agreed, minimum tonnage during each weather working day of 24 hours (subject to the exceptions in Clause 1 of Addendum No. 1). If the seller fails to deliver at the agreed rate, the seller will pay the buyer a penalty, called demurrage, at an agreed rate. If the seller delivers the cargo at a faster rate than guaranteed, the buyer will pay the seller a premium, called despatch, at an agreed rate, usually half the rate of demurrage. Both the demurrage and despatch are paid for each day, pro-rated, of the time lost or saved. Addendum No. 1 includes such items as filing times, holiday time, overtime responsibilities, payment terms, documents necessary for claims and interest charges for failure to make payment on time. Importers should be fully aware of all the terms and conditions of this important and useful contract addendum as it is almost always included with the NAEGA 2 contract.

GAFTA 27 AND GAFTA 30

GAFTA publishes several standard form contracts.

GAFTA 64 is FOB Terms; however, NAEGA No. 2, along with its related Addendums, are more commonly used when grain is being shipped from North American locations.

GAFTA No. 30 is a standard contract for less-than-full cargo (parcels) bulk shipments of grain from the United States that are purchased under CFR or CIF terms, while GAFTA No. 27 is the CFR or CIF contract form for full cargoes. As mentioned, GAFTA has many standard contract forms. Buyers and sellers also often use the GAFTA 100 for bulk CFR and CIF sales when originating grain from other origins.

GAFTA 27 and GAFTA 30

A copy of current GAFTA Contracts can be found on their website at: <https://www.gafta.com/All-Contracts>

Some important features of GAFTA contracts include:

Quality and condition final: Under GAFTA No. 27, Clause 5 and GAFTA 30, Clause 6, quality can be determined by sealed sample, at discharge, or at load as evidenced by an official certificate of inspection at the time of loading. Where determined by an official inspections certificate at load, that certificate is final. Delivery of higher grades of grain of the same type and description is permissible.

*GAFTA 27
and
GAFTA 30*

Quantity: Under GAFTA 30, the tolerance is at the seller's option, with two percent more or less at the contract price and a further three percent more or less to be settled at the CFR or CIF market price on the final bills of lading date. If more than one shipment is made under one contract, each shipment is to be considered a separate contract, but the quantity tolerance of the mean contract quantity will not change.

Under GAFTA 27, the tolerance is 5 percent more or less at contract price and an additional 5 percent, at the seller's option, to be settled at the C&F or CIF market price on the final bill of lading date. It is also common, particularly under U.S. government export promotion programs, for all tolerances to be priced at the contract price.

Weights: Under both contracts, Clause 18 for GAFTA 30 and clause 16 for GAFTA 27, specifies that the cargo quantity is weighed and determined at discharge. These GAFTA contracts also incorporate the GAFTA weighing rules 123, which users of these contracts should read and understand. Any deficiency from the bill(s) of lading weight (shipped weight) will be settled by the seller to the buyer; any excess, from the buyer to the seller. In each case, settlement is at contract price. In practice many or perhaps most grain contracts using GAFTA form contracts will agree to have weight, like quality, determined at the load port by a certificate issued by an official agency of the exporting country, or a recognized surveyor.

Extension: If the seller fails to ship the cargo within the specified shipment period the seller has an additional eight consecutive days in which to ship the cargo as long as the seller notifies the buyer by the first business day that follows the expiration of the original shipment period. The shipment date is determined by the shipped on board date stated on the bill(s) of lading. The extension clauses are Clause 10 in GAFTA 27 and Clause 11 in GAFTA 30.

These clauses also specify a formula to compensate the buyer for the extension, based on a percentage of the CFR or CIF price, and this amount is deducted from the original contract price at time of payment.

Strike clause: Both of these GAFTA contracts include a force majeure clause which suspends the seller's obligations during the period of the force majeure event. This is clause 21 in both GAFTA 27 and GAFTA 30. The event must fit within the specific events stated in the force majeure clause, and the seller must provide the buyer with notice within the time periods stated in this clause, along with a statement of the reasons supporting their declaration of force majeure. If the force majeure event continues for more than 21 days after the end of the shipment period, then the buyer has the option to cancel the unfulfilled portion of the contract,

but to do so the buyer must notify the seller no later than the first business day after the end of this 21 day period.

*GAFTA 27
and
GAFTA 30*

Arbitration: Clause 28 of GAFTA 27 and GAFTA 30 specify that all disputes arising from the contracts will be settled by arbitration in London, England, in accordance with the arbitration rule No. 125 of GAFTA. Under this rule, the parties each appoint their own GAFTA- approved arbitrators who in turn choose a third arbitrator. GAFTA arbitration rulings can be appealed within GAFTA to a GAFTA- appointed panel of arbitrators. A party can also ask the English courts to review the award by the GAFTA appeal panel, though the courts are not obligated to take up an appeal. English courts will only hear an appeal of an arbitration award if the award presents novel or particularly important issues. Asking an English court to hear the appeal of an arbitration award is referred to seeking a “leave to appeal.” See Appendix F for a copy of arbitration rule No. 125 of GAFTA.

Insurance: Unless terms are CIF, the buyer is responsible for securing marine insurance. Clause 20 of GAFTA 30 and GAFTA 27 sets out the minimum insurance coverage that the seller must purchase. The requirements are detailed, and incorporate the GAFTA insurance terms No. 27. As of January 2022 the minimum coverage is “WA,” which means “with particular average” , along with war, strikes, riots and civil commotion coverage.. WA insurance includes coverage if the vessel sinks, is stranded, on fire or in a collision (so-called FPA or free of particular average coverage), but adds coverage for damage caused by seawater or inclement weather. ARI or “all risk” is even more comprehensive as it covers all risks of physical loss or damage from external causes.

Appropriation (advice of shipment): FOB contracts require the seller to notify the buyer of delivery, while C&F and CIF contracts require the seller to notify the buyer of shipment. Clause 12 of GAFTA 30 and GAFTA 27 provide the appropriation clause in detail. Such a clause is required to insure that the buyer has timely notice of the vessel name, the date of the bill(s) of lading, the quantity loaded and the contract number to which the shipment applies. Remember that in a CFR or CIF transaction the buyer often will have little insight into what is happening at the load port as the seller is responsible for not only loading the goods onto the vessel, but also chartering in the vessel. Buyers therefore will sometimes hire a surveyor to monitor the loading operations.

BASIC DOCUMENTS ASSOCIATE WITH THE GRAIN TRADE

This section will take a closer look at some of the basic documents used in the international feed grains trade. These documents constitute the core of the transaction and are the mechanism by which title, or ownership, and the right to possession of the of the cargo is transferred from one party to another.

The specific documents required for any given shipment depend on U.S. Government regulations, the destination country's import regulations, importer's requirements, and mode of transportation, along with the contracts terms of sale and method of payment.

Slight discrepancies or omissions in documentation may prevent goods from being exported, may result in the shipper not getting paid, or may even result in seizure of the goods by U.S. or destination customs agents.

Basic Documents Associated with the Grain Trade

While completion of much of the documentation is routine for freight forwarders or customs brokers, the exporter is ultimately responsible for accuracy of the documentation.

The Draft: A draft is an instrument by which one party directs another party to make payment and/or acceptance. They are more often used when payment does not involve the use of a documentary letter of credit. In a draft, the exporter, who is requesting payment, is the drawer, and the importer, who is responsible for paying the draft, is called the drawee. In order to be negotiable, a draft:

1. Must be in writing and signed by the drawer;
2. Must contain an unconditional promise or order to pay a certain sum of money;
3. Must be payable on demand or at a fixed, determinable future time;
4. Must be payable to order or to bearer;
5. Must name the drawee or otherwise indicate the drawee with reasonable certainty.

Drafts can be drawn payable on demand and are called sight or demand drafts. Drafts also may be time drafts, which are payable at a later date. The type of draft depends on the payment or finance method used by the importer. The draft covering the export of grain and co-products from the

*Basic
Documents
Associated
with the
Grain
Trade*

United States is generally expressed in U.S. dollars but may also be expressed in other currencies. The draft may be payable either to the drawer or exporter, but more often it is payable to the seller's bank. Exhibit 1 in Appendix G gives an example of a sight draft.

Commercial Invoice: The most common invoice used in the grain trade is the commercial invoice, which is a bill for the purchased grain. It describes the goods being sold and the amount to be paid by the importer, including any charges in connection with the shipment of the grain and typically states the terms of shipment (FOB, CIF or C&F).

The invoice should be dated and contain the name and address of both the exporter and the importer, the name of the vessel (or carrier), the port or location of loading and, in the case of a CIF or CFR transaction, and the name of the destination.

There may be additional requirements in order to comply with customs and exchange controls in the importer's country, including the use of an additional customs invoice. The description of the goods sold in the commercial invoice must correspond exactly with the description contained in the letter of credit if this payment method is used. The commercial invoice also should be consistent with the information contained in other documents accompanying the invoice. See Exhibit 2 in Appendix G for a sample commercial invoice.

In addition, some countries require a legalized or consular invoice to accompany the commercial invoice and other shipping documents. This invoice is simply a commercial invoice that must be presented, legalized and given a visa or stamp by the embassy or consular office of the importer's country.

Bill(s) of Lading: The bill(s) of lading is issued by the vessel owner and typically is signed by the vessel master or agents for the vessel. The bill of lading serves three functions. First, it is a receipt for the goods loaded. Second, it is a document of title as it gives the holder of the bill the right to possession of the goods (in the case of a bill of lading made out "to the order of" the consignee, or a bearer or blank consigned bill of lading), or to the person named as the consignee (in the case of a so-called straight bill of lading). Third, it is evidence of a contract of carriage between the vessel owner and the holder or named consignee. There are many standard form bills of lading. One often used in U.S. grain exports is the Baltimore Form C bills of lading. Whatever form is used, the bills of lading should show the name of the shipper, the vessel or carrier transporting the goods, the type of grain being exported, the port or location of shipment, the date that the goods were loaded on board, the

Basic Documents Associated with the Grain Trade

destination, the consignee and the party to be notified upon arrival of the grain.

Bills of lading can be issued in two forms: "straight" (non-negotiable) or "to order" (negotiable). Some countries prohibit the issue of "to order" bills of lading. In such cases, the seller normally consigns the "straight" bill of lading to an agent or bank at the destination, with instructions to release the bill(s) of lading to the buyer only upon confirmation of payment. The shipping company should not surrender the bills of lading without the agreement of the agent or bank. If the "straight" bills are consigned to the buyer, the buyer can take possession of the goods upon identification without being required to present the bills of lading themselves.

Most bills of lading used in exporting feed grains are charter party bills of lading which are negotiable, in other words are consigned "to the order" or a named entity or just "to order." They are issued by the vessel owner in two or three original sets, each of which is negotiable. Thus, any one set gives the holder title to the goods. The presentation of any properly endorsed original will allow a holder to pick up the merchandise at the port of destination. The bills of lading may be endorsed in blank or endorsed to the buyer, his agent or some other third party.

Insurance Policy or Certificate of Insurance: The contract between the buyer and the seller should specify the extent and the value of insurance coverage for the feed grain, which party is required to obtain the policy or certificate and who must pay for the insurance. The coverage available under marine policies can range from specific risks, such as fire, collision or sinking, to general "all risks" coverage. However, all risks coverage does not necessarily cover war, strikes, riots and civil commotion. Such circumstances could require special endorsements or policies, such as war risk insurance.

Official Export Inspection Certificate: Under the U.S. Grain Standards Act, grain being exported must be officially inspected by USDA-licensed inspectors from either the Federal Grain Inspection Service (FGIS) or an FGIS-authorized state agency, who will then issue an official certificate showing the commodity type, class, grade, quality, condition and quantity of grain and the loading location. Some importers may also require a copy of the official grain inspection log, which is a record of the individual lots of grain that comprised the cargo. A sample inspection certificate is shown as Exhibit 4 in Appendix G.

Official Grain Weight Certificate: In addition to the official inspection certificate, FGIS or an FGIS-authorized state agency will issue an official weight certificate which indicates the net weight, date and place of issue,

the name of the carrier, location of the grain, kind of grain and the date and time the loading started and finished. A sample weight certificate is shown in Exhibit 5 of Appendix G.

Phytosanitary Certificate: A phytosanitary certificate is issued by the USDA's Animal and Plant Health Inspection Service (APHIS) or an authorized state agency. The document certifies that the grain being shipped is free of quarantine pests and generally conforms to the phytosanitary requirements of the importer's country. A sample phytosanitary certificate is shown as Exhibit 6 of Appendix G.

Certificate of Origin: A certificate of origin is normally issued by the exporter and certified by a recognized chamber of commerce and certifies that the grain is a product originating in the United States of America. The certificate identifies the seller or the agent and the name of the carrier, and it gives a general description of the commodity. A sample certificate of origin is shown as Exhibit 7 in Appendix G.

Landing Certificate: While landing certificates are not required by the importer, the exporter may require this document.

Basic Documents Associated with the Grain Trade

When utilizing commercial U.S. government programs (namely, the GSM-102 credit guarantee programs and the Export Enhancement Program), exporters are required to obtain and maintain official records that can demonstrate to USDA the commodity actually arrived at the importer's designated destination. The records or documents must be in English or be accompanied by a translation acceptable to USDA.

Records acceptable to meet this requirement include an original certification of entry signed by an authorized customs or port official of the importing country, by the importer, by an agent or by a representative of the vessel or shipping company which delivered the commodity to the importing country or by a private surveyor in the importing country.

Important points which must be included in a landing certificate are:

1. Certification that the commodity entered the importing country;
2. Identification of the export carrier;
3. Quantity of the commodity sold;
4. Kind, type, grade and/or class of the agricultural commodity;
5. Date and place of unloading of the commodity in the importing country.

Basic Documents Associated with the Grain Trade

U.S. Export Requirements

The U.S. Government requires export documentation for a number of different reasons including national security, control of products in short supply, compiling export statistics, administration of export laws, protection of endangered species, and to protect U.S. export markets by ensuring product quality of specific exports.

The main document required by the United States government is the Shippers Export Declaration (SED).

Importing Country Requirements

Each destination country has different set of requirements regarding the documentation that must accompany any import shipment.

Importing countries require these documents for the administration of their import laws, assessment of taxes, and protection from hazardous pests and diseases.

Some of the more frequently required documents are: commercial invoice, bill of lading, phytosanitary certificate (for plants or plant products), veterinary health certificate (for animals or animal products), packing list, and certificate of origin.

Other import regulations that may affect a shipment are packaging and labeling requirements, and recycling laws.

Importer's Requirements

The importer may require documents in addition to the documents required by their government. An importer may need a specific document in order to receive an import permit from the local government, or to obtain financing from a financial institution.

Possible documents requested are: pro forma invoice, inspection certificate for grade and condition, or a statement of processing methodology (depending on the level of processing involved).

Other Documents: Some other documents often required by importers include:

- a certificate of fumigation, often provided by a certified fumigation company or marine chemist;

- a certificate from a private laboratory for quality tests not covered under the official grain inspection certificate;
- an official stowage examination certificate, stating that the vessel holds were duly examined prior to loading and found to be substantially clean;
- a crop year certificate, usually issued by the supplier, certifying that the feed grain loaded was grown in a certain crop year;

Basic Documents Associated with the Grain Trade

An experienced freight forwarder can assist shippers in determining what documents are required and can complete much of the documentation on the shipper's behalf.

Additional sources for determining documentation requirements for any given shipment are: bank, destination country's consulate, and;

- USDA's Foreign Agricultural Service <http://www.fas.usda.gov/>
- Animal and Plant Health Inspection Service - <http://www.aphis.usda.gov/>
- Food Safety and Inspection Service (<http://www.fsis.usda.gov/>)

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Todd Erickson
Senior Advisor with NAEGA and a NAEGA Special Grain Arbitrator

Grain Quality

U.S. Grades and Standards

The international grain trade is built on the ability to deliver a high quality product worldwide. Achieving this goal requires effective management of grain quality along the supply chain from farm gate to end user. It is essential to the satisfaction of all customers, with the ultimate customer being the retail consumer.

In many exporting countries, grain is delivered at harvest directly from farm to a local storage warehouse, commonly known as a “country elevator” in North America, or as a “silo” in Australia.

Having a process that assesses the many aspects of grain quality after it leaves the farm helps preserve quality and document characteristics that will ultimately help determine its value, and will affect its ultimate selling price. This process ensures that various lots of grain are combined with grain of similar type and quality as it accumulated into larger lots for transport. It will also determine the manner in which the grain is to be segregated, stored, handled and transported along the supply chain.

The U.S. inspection and grading system provides a way to ensure that the grain delivered is of the quality that the customer purchased – a top priority for the quality assessment upon arrival to the end user. As grain arrives at the feed mill, malt house, flour mill or other first stage processor; its quality factors are again tested making sure it is suitable for its intended use.

Again, the grain is likely to be segregated and managed according to quality factors. While the processor would rather not have to make adjustment that are likely to add to costs; if incoming grain is not of adequate quality, the receiving end user will have a final opportunity to adjust the processing methods to help compensate for its inadequacies.

Uniform commodity grades and standards provide a reliable means for

quantifying factors of quality. This allows the market to more easily assign a value to these quality factors, generally in the form of premiums and discounts. Having a widely adopted system of grades and standards can lower costs in the supply chain by creating products of uniform quality that flow through the system.

In the real world, grains are usually not dealt with individually, that is grain by grain, but as a bulk volume of a multitude of grains. This is why we speak of “mass properties”, and why we must differentiate between individual properties that are characteristic of particular kernels.

The most important mass properties include purity (*percentage of dockage, broken corn and foreign material - BCFM*), bulk density (test weight, hectoliter weight, hundred-kernel weight). Moisture content, kernel soundness, hardness and density (*vitreousness*) may also be included. These characteristics are the primary assessment of quality. For the commercial trade, the effects of pests and pathogens also need to be considered.

Apart from observable physical properties, some quality factors are so complex that laboratory tests may also be required. Knowledge of nutritional value (*energy, crude protein, amino acid profile*) is also important, especially when there are several end use objectives may be involved. This is the reason why a detailed quality assessment is necessary to ensure a uniform and high-quality supply for the processing industry.

Moreover, there is no such thing as ‘absolute quality’. As such, various methods are used to determine grain quality, as no single quality factor is sufficient for all possible uses. ‘Fitness for purpose’ is probably the best definition for grain quality.

The proper management of grain quality as it move through the supply chain, can save additional costs or add significant value to the process. Knowledge and understanding of grain quality will assist in merchandising decisions, determining how a specific lot of grain may be stored, to where it may be shipped, how it might be best utilized, negotiating it highest value, and to what final market it will be sold and delivered. These market dynamics provide the basis for domestic and international trade while promoting efficiency in merchandising and procurement.

Across the U.S. supply chain and marketing system, quality requirements for grain exports are governed by both contract specifications and a set of government-regulated standards that govern

the inspection, sampling, grading and weighing of grain. These grain standards are designed to ensure that the processes and procedures for assessing weights and quality grades result in a uniform product that facilitates the trading and marketing of U.S. grain. The grades and standards in this respect are contained in the regulations of national authorities and organizations.

One of the major strengths of the U.S. marketing system is its long established quality inspection process based on an underlying set of federal grades and standards. This process supports the price and delivery of quality grain across a number of agricultural commodities to both domestic end users and export customers around the world.

USDA has developed strict measures for quality grading based on standards developed for each commodity type or product providing a common language among buyers and sellers, which in turn assures consistent quality for consumers. These objective, quantifiable, and verifiable standards is a major reason for the high level of confidence importers have in the quality of U.S. grain they purchase.

A SHORT HISTORY OF GRAIN INSPECTION, GRADES AND STANDARDS

The economic value of grain is based upon its physical and/or chemical characteristics. This is because different grain-based products (e.g., food, feed, ethanol or industrial) often requires grain with different characteristics. To help processors identify grains that will provide the best “end use quality factors,” grading standards and tests have been developed that measure grains’ key physical and chemical characteristics, i.e., test weight, moisture, purity, damage, protein, starch, oil, etc. Buyers purchase grain based on these quality factors that indicate how these grains may perform or function in their intended end use. Use of these grains may vary from an animal feed ingredient to a food ingredient after milling, malting or other types of processing

The rapid expansion of the U.S. grain industry in the early twentieth century created a need for a uniform system of measuring certain quality factors and establish a grading system in order to better facilitate commercial trade. Independent attempts by local Chambers of Commerce, boards of trade, and major grain corporations to develop standards had resulted in inequalities among markets. These disparities highlighted the need for nationally uniform standard to reduce confusion that characterized the trade during that period.

U.S. Grain Standards Act

This decentralized and chaotic system led farmers, end users, the commercial trade and local governments to propose a national inspection program, and a national weighing program. As a result, the Department of Agriculture established laboratory tests and conducted numerous interviews and hearings to identify the most urgent needs of the grain industry. This information became the basis for the federal legislation that was eventually adopted.

At the request of the industry, Congress passed the United States Grain Standards Act (P.L. 64-190 or USGSA) on August 11, 1916. The first standards established under the Act were for corn and became effective December 1, 1916. It was the culmination of 25 years of investigation, public hearings, and debate.

Several decades later, the Agricultural Marketing Act of 1946 authorized similar inspection and weighing services for rice, pulses and certain other commodities. Other major changes to the law were adopted in the USGSA Amendments of 1968, the USGSA of 1976 (P.L. 94-582), and the Grain Quality Improvement Act of 1986 (P.L. 99-641).

The U.S. Grain Standards Act provides for the establishment of official U.S. grain standards that are used to measure and describe the physical and biological properties of the grain at the time of inspection. The grades, classes and conditions reported on official certificates are determined according to the quality factors defined in the standards.

The U.S. Grain Standards Act, with few exceptions, requires official certification of all grains and oilseeds exported from the United States. It requires these products to be officially weighed and inspected for quality. These official services can also be provided, upon request, for domestic commercial grain transactions.

USDA standards exist for twelve grains (listed from largest to smallest volume inspected): corn, soybeans, wheat, grain sorghum, barley, oats, rye, flaxseed, sunflower seed, canola, triticale and mixed grain. Commodities such as rice, pulses and hops have similar standards for grade and quality factors.

Other commodities, along with a wide range of processed products, including; feed stuffs, meals, flour, food mixes, edible oils and other cereal food products, have no official USDA standards.

All government agencies involved in the grading and inspection of grains are strictly guided by the United States Grain Standards Act. This ensures consistency of test results and services, from elevator to

elevator, and state to state. Official inspections of grains, oilseeds, and other agricultural and processed commodities are based on established standards, and on sound, proven, and standardized procedures, techniques, and equipment.

Federal Grain Inspection Service (FGIS)

FGIS was created by Congress in 1976 to manage the national grain inspection system, which was initially established in 1916, and to institute a national grain weighing program.

Today FGIS facilitates the marketing of U.S. grain and related products by establishing standards for quality assessments, regulating handling practices, and managing a network of Federal, State, and private laboratories that provide impartial official inspection and weighing services.¹

With a few exceptions, the official inspection of export grain is mandatory. Only the partners of the official system, FGIS field offices and state and private agencies authorized by FGIS can provide an official grain inspection certificate. Official personnel employed or licensed by FGIS obtain representative samples using approved methods and equipment.

Changes in U.S. grain standards

Grain Quality Improvement Act of 1986

The Grain Quality Improvement Act of 1986 required FGIS to revise certain procedures in order to enhance the quality of U.S. grain exports. The act addressed three primary areas: grain handling practices, insect tolerances, and the usefulness of grain standards. More stringent insect tolerances became effective in May 1988.

Before the implementation of this act, some elevator operators removed and stored dust, dockage and foreign material during grain handling to reduce dust levels in the elevator, then recombined it before loading the vessel. This practice is no longer permitted. While the act prohibits recombining dust that has been removed and stored, it does not require dust to be removed.

FEDERAL GRAIN INSPECTION SERVICE - FGIS

The Federal Grain Inspection Service (FGIS) is part of the U.S. Department of Agriculture's (USDA) Grain Inspection, Packers and Stockyards Administration (GIPSA).

Under the United States Grain Standards Act (USGSA) and the Agricultural Marketing Act of 1946 (AMA), FGIS:

- Establishes and maintains official U.S. grain standards for barley, canola, corn, flaxseed, oats, rye, sorghum, soybeans, sunflower seed, triticale, wheat, mixed grain, rice, and pulses;
- Inspects and weighs grain and related products for domestic and export trade;
- Establishes methods and procedures, and approves equipment for the official inspection and weighing of grain;

FGIS

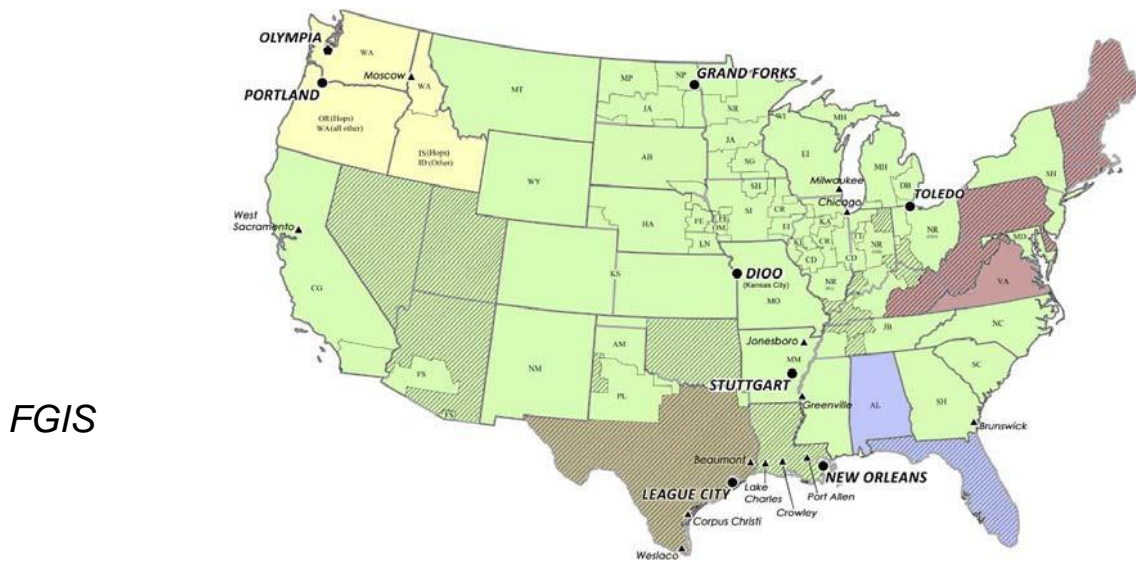
- Supervises the official grain inspection and weighing system. The official system is a network of FGIS field offices, and State and private grain inspection and weighing agencies across the nation that are authorized by FGIS to provide official inspection and weighing services.
- Provides international services and outreach programs and protects the integrity of the official inspection system and the market at large to ensure markets for grain and related products are fair and transparent.

FGIS and the official agencies that comprise the official system provide services under both the USGSA and the AMA on a fee basis for both export and domestic grain shipments. The official system is a unique public-private partnership overseen by FGIS. The system includes Federal offices and State and contracted private agencies authorized by FGIS to provide official inspection and weighing services for the domestic and export grain trade.

FGIS administers the U.S. inspection and weighing system for grains and other commodities through field offices and two federal/state offices in the United States and Canada. FGIS field offices also oversee the work of state and private agencies which provide official services at other domestic grain markets. Eight of these state agencies are also authorized to perform official export services at ports.

While the composition of the official system is diverse, its results are not. Every customer, whether on the East Coast or the Gulf of Mexico, or in the Midwest or the Pacific Northwest, receives consistent, accurate service. That's because every official service provider operates under uniform, official U.S. grain standards and procedures.

The official grain inspection and weighing system serves producers, handlers, processors, exporters, importers, and end-users of American grain by providing consistent and professional grain inspection and weighing services. The FGIS is required by law to collect fees that cover the cost of these services.



Source: USDA AMS FGIS “Official Agency Directory”
<https://www.ams.usda.gov/sites/default/files/media/2019OADirectory.pdf>

The quality grade is reported on a “FGIS Official Export Grain Inspection Certificate” which represents the entire cargo or lot submitted for inspection. U.S. and international buyers rely on official inspection certificates to provide accurate, official descriptions of the grade, class, and condition of grain. Official grain inspection certificates are legal documents that are admissible in court.

The FGIS has the capacity to perform physical, chemical and microbiological tests – using the official laboratory methods of the Association of Official Analytical Chemists – requested in laboratory specifications.

Every official State and private agency is backed by the resources and expertise of the FGIS National Grain Center located in Kansas City, Missouri. The accuracy of officially approved equipment is verified, and re-verified, by FGIS technicians using finely calibrated master instruments and official reference methods. Official personnel pass rigorous tests and undergo extensive and continuous training. System-wide quality control requirements ensure that official personnel consistently provide high-quality, accurate services and information. The work of official personnel is reviewed and monitored by an extensive quality assurance program.

FGIS

The quality factors that can be determined by the FGIS may include; test weight (bulk density) and percentages, by weight, of damaged kernels, broken kernels, foreign material, and other factors. The grade certificate may also note specific conditions of the grain, such as moisture content, odor and infestation. No seasonal adjustments are made on U.S. grades, nor is the cropping year of production noted.

Other quality assessment services provided by FGIS, and available upon request, include; the determination of protein and falling numbers in wheat, oil content in canola and sunflower seed, and aflatoxin in corn.

FGIS also performs stowage examinations within 24 hours prior to loading to assure that carrier's vessels are clean, dry and fit for loading.

FGIS also works closely with other U.S. government agencies. For example, if FGIS were to find excessive levels of aflatoxin in corn, this would be reported to the Food and Drug Administration (FDA) for action to prevent the cargo from entering commercial channels. FGIS also works closely with the Animal and Plant Health Inspection Service (APHIS) to report insects found during inspection when the importing country has specified phytosanitary restrictions. The cooperation between U.S. government agencies is designed to assure that overseas customers receive the quality of grain desired.

There are a number of private companies and commercial business providing unofficial inspection services and quality analysis information. FGIS does not have any authority over unofficial agencies, and the certificates issued by these agencies are not "official" FGIS certificates. These other inspection companies can provide services such as; trace metal analysis, mycotoxin testing for other than aflatoxin, and testing for zearalenone and T-2 toxin using methods governed by the American Association of Cereal Chemists and other similar entities.

FEDERAL REGISTER – GRADES AND STANDARDS

The standards represent currently accepted market practices for the various grains and have been revised or amended from time to time through public rule-making procedures. Before FGIS can establish, revise or repeal any of its standards, rules and regulations, it is required by law to announce its intentions in the *Federal Register*.

The *Federal Register* is a publication that records all changes or proposed changes in federal regulations. These changes must be published and the public offered opportunity for comment before they go into effect. FGIS sends copies of FGIS *Federal Register* notices and proposals electronically to the agricultural offices of U.S. embassies worldwide, and will send any of its *Federal Register* announcements to anyone who requests them. The agency also publishes its *Federal Register* actions in news releases.

A *Federal Register* announcement includes a description of the action, rules the action would replace or affect, the effective date, reasons for taking action, objectives and effects of the action and an impact analysis (for major regulations). The announcement also includes the identification and addresses of FGIS contacts, a summary of the comments received on previous announcements and text or amending language to be used as text of the regulation or action. The final rule includes exact language amending the regulation.

Changing the grain standards is a lengthy process, requiring at least one year from initiation until implementation. The public is given the chance to comment throughout the rule-making process, including:

1. Before rule-making at preliminary public and private meetings, or in writing to agency officials whenever an individual, company or group has a concern;
2. During the comment period published in the *Federal Register* notice to change or establish a standard;
3. During the comment period published in the *Federal Register* "Proposed Rule."

FGIS usually allows a 60-day comment period for *Federal Register* actions that would change or establish a standard, and FGIS may allow additional time for comment to parties who request an extension. Oral and written comments should be addressed to the contact identified in the *Federal Register*. FGIS has a special e-mail address, published in the *Federal Register*, which can be used for submitting comments. Changes to the standards usually take effect one year after publication.

HOW GRAIN IS SAMPLED, INSPECTED AND GRADED

In order to be officially inspected, grain must be weighed and graded according to the provisions of the U.S. Grain Standards Act. This means that the equipment and procedures used must be approved and checked regularly for accuracy and that inspectors must be tested for proficiency

in carrying out their inspection duties. The U.S. Congress has given FGIS responsibility for carrying out this work.

There are seven basic operations that are performed follow a prescribed path when officially inspecting and grading grain before it is loaded aboard carrier or vessel.

*Official
Inspection
Procedures*

1. Obtain a representative sample.
2. Examine the sample for objectionable odors, insect infestation, heating, or other harmful conditions.
3. Divide out an appropriate size sub lot of the sample and determine the moisture content.
4. Recombine the sample portion used for the determination of moisture, determine the test weight.
5. Divide out an appropriate size sub lot of the sample (typically 250 grams) and determine the percentage of foreign material and broken corn (BCFM) in the sample.
6. Divide out an appropriate size sub lot of the sample (typically 125 grams) and determine the percentage of damaged kernels and class (i.e. flint corn, dent corn, or waxy corn).
7. Record all the required information relating to the required quality factors, and determine the applicable USDA quality grade.

In addition, before a carrier or vessel can be loaded for export it must be inspected to determine that it is “fit for purpose”. The carrier or vessel stowage area must be clean, dry, free of odor and infestation and otherwise suitable for receiving or storing grain, insofar as the suitability may affect the quality, quantity or condition of the grain.

HOW GRAIN IS SAMPLED

The first and critical step in conducting any test is representative sampling. If this initial step is not conducted with the necessary diligence, there may be serious mistakes. Without a representative sample, the final grade will not reflect the true grade or value of the grain.

In order for a sample to be considered representative, it must:

- be obtained in accordance with recommended USDA FGIS procedures;
- be of the prescribed size (at least 1000 grams or approximately 1¼ quarts);
- be packaged and handled appropriately and securely, protected from contamination, manipulation, substitution, and careless handling.

For more information on grain sampling, please refer to USDA AMS publication: “Grain Inspection Handbook – Book 1 Sampling, <https://www.ams.usda.gov/sites/default/files/media/Book1.pdf>

Preliminary Examination

Official Sampling Procedures

Upon the initial sampling and inspection the sampler must:

1. Observe the uniformity of the grain as to class, quality and condition;
2. Make preliminary determinations for "Heating, Infestation, and/or Odor";
3. Draw the representative sample; and
4. Report relevant information to the inspector.

The inspector must review the sampler's remarks/information.

If the inspector suspects the sample is not representative, the inspector will consult the sampler and, if necessary, dismiss the inspection or arrange to obtain another sample.

Probing and Collecting a Sample

A large percentage of grain is sampled with a grain probe. Probe sampling is the only approved method for obtaining samples from stationary lots. If probe sampling is performed correctly, the samples drawn will consistently be representative.

To obtain a proper sample, the proper equipment should be utilized,

Hand Probe: This standard piece of equipment, sometimes referred to as a “trier”, is constructed of brass or aluminum. Probes come in various

sizes with standard lengths of 5, 6, 8, 10, and 12 feet. The type and size of carrier dictates which probe length to be used.

There are two types of hand probes: 1) compartmented probes, in which slots in the outer tube match compartments in the inner tube, and 2) open throat probes, in which the inner tube is open. Open-throat probes tend to draw more of their sample from the top portion of the grain, while compartmented probes draw a representative sample from each layer. All official grain probes are compartmented probes with an outer tube that is 1 3/8-inches in diameter.

Mechanical Probe: There are two types of mechanical probes which are recommended for sampling stationary lots of grain in trucks, railcars, or other open-top carriers.

The gravity-fill probe function is similar to compartmented hand probes except that after the compartment is filled it rotates to an inner tube where it is forced up by air.

The core probe functions by forcing the sample up into the core as the probe is pushed down and then using air to transport the sample to the output point.

A third type, the in-load suction probe, which uses negative air pressure to suck the sample into the bottom of the probe, is not recommended since it tends to overestimate foreign material.

Diverter Type Sampler: In most large grain terminals and export facilities a “Diverter Type” sampler” is used. Within the grain patch, they are located either before or after the scale, and sweeps a sampling container, called a pelican, through the grain stream once every sampling period, which is usually set between 12 and 25 seconds. The grain sample then flows through a pipe to the inspection lab, where it is inspected and graded. Regulations also requires grain arriving by barge at an export elevator to be officially weighed; however, official inspection of this grain is optional.

Sampling Canvas: Heavy canvas cloth or similar material can be used to display the sample from the compartmented probe. Another alternative is a short section of rain gutter or half section of pipe. The sampling canvas or other material should be at least 6 inches longer than the probe used to draw the sample. This size is necessary so that the grain from the entire length of each probe will not spill off the ends of the canvas. Always keep sampling canvases clean, dry, and free of holes.

*Official
Sampling
Procedures*

Sampling Containers: Containers such as heavy cloth or canvas bags and metal buckets or plastic cans may be used to transport the sample to the inspection station. Sample containers should be free of all old grain, insects, and other waste material prior to use. Use air-tight containers or bags lined with a polyethylene liner to store grain in order to prevent loss of moisture and to protect the sample from adverse environmental conditions such as rain or humid weather.

Where to Probe: Where to probe is determined by the size and configuration of the carrier. Recommended probe sites are anywhere in the carrier except the corners and the center of the load, which typically sits directly underneath the loading spout. It is also recommended to vary the probe sites between loads in a random manner. Receiving locations which routinely sample carriers in the same location have found that bad grain seems to migrate to the areas in the load which are not sampled.

HOW GRAIN IS INSPECTED AND GRADED

The effectiveness of the official U.S. grain inspection system is its ability to obtain consistent, accurate, and repeatable results. This depends not only on the official inspector's ability, but other operators across the industry, to sample, inspect, and grade certify the various grains for which standards have been established.

In view of this fact, the Federal Grain Inspection Service (FGIS) has published the Grain Inspection Handbook.

For more information on grain grading procedures, please refer to USDA AMS publication: "Grain Inspection Handbook – Book 2 Grain Grading Procedures: <https://www.ams.usda.gov/sites/default/files/media/Book2.pdf>

The four considered major quality factors are:

- I. Moisture
- II. Bulk Density - Test Weight
- III. Purity – Dockage, Foreign Material, BCFM
- IV. Soundness - Damaged Kernels

Although moisture, protein, and oil contents are not part of the quality factors that determine the "official USDA numerical quality grade", they are important quality factors and are often specified on contracts for many markets. NIT is used for rapid estimation of moisture, protein, and oil contents.

The following is only meant to be a general overview.

Preliminary Examination

Upon the initial sampling and inspection the sampler must:

5. observe the uniformity of the grain as to class, quality and condition;
6. make preliminary determinations for "Heating, Infestation, and Odor";
7. draw the representative sample; and
8. report relevant information to the inspector.

The inspector must review the sampler's remarks/information.

If the inspector suspects the sample is not representative, the inspector will consult the sampler and, if necessary, dismiss the inspection or arrange to obtain another sample.

Official Inspection and Grades

Moisture

Moisture content is an important consideration as it significantly affects storability of the grain. The desired moisture content must be such that the grain quality will be maintained during storage, transportation and delivery, as well as long periods of time the grain may be stored in a warehouse.

Moisture content also affects both the test weight and bulk density. Consequently, these measures should only be referenced on an agreed standardized moisture content. For example, the specific gravity of corn is 1.3, while that of water is 1.0. When the moisture content of corn increases, the test weight of the corn will decrease.

For corn, the determination of moisture content is especially important as there is special emphasis on drying as the grain as it is brought into the warehouse at harvest. Proper management of moisture at harvest and through the drying process can help to avoid corn kernels developing microscopic stress cracks (i.e. checking) in their pericarp. Later, in the course of handling, these stress crack kernels will break up into several parts and the original value will decrease. These broken kernels will initiate the decomposition processes and promote the growth of storage molds and infestation of insects. Heating of the grain mass may occur, possibly resulting in heat damaged and further loss of

grain quality.

Moisture meters are used to determine the amount of moisture within grain presented for sale, a critical assessment of quality that affects the value and storability of the grain. As of 2022, the Agricultural Marketing Service (AMS), FGIS uses the DICKEY-JOHN GAC 2500- UGMA and Perten AM 5200-A as the official moisture meters for all officially inspected grains and commodities.

Handle all cold samples quickly to reduce the possibility of condensation in a warm room. Samples on which snow or ice has melted or which contain snow or ice, are unsuitable for moisture testing.

The sample temperature range limit is between 0 - 40 degrees Celsius (32-104 degrees Fahrenheit). The sample-to-instrument temperature difference limit is 20 degrees Celsius (36 degrees Fahrenheit). If the instrument finds any of these limits exceeded, it will not display moisture results.

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Because of wide variations between room and grain temperatures throughout the year, it is not possible to predict exactly how long after the thermometer has been inserted into the grain that the temperature should be read. Generally, three to five minutes is sufficient to obtain an accurate temperature.

Keep all samples in sealed moisture-proof containers if they cannot be tested within approximately 15 minutes. Do not use paper bags, fiber cartons, or similar containers that allow moisture losses. Use metal cans, plastic containers and plastic bags to preserve the sample integrity. Do not file samples with paper identification inserted in the grain. Paper absorbs moisture and lowers the moisture of the grain.

Paper bags, fiber cartons and so forth are not used as moisture sample containers. Containers found to be the most practical for use in determining moisture are moisture-proof, plastic 475-ml containers with openings of approximately 45 mm. Paper identification should not be inserted in the grain samples.

Bulk Density - Test weight per bushel

Test weight, which in the U.S. is the weight in pounds of grain per Winchester bushel (35.2 l), is determined on a 1 quart (1.18 l) sample. If the test weight is extremely low, the soybeans may contain less oil.

The bulk density or “Test Weight”, which in the United States is measured per bushel, is the weight of the grain required to fill a level

Winchester bushel measure (approximately 35.2 liter capacity).

The factor "test weight per bushel" is determined using an approved apparatus which has a kettle capacity of 1 dry quart (approximately 1.1 liters). This determination is made on a representative portion of grain, not less than 1 1/8 to 1 1/4 quarts (1.2 to 1.4 liters) cut from the representative sample using a Burner divider, before removing foreign material using an official test weight apparatus..

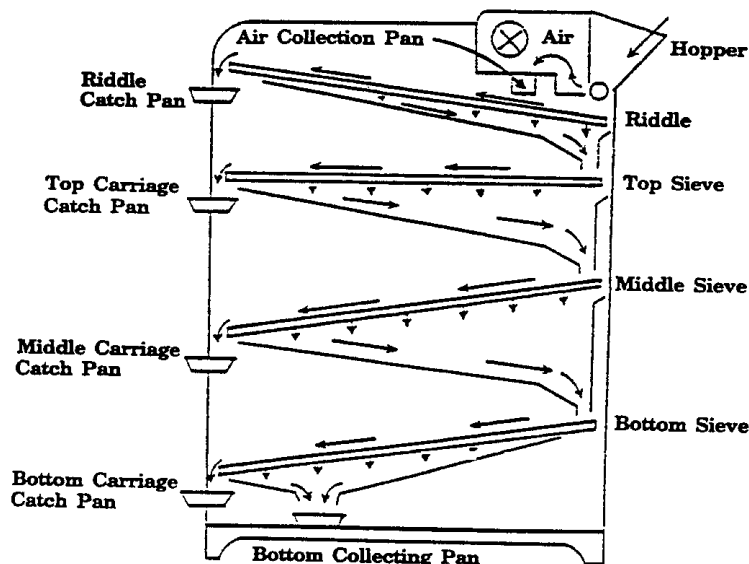
Test weight per bushel is a grading factor. Generally, it is expressed in pounds per Winchester bushel, but upon request it will be converted to kilograms per hectoliter.

To determine test weight, the work sample is poured into the closed hopper which is centered over the kettle. The valve is opened to allow the grain to fill the kettle. A standard stoker held in both hands with the flat sides in a vertical position is used to remove the excess grain from the top of the kettle with three full-length, zigzag motions. The kettle is hung on the beam, and the beam weights are moved until the beam is perfectly balanced. Then the test weight per bushel is read.

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Dockage

Dockage is a factor determined for barley, flaxseed, rye, sorghum, triticale and wheat, but not for other grains. Dockage consists of material which can be easily removed by machine and includes material lighter than, larger than and smaller than the grain.



Dockage is determined with a special machine called the Carter Dockage Tester. The dockage tester uses aspiration (air) and a

combination of riddles and sieves to prepare samples for grading by removing the readily separable foreign matter. Generally, the foreign material removed consists of all matter lighter, or of a different size than the grain. Like moisture, dockage does not influence the numerical grade of the grain, but it always is determined and reported on the certificate.

After dockage is removed, a portion of the sample is manually examined for foreign material, which is all material remaining in the sample other than the predominant grain. Foreign material includes materials which could not be separated mechanically, such as seeds and other grains similar in size and weight to the grain.

The Dockage Tester can also be used to determine the percentage of broken corn and foreign material in corn. Broken corn and foreign material is a grading factor in corn.

Foreign Material

A test used to determine the “purity” of the sample is to measure the foreign material. Foreign matter includes all material other than the grain that is being specified for testing, including; other grains, weed seeds, pods, leaves, stems, etc.

When determining “broken corn and foreign material” (BCFM) for corn, all the components that are foreign to the corn kernels are isolated from the corn sample, especially material that will have unfavorable effects on its utilization and storage life. The mass of this material is weighed. In the USA, sieves having 4.8 mm (14/64 in.) and 2.4 mm (6/64 in.) round-hole are used for this purpose.

Soundness - Damage Kernels

Grain quality, and as it applies in the context of “damage” is a very broad term. More specifically, grain damage is any degradation in the quality of grain; specifically that impacts the soundness of the whole grain kernel. It can relate to many issues such as mechanical damage, change in chemical compositions, insect infestations, and many others. Damage to grain will impact its economic value, price, feed quality, and food product quality, as well as its susceptibility to pest contamination.

Damage to grain can be divided into two general categories; 1) Field Damage, and 2) Storage Damage

Field Damage: Field damage is caused by events that happen to the grain crop while growing and standing in the field. This may include

such things as damage to the grain from plant diseases, field insects, field fungus, molds and mycotoxins, as well as frost damage, etc.

Storage Damage: Storage damage is caused by events that happen between the field and its final end use. Grain may go through any number of storage and handling operations as it moves through the supply chain, each of which can each contribute to grain damage. For example, grain might encounter damage from:

- Breakage due to free fall, conveyors, spouts, grain throwers, elevators, hoppers, dryers, etc...
- Damage from excessive moisture and/or excessive heating during storage or mechanical drying.
- Damage from storage fungus, molds, and associated mycotoxins.
- Damage from storage insects.
- Damage from contamination by foreign materials, animal filth, chemicals, etc...

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Assessing grain damage is a very broad topic. In order to quantify grain damage, one must also possess a deep understand grain quality. In addition, many of the factors that need to be assessed are not easily measured. Many common methods for determining grain damage levels include some type of visible inspection, which can carry with it a large amount of error.

To one extent, damaged grain can be characterized by the extent to which it reduces its storage time. For example, cracked or broken kernels are more susceptible to insect or bacteria as well as chemical degradation.

To another extent, the damage to the actual grain is only one example of losses incurred after harvest. Damage to grain can also occur from contamination by foreign materials, animal filth, chemicals, etc

It can be difficult to address many of the factors that can be considered damage. It is not the purpose of the space available in this manual to address the topic in great detail. As such, we would direct you to the USDA website which contains the most current information on the subject for each type of grain.

USDA AMS – “Grain Inspection Hand Book II – Grain Grading Procedures”

- Chapter 2 Barley: <https://www.ams.usda.gov/sites/default/files/media/Book2.pdf>
- Chapter 4 Corn: <https://www.ams.usda.gov/sites/default/files/media/Book2.pdf>
- Chapter 9 Sorghum: <https://www.ams.usda.gov/sites/default/files/media/Book2.pdf>

A summary of the USDA standards for barley, corn, sorghum and other grains and oilseeds are listed in this hand book. The USDA also provides other materials to support the interpretation and application of these standards in the field.

INTERPRETIVE FACTORS – VISUAL GRADING AIDS

The visual grading aids system represents the foundation for the national inspection system's subjective quality control program, providing an effective management tool for aligning inspectors and assisting them in making proper and consistent subjective grading decisions.

The visual grading aids system was developed to assist inspectors in making subjective grading decisions and to reduce intermarket differences in inspection results.

These images are approved by the FGIS Board of Appeals and Review (BAR) for use in the Official inspection program and referenced throughout the multiple volumes of the Grain Inspection Handbook. The visual grading system consists of the following:

Official Inspection and Grades

- a. **Visual Reference Images (VRI):** Image guides used to ensure consistent and uniform application of grading interpretations and illustrate types of damage in conjunction with written descriptions.

The system consists of a series of commodity specific VRI and descriptive text which help reduce the impact of normal perceptual differences between inspectors. To view individual VRI: <https://www.ams.usda.gov/book/visual-reference-images>

- b. **Interpretive Line Prints (ILP):** Appearance images used as an aid in making subjective grade determinations on general appearance with written descriptions.

Interpretive Line Prints are photographs exhibiting a particular attribute. These prints allow a more uniform application of the general appearance factors. Both the Interpretive Line Slides and Prints are available for viewing at every FGIS Field Office and are available for purchase from the manufacturer.

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The Interpretive Line Slide System consists of a portable table-top viewer and photographic slide transparencies. The portable viewer uses a precisely controlled light source of desired intensity and quality. The Interpretive Line Slides are placed on the viewer at the inspection table to aid the inspector in making grading decisions.

The slides are designed for use with the special viewer only. If they are used in a normal slide projector, they will become bleached by the high intensity light, rendering them unusable for the comparative purposes for which they were intended.

- c. **Other Factors (OF):** Visual aids used in identifying other factors that are not considered damage, such as: foreign substances, weed seeds, toxic substances, types of commodities, and insects injurious to stored grain. To view reference images (VRI): <https://www.ams.usda.gov/book/other-factors>
- d. **Miscellaneous Aids:** Inspectors may use a magnifying glass or similar device for visual identification of small objects

Requirements: All Official Service Providers (OSP), including both FGIS Field Offices and Official Agencies, are required to ensure access to current FGIS generated VRI-ILP for the commodities inspected by the OSP at every inspection location. The OSP is not required to have every VRI available at all times, just the VRIs that apply to the commodity for which they are providing official inspections at that time. (I.e., if the OSP is inspecting Corn, the Corn VRIs must be on-site and accessible to the inspector.)

OFFICIAL CERTIFICATES

Official inspections result in the issuance of official certificates. Certificates report the grade of the grain inspected based on characteristics such as test weight, moisture, cleanliness, and damage. Certificates are issued for the various grains for which standards exist under the U.S. Grain Standards Act and Agricultural Marketing Act of 1946.

Certificates are the final product in the chain of official inspection services. They document the official procedures followed; date, location of the inspection or weighing process, and provide specific service results factor-by-factor or by service requested.

Types of Certificates

- **Class A Official Inspection (*White Certificate*)** is an inspection and certification by an official inspector employed by an official inspection agency of an official sample taken by an official sampler employed by an official inspection agency.
- **Class B Official Inspection (*Yellow Certificate*)** is an inspection and certification by an official inspector employed by an official inspection agency of an official sample taken by a grain elevator or warehouse employee licensed under the U.S. Grain Standards Act.
- **Class C Official Inspection (*Pink Certificate*)** is an inspection and certification by an official inspector employed by an official inspection agency of any submitted sample.
- **Class D Official Commercial Inspection (*Green Certificate*)** is an inspection and certification (if requested) by an official inspector employed by an official inspection agency of a sample-lot of grain obtained by an official sampler employed by an official agency in accordance with the procedures mutually agreed to between the person requesting the service and the official agency.
- **Class E Official Commercial Inspection (*Blue Certificate*)** is an inspection and certification (if requested) by an official inspector employed by an official inspection agency of any submitted sample in accordance with the procedures mutually agreed to between the person requesting the service and the official agency.

An FGIS official Export Inspection Certificate is mandatory for all exported grain. What the importer will require is a Class A Official Inspection (White Certificate).

An FGIS official Weight Certificate is mandatory for all export grain. In addition the importer may require a Supervision of Grain Weight Certificate that shows the grain loaded and weighed by approved elevator weighing personnel using approved equipment and official procedures for domestic grain weighing.

The exporter should also require an FGIS official Stowage Examination Certificate that certifies the results of an official stowage examination.

HOW GRAIN IS WEIGHED

With few exceptions, official weighing is mandatory for all grain exported from the United States. During weighing operations, technicians employed or licensed by FGIS observe and verify the weighing and loading of grain and monitor scales and grain flow security. The weight may be certified separately or included on the official inspection certificate. "Class X," or official supervision of 100 percent of the weighing process, is required on export grain.

Official Weighing Class "X"

Official Weighing is when official personnel (GIPSA, State, or private employees licensed by GIPSA) determine and certify the quantity of a lot of grain. The official agency in the elevator's area weighs or observes the weighing by physical supervision and monitors the discharge of grain through the scales, out of the elevator, into a carrier.ⁱⁱ

Official Weighing Procedures

Class X weighing is 100 percent supervised by licensed official personnel, who then issue an official "white" certificate.

Supervision of Weighing Class "Y"

Domestic shipments may be Class X or Class Y weighed. Upon request of an applicant, GIPSA can provide Class Y (Official) weighing service under the United States Grain Standards Act (Act). Approved elevator weighing personnel perform the weighing using GIPSA approved scales under GIPSA supervision. Supervision is provided by GIPSA employees or a designated agency in an elevator's area. They (designated agencies) establish the cost for this service and submit their fees to GIPSA for approval.ⁱⁱⁱ

Class Y weighing is performed by elevator personnel who do the weighing and issue "yellow" certificates.

Scales and Weighing

The scales used for the official weighing of grain and commodities must be installed and operated under FGIS guidelines.

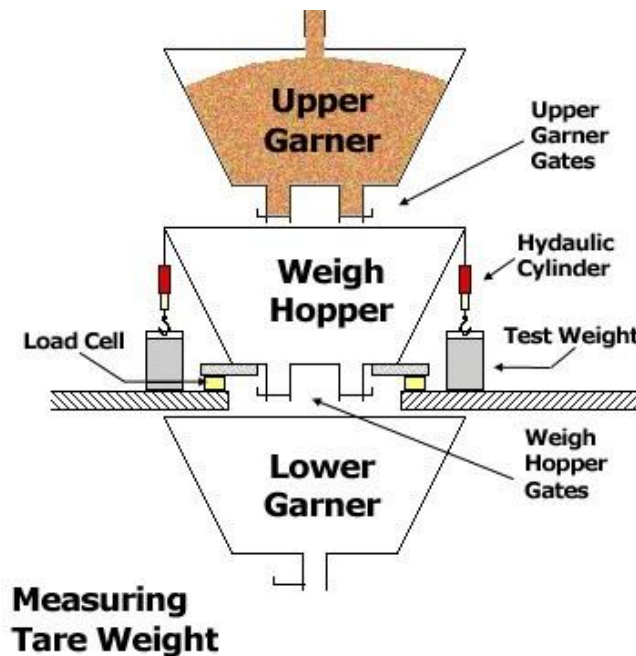
Scales at export elevators are tested every six months and must remain accurate to the nearest one pound per 1,000 pounds. Accuracy of the standard weights used to calibrate scales is verified every three years, or as needed.

In addition to scale testing, FGIS calibrates 13 railroad master track scales to the National Bureau of Standards' official track scale under an agreement with the American Association of Railroads. These master scales calibrate track scales across the United States.

Most U.S. grain is weighed via an electronic weighing system. The system consists of a load receiving element (i.e., weigh hopper, platform, etc., with load cells), an indicating element (i.e., digital instrument), a printer and the associated material handling equipment. The load cell senses the amount of the applied load in the load receiving element and produces an output voltage that is sent to the digital instrument. The digital instrument converts the output voltage into a digital display. The tape printer records the digital display onto a tape or ticket for a permanent record.

Bulk Weighing Scales: In large grain elevators, terminals and export facilities, all official weighing of loose grain is performed on "Bulk Weighing Scales". This is automated and located within the grain path just prior loading on the carrier or a shipping bin.

Official Weighing Procedures



Source: USDA AMS "Operation of a Bulk Weighing Scale Overview"
<https://www.ams.usda.gov/resources/operation-bulk-weighing-scale>

A bulk weighing scale weighs a batch of grain in a "Weigh Hopper" which sits on load cells or levers. Grain cannot flow into or out of the Weigh Hopper while the scale is recording a weight. During this time, grain flowing to the scale accumulates in another hopper, the "Upper

Garner”, directly above the Weigh Hopper. After the weight is recorded, the Weigh Hopper dumps its grain into a “Lower Garner”, which releases it at a rate which will not overload the conveyor belts underneath. Grain enters the Weigh Hopper through slide gates at the bottom of the Upper Garner and leaves through slide gates at the bottom of the Weigh Hopper. The operation of the gates is controlled by a computer “Scale Controller”, which also records weights and generates an alarm if it detects a malfunction.

Levertronic Scales

There are two types of electronic scales: levertronic and full electronic. Levertronic scales are mechanical scales that have been converted to electronic scales by inserting a load cell into the lever system. The dial used to obtain and print a weight is replaced with a digital instrument and printer.

Full Electronic Scales

In full electronic scales, the load receiving element is either supported by, or rests on, the load cells.

Digital Instrument with Printer

Digital instruments, printers and control boards are located in the control room. The control room is the operations control center for the export elevator. It may be located in the elevator or in a building separated from the elevator.

A digital instrument may have some sort of control that allows the operator to manually or automatically operate the gates of the garners and the scale. In the manual mode, the operator controls the operation of each cycle; in the automatic mode, the scale cycle repeats in succession.

Elevator personnel control equipment with computer graphical displays interfaced to equipment in the elevator. FGIS monitors grain flow with these same graphical displays. Elevator personnel can control bin selection, tripper movement, diversion points, legs, conveyor belts, slides and gates from this board. Official weighing personnel monitor export grain flow after weighing and sampling to assure that all of the grain weighed and sampled is actually delivered to the vessel.

Scale Tapes

In supervising manually operated electronic weighing systems, the official weighmaster continually verifies that the weight value displayed

Official Weighing Procedures

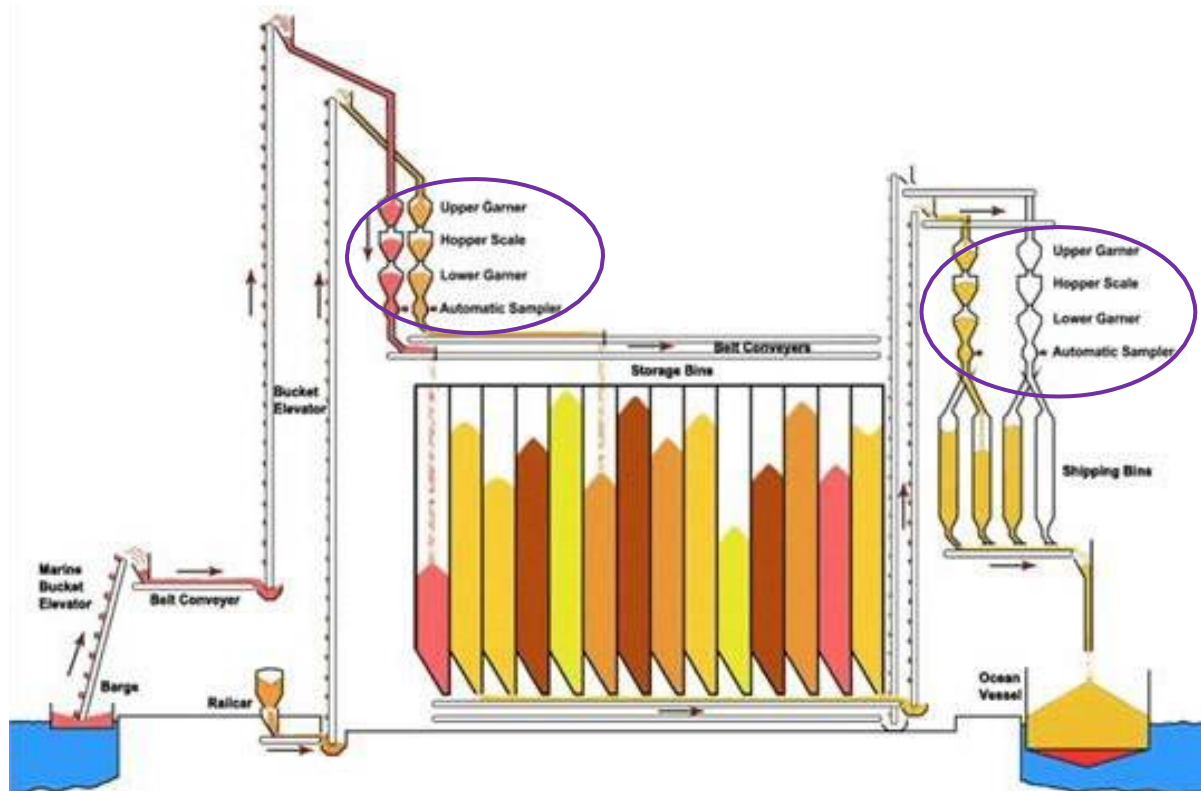
on the digital instrument is the same as the printed value on the scale tape of the ticket to assure proper system operation and to detect any printer malfunction.

Official Weighing Procedures

The weight of each draft is added to determine the sub lot total. The official weighmaster records the number of the sub lot on the tape and initials the total weight. When the tape is removed from the printer, the official weighmaster records the time, carrier identification, kind of grain, tape number and scale numbers. If this information is printed on the tape automatically, the weighmaster verifies the accuracy of the information and initials it.

AUTOMATED WEIGHING AND SAMPLING SYSTEMS

Since 1989, FGIS has been encouraging export elevators to install automated systems to monitor grain flow paths, maintain weight records, and activate alarms and shut-down devices, if necessary.



Source: USDA AMS “Export Elevator Overview”
<https://www.ams.usda.gov/resources/export-elevator-overview>

Such systems can monitor flow paths more diligently than humans and are less likely to record erroneous weights. In addition, they can prompt

*Official
Weighing
Procedures*

personnel to perform scale checks and reduce the need for inspection personnel to visit sites inside the elevator. Additionally, as entering an operating elevator always involves some risk, an automated system can improve safety.

An export elevator can load a ship with 60,000 tons of grain, worth over \$30 million, in less than two days. The weight certificate must be very accurate, due to the large sums of money involved. GIPSA typically has teams of 3-5 people to inspect and weigh that grain: a shift supervisor, a weigh master, a sampler, a grader, and protein analyst or mycotoxin tester.

An order of grain to be loaded aboard a ship, referred to as a "lot", is divided into smaller units called "sub lots" for inspection purposes. A sub lot which does not pass inspection, referred to as a "material portion," is not allowed to be loaded onto the ship. Grain is inspected by sub lots rather than waiting for the entire lot to be loaded so the lot will be of uniform quality. A lot is often divided among several customers at its destination, so it is important for no customer to be stuck with a pocket of bad grain. Also, a pocket of bad grain could spoil during the voyage and contaminate the rest of the shipment.

Every elevator has a different layout. The grain is weighed, sampled, and held in a shipping bin while it is being graded. Grain which has passed inspection is loaded onto a ship.

The elevator is responsible for contracting for the design and installation of the official automated system because it must be integrated with the elevator's own control system. Repairs and upgrades are made by the elevator's automation contractor, but must be approved beforehand and checked out afterward by FGIS.

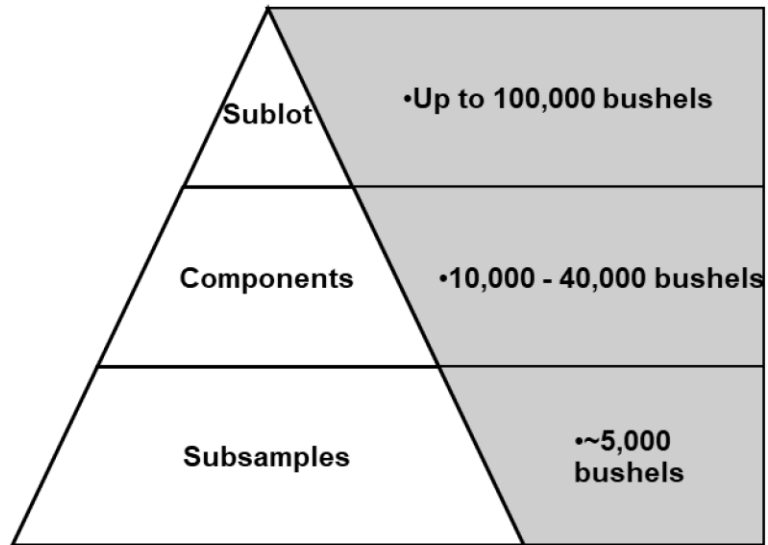
The inspection process requires continuous sampling during loading or unloading. Grain is sampled and accumulated in a systematic process for examination. The elevator benefits because a properly functioning automation system allows FGIS to operate with a smaller inspection team, and hence charge smaller fees.

FGIS advises the elevator and contractors during the development of the system, and carefully checks out the system for security and functionality before approving its use. FGIS assumes control of the automated system after its approval.

UNIFORM INSPECTION PLAN / CERTIFICATE

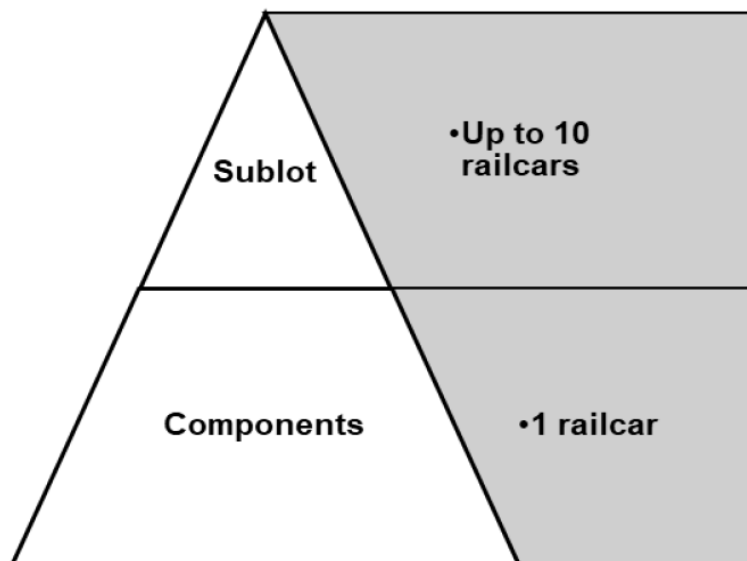
During the loading of an export grain vessel, FGIS follows a uniform plan for sampling and inspection.

Ship Sampling: Ship subplot samples are composed of multiple component and subsamples.



Note: When component ship sample analysis is requested on one or more factors, the maximum subplot size increases to up to 200,000 bushels.

Unit Train Sampling: Unit train subplot samples are composed of multiple component samples.



FGIS Official personnel continuously obtain and examine samples (subsamples, component samples, and subplot samples) during the loading or unloading of ship lots or unit trains to determine uniformity. Official personnel are responsible for determining when to analyze subsamples, component samples, and subplot samples.

Each subsample, component sample, and subplot sample is analyzed for specific quality criteria as per the Official U.S. Standards for Grain, and in accordance with the terms of the underlying contract.

The inspector uses an inspection log to record his findings for each subplot. Each log contains all of the factor results for each subplot, plus any other observations made by the sampler and inspector. It is a complete record of all inspection information concerning the lot.

The record of the Inspection Log is retained by FGIS; however, a buyer can obtain a copy by requesting it in the contract.

The product of all analyzing, grading and monitoring is the Official Export Grain Inspection Certificate. There are two options under which ship lot grain can be loaded and certified. Under Option 1, the exact grade must be loaded; with Option 2, the exact grade or a better grade can be loaded. Option 2 gives the shipper more flexibility and gives the buyer a potentially better quality of grain.

While the grain standards denote a general level of quality, more stringent criteria can be requested in a contract. For example, if a buyer contracts for U.S. No. 2 or better yellow corn and 3 percent BCFM is excessive for the end use, the contract can specify "U.S. No. 2 or better yellow corn, maximum 2.5 percent BCFM." However, more stringent criteria may command a premium price.

It is also important to specify in the contract all of the optional testing services FGIS is to perform, such as "aflatoxin testing to be performed by FGIS." If FGIS is not specified to perform the test, then it may be done by a private laboratory.

For more information on Cumulative Sum Sampling Plan (CUSUM), please refer to USDA FAS publication: "Cumulative Sum Sampling Plan (CUSUM) Attributes Standards Only, October 2017, <https://www.ams.usda.gov/sites/default/files/media/CumulativeSumSamplingPlan.pdf>

LOADING ORDER

Every buyer of U.S. grain wants to receive a cargo whose weights and quality are accurate and consistent with the terms of the contract. This can come about due to official services provided by the USDA FGIS and an underlying set of uniform standards and procedures. These processes come together with the creation of a loading order.

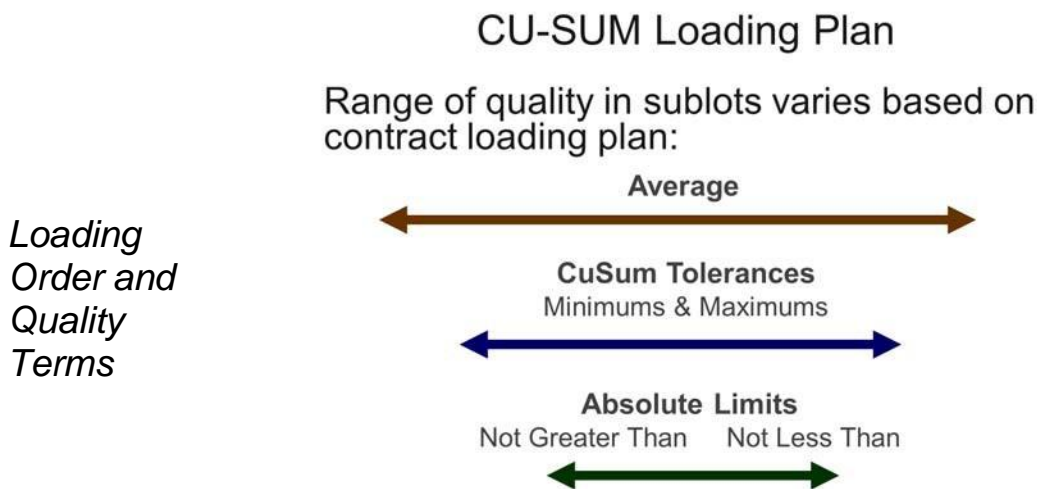
Prior to loading and before inspection can begin, the shipper makes an application for inspection providing a loading order to FIGS personnel, reflecting contract requirements for quality and quantity. The loading order document must reflect the same quality and condition factors contained in the sales contract. Specifically, the document must declare the following:

Loading Order

- (1) The exact quality grade, percent moisture and dockage, when applicable.
- (2) Details on Average, Minimum and/or Maximum or CuSum Quality factors.
- (3) The approximate quantity of grain in the lot.
- (4) The subplot size.
- (5) The destination.
- (6) “Option 1” or “Option 2” certification, or the term “or better.” (See previous page for explanation...)
- (7) Any official criteria (e.g., protein, oil, starch, mycotoxins, falling number), lower limits on sample grade or special grade factors (e.g., free from stones, ergot, or insects), or other maximum or minimum limits for factor determinations.
- (8) Any alternative reporting requirements, such as alternative moisture basis for protein, oil, starch, or falling number or increased precision for certain factors.
- (9) Any other specific requirements needed to fulfill contract requirements.

QUALITY TERMS IN THE CONTRACT

In addition to the Quality Grade, the loading and sampling terms specified within a contract and the resulting load order and loading plan will have an impact on the variability of the quality contained within a single cargo.



*Loading
Order and
Quality
Terms*

For example, specifying quality is to “Average” No. 2 Yellow Corn, will result in greater variability within the cargo and the related quality factor, than if the quality specification has “maximum or minimum limits” or CuSum. Furthermore, absolute limits of “not greater than and not less than” will result in an even tighter specification and even less variability.

FGIS personnel are advised to use the following guidelines when interpreting contract terms and load order specifications.

Average Quality

When “Average” factor inspection is requested, it is the loading elevator’s responsibility to meet the quality level specified in the contract.

If the lot is based on average quality, state the term “Average” after the grade to be loaded; (*e.g., U.S. No. 2 or better YSB – Average*).

The final values indicated on the inspection certificate for “average” factors is based on the final factor average. It will not show the range of results that made up the final average factor values, unless specifically requested.

The “Average” grade will be applied to official criteria factors, and moister; but does not apply to such quality factors such as odor and condition. In addition, aflatoxin results above 20 ppb may not be averaged with results at or below 20 ppb.

Maximum and Minimum Limits

Load orders can specify maximum or minimum limits as quality criteria. Inspection plan tolerances are then applied to a specific factor if the load order indicates a maximum or minimum limit.

If average on most factors and minimum and/or maximum on select factors, the contract and loading plan will state the grade accordingly (*e.g., U.S. No. 2 or better YSB – Average except Moisture maximum 13.0 percent, Foreign Material maximum 2.0 percent*).

To express a minimum and/or maximum factor requested at the grade or specified limit per subplot, the applicant should state the term “No subplot to exceed” with “Minimum” or “Maximum” after the grade to be loaded or after a specific factor (*e.g., U.S. No. 2 or better YSB – No subplot to exceed maximum 1.0 percent FM; or U.S. No. 2 or better YSB - No subplot to exceed, all factors minimum or maximum per subplot*). “No subplot to exceed” is not applicable to Average Quality.

Load orders which specify a quality limit without the term “maximum” or “minimum”, are treated as a maximum for factors having maximum limits (*e.g., damaged kernels total (DKT), foreign material, moisture (M)*), or as a minimum for factors having minimum limits (*e.g., test weight per bushel, sound barley*).

Applicants must indicate on the load order wheat protein as a maximum, minimum, or average amount if a specific wheat protein level is shown on the load order. Consider wheat protein expressed as “ordinary” as an average.

Cumulative Sum (CuSum) Sampling Plan

The CuSum method of sequential analysis was developed by E. S. Page of the University of Cambridge. CuSum methodology was first published in 1954 by the *Biometrika*, a peer-reviewed scientific journal by Oxford University Press.^{iv} The method was designed to manage a quality inspection process on an active production line. In statistical quality control, the CuSum is a sequential sampling and analysis technique. It is typically used for monitoring change detection.

**Loading
Order and
Quality
Terms**

The CuSum inspection process was designed to maintain an output of constant good quality throughout the process, rather than to screen out poor quality after it has been produced. As such, the shipper is requested to establish the desired quality level for loading throughout process. The CuSum sampling will tell whether the production meets or fails the intended grade..

For managing grain quality, the shipper is provided with step-by-step quality report as each sample is pulled from the grain flow and graded. This information may then be used to help the shipper control the quality through the loading process. CuSum values provide evidence of improving or worsening quality and signals the need to make improvements.

If minimum and/or maximum (CuSum) on most factors and average on select factors, state the grade accordingly (*e.g., U.S. No. 2 or better YSB – CuSum except Moisture average 13.0 percent, Foreign Material average 2.0 percent*).

Note: CuSum values will not be applied to factors requested on an Average Quality or “No subplot to exceed” basis.

The ability to abuse the CuSum sampling plan by intentionally loading poorer quality grain, after establishing a history of good quality, is limited.

Electing the Certification Option

The applicant for inspection must also select one of two the certification options and indicate this choice on the load order document.

Under **Option 1**, the exact grade of the grain is shown on the certificate.

Under **Option 2**, the lot is certified as being equal to or better than the grade specified by the contract. Option 2 certification is used if the load order specifies “or better” as part of the load order grade, or if Option 2 is specifically requested.

Typically, Option 2 in most frequently selected for grain shipments.

The applicant may change the certification option at a later time, provided the certificates have not been issued or corrected; then, certificates are issued to reflect the new certification option.

STOWAGE EXAMINATION

The USDA FGIS provides an Official Commercial Inspection Services (OCIS), or stowage examination. This OCIS is performed by official personnel or licensed cooperators who visually inspect an identified carrier or container that has been designated to hold grain or related products are fit for loading.

To be considered fit, the carrier's stowage area must be clean, dry, free of odor and infestation and otherwise suitable for receiving or storing grain, insofar as the suitability may affect the quality, quantity or condition of the grain.

To determine cleanliness, stowage space is examined for:

1. **Previous Cargo.** If the stowage space contains fertilizer, old grain, loose cement, coal, lime, dunnage, refuse or other debris, the space is declared unfit for loading.
2. **Rust Scale and Paint Scale.** Rust scale and paint scale must be checked to see if they could become dislodged from the carrier and contaminate the grain. Loose scale will break when struck with a fist or when light pressure is applied with a knife blade under the edge of the scale. The use of safety goggles is recommended when scraping rust or similar material. Rust scale should not be confused with oxidation rust, which forms on exposed metal surfaces. Oxidation rust will not flake off when light pressure is applied. For ships, the area is declared unfit when a single area of loose rust scale or paint scale is more than 25 square feet (approximately 2.3 square meters), or several patches of loose rust scale or paint scale together exceed 100 square feet (approximately 9.3 square meters).
3. **Unsanitary conditions.** If the stowage space contains any animal filth, rodent excreta, bird excreta, decaying animal or vegetable matter, sewage or any other unsanitary conditions, the space is declared unfit for loading. Sites close to the hatch (e.g., ship deck, top side of the hatch cover) also must be clean.
4. **Unknown substances.** If any unknown substances are found, the space is declared unfit for loading. All unknown substances are considered contaminating. FGIS does not try to identify them but, if possible, FGIS will take samples of the substance and show them to the supervisor for future reference.

To determine dryness, the stowage space is examined for hydraulic

*Stowage
Exam*

fluid, standing water, puddles or any amount of leaking water; if any of these are present, the space is declared unfit for loading. Condensation, commonly called "sweating," can form on bulkheads or lower decks. This is unavoidable and poses no threat to the grain.

If the stowage space is contaminated with the odor of petroleum, an oil-based chemical, decaying animal or vegetable matter, or any other commercially objectionable foreign odor, the space is declared unfit for loading.

Finally, the stowage space is examined for infestations of rodents and/or insects. The discovery of any live rodents or more than two live insects injurious to stored grain will result in the space being declared unfit for loading.

PHYTOSANITARY REQUIREMENT AND CERTIFICATE

The United States is a signatory to the International Plant Protection Convention (IPPC) of the Food and Agriculture Organization (FAO). The IPPC develops and adopts International Standards for Phytosanitary Measures (ISPMs) by which an importing country may require a phytosanitary certificate for certain agricultural products. Under the IPPC, the National Plant Protection Organization (NPPO) of the exporting country is responsible for establishing and maintaining a national export certification system to produce valid and credible phytosanitary certificates.

When an importing country has phytosanitary regulations prohibiting the entry of certain pests. The U.S. government will examine the cargo for the presence of the prohibited pests and issue a phytosanitary certificate.

The FGIS has the authority to provide phytosanitary inspections of grain and processed grain products. In addition to inspecting grain (milled or not), FGIS is authorized to provide phytosanitary inspections for the grain products. The commodity must be produced solely from grain (only the seeds of a plant) and be one of the acceptable species in order for FGIS to conduct the inspections.

This certificate is issued by the USDA's Animal and Plant Health Inspection Service (APHIS), not by FGIS.

FUMIGATION AND GRAIN PROTECTANTS

A fumigant is a gas which penetrates the grain kernels and kills insects at all life stages: eggs, larvae and adults. Also, gas grain protectants are applied to the surface of grain and kill adult insects on contact, but do not kill insect eggs.

Fumigation and Grain Protectants

When a portion of cargo is graded "infested," the exporter can accept the official certificate with "infested" designation, return the infested cargo to the elevator or continue to load the vessel and then fumigate the cargo while in transit, following procedures specified by FGIS. If the exporter selects the last option, the "infested" designation is not reported on the certificate because the condition is considered remedied.

The fumigation is performed by a registered applicator. FGIS personnel observe the fumigation to assure that it is performed according to correct procedures. FGIS requires the applicator to sign a statement on the applicator's company's letterhead stating that the fumigant was applied according to U.S. government regulations and the manufacturer's instructions.

COMPLAINTS

If a discrepancy between grain quality at origin and destination occurs, an importer can register a complaint with the U.S. Embassy's agricultural counselor, attaché or trade officer. The embassy will then notify the USDA's Foreign Agricultural Service (FAS) in Washington, D.C., who in turn will notify the FGIS Office of International Affairs (OIA). The OIA will review the complaint, gather information about the reported discrepancy and respond to the complaint. However, FGIS does not issue a new certificate, nor does it function as an arbitrator between buyer and seller.

Complaints

File samples are held for 90 days after loading. If they are available when the complaint is filed, they will be re-examined during the investigation. If a receiver chooses to submit a sample from destination, then it will also be examined. The FGIS findings are sent in a report through the U.S. Embassy to the originator of the complaint. The facts in the response are available to any person having financial interest in the grain.

For further information on U.S. inspection, sampling and grading standards, contact:

Federal Grain Inspection Service, USDA/GIPSA

Room 1627 -- South
14th and Independence Avenue, SW
Washington, DC 20250
Phone: (202) 720-9170
FAX: (202) 720-2333
Email: fgis.oda@usda.gov

National Grain Center

USDA, AMS, FGIS
10383 N Ambassador Drive
Kansas City, Missouri 64153
Fax: 816-872-1253

Questions and inquiries: Email FGISASKTSD@usda.gov

U.S. GRADE STANDARDS

BARLEY

Barley - Grain that, before the removal of dockage, consists of 50 percent or more of whole kernels of cultivated barley (*Hordeum vulgare* L.) and not more than 25 percent of other grains for which standards have been established under the United States Grain Standards Act. The term “barley” as used in these standards does not include hull-less barley or black barley.

Any barley of a six-rowed or two-rowed type. The class Barley is divided into the following three subclasses:

- (i) Six-rowed barley. Any six-rowed barley that contains not more than 10.0 percent of two-rowed varieties.
- (ii) Two-rowed barley. Any two-rowed barley with white hulls that contains not more than 10.0 percent of six-rowed varieties.
- (iii) Barley. Any barley that does not meet the requirements for the subclasses Six-rowed barley or Two-rowed barley.

*Official
U.S.
Standards*

§810.207 Grades and grade requirements for barley.

Grade	Minimum limits of		Maximum limits of				
	Test weight per bushel (pounds)	Sound barley (percent)	Damaged kernels ¹ (percent)	Heat damaged kernels (percent)	Foreign material (percent)	Broken kernels (percent)	Thin barley (percent)
U.S. No. 1	47.0	97.0	2.0	0.2	1.0	4.0	10.0
U.S. No. 2	45.0	94.0	4.0	0.3	2.0	8.0	15.0
U.S. No. 3	43.0	90.0	6.0	0.5	3.0	12.0	25.0
U.S. No. 4	40.0	85.0	8.0	1.0	4.0	18.0	35.0
U.S. No. 5	36.0	75.0	10.0	3.0	5.0	28.0	75.0

U.S. Sample Grade:

U.S. Sample grade shall be barley that:

- (a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, 4, or 5; or
- (b) Contains 8 or more stones or any number of stones which have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (*Crotalaria spp.*), 2 or more castor beans (*Ricinus communis* L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cocklebur (*Xanthium spp.*) or similar seeds singly or in combination, 10 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1-1/8 to 1-1/4 quarts of barley; or
- (c) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or
- (d) Is heating or otherwise of distinctly low quality.

¹ Includes heat-damaged kernels. Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels.

Malting Barley is divided into the following two subclasses:

(i) Six-rowed Malting barley has a minimum of 95.0 percent of a six-rowed suitable malting type that contains not more than 1.9 percent injured-by-frost kernels, 0.4 percent frost-damaged kernels, 0.2 percent injured-by-heat kernels, 0.1 percent heat-damaged kernels, 1.9 percent injured-by-mold kernels, and 0.4 percent mold-damaged kernels. Six-rowed Malting barley must not be infested, blighted, ergoty, garlicky, or smutty as defined in §810.107(b) and §810.206.

(ii) Two-rowed Malting barley. Barley that has a minimum of 95.0 percent of a two-rowed suitable malting type that contains not more than 1.9 percent injured-by-frost kernels, 0.4 percent frost-damaged kernels, 0.2 percent injured-by-heat kernels, 0.1 percent heat-damaged kernels, 1.9 percent injured-by-mold kernels, and 0.4 percent mold-damaged kernels. Two-rowed Malting barley must not be infested, blighted, ergoty, garlicky, or smutty as defined in §810.107(b) and §810.206

*Official
U.S.
Standards*

§810.204 Grades and grade requirements for Six-rowed Malting Barley.

SIX-ROWED MALTING BARLEY									
Grade	Minimum Limits of -			Maximum Limits of -					
	Test weight per bushel (pounds)	Suitable malting type (percent)	Sound barley ¹ (percent)	Damaged kernels ¹ (percent)	Wild oats (percent)	Foreign material (percent)	Other grains (percent)	Skinned and broken kernels (percent)	Thin barley (percent)
U.S. No. 1	47.0	97.0	98.0	2.0	1.0	0.5	2.0	4.0	7.0
U.S. No. 2	45.0	97.0	98.0	3.0	1.0	1.0	3.0	6.0	10.0
U.S. No. 3	43.0	95.0	96.0	4.0	2.0	2.0	5.0	8.0	15.0
U.S. No. 4	43.0	95.0	93.0	5.0	3.0	3.0	5.0	10.0	15.0

¹ Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels or considered against sound barley.

Notes: Malting barley must not be infested in accordance with §810.107(b) and must not contain any special grades as defined in §810.206. Six-rowed Malting barley varieties not meeting the requirements of this section must be graded in accordance with standards established for the class barley.

§810.205 Grades and grade requirements for Two-rowed Malting barley.

§ 810.205 Grades and grade requirements for Two-rowed Malting barley.									
Grade	Minimum Limits of -			Maximum Limits of -					
	Test weight per bushel (pounds)	Suitable malting type (percent)	Sound barley ¹ (percent)	Damage Kernels ¹ (percent)	Wild Oats (percent)	Foreign material (percent)	Other grains (percent)	Skinned and broken kernels (percent)	Thin barley (percent)
U.S. No. 1	50.0	97.0	98.0	2.0	1.0	0.5	2.0	4.0	5.0
U.S. No. 2	48.0	97.0	98.0	3.0	1.0	1.0	3.0	6.0	7.0
U.S. No. 3	48.0	95.0	96.0	4.0	2.0	2.0	5.0	8.0	10.0
U.S. No. 4	48.0	95.0	93.0	5.0	3.0	3.0	5.0	10.0	10.0

¹Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels or considered against sound barley.

Notes: Malting barley must not be infested in accordance with §810.107(b) and must not contain any special grades as defined in §810.206. Two-rowed Malting barley varieties not meet the requirements of this section must be graded in the accordance with standards established for the class barley.

*Official
U.S.
Standards*

§810.207 Special grades and special grade requirements.

- (a) Blighted barley. Barley that contains more than 4.0 percent of fungus-damaged and/ or mold-damaged kernels.
- (b) Ergoty barley. Barley that contains more than 0.10 percent ergot.
- (c) Garlicky barley. Barley that contains three or more green garlic bulblets, or an equivalent quantity of dry or partly dry bulblets in 500 grams of barley.
- (d) Smutty barley. Barley that has kernels covered with smut spores to give a smutty appearance in mass, or which contains more than 0.20 percent smut balls.

For more information on U.S. Grade Standards for barley, please refer to USDA AMS publication: “U.S. Standards Subpart B – United States Standards for Barley”

<https://www.ams.usda.gov/sites/default/files/media/BarleyStandards.pdf>

CORN

Corn - Grain that consists of 50 percent or more of whole kernels of shelled dent corn and/or shelled flint corn (*Zea mays* L.) and not more than 10.0 percent of other grains for which standards have been established under the United States Grain Standards Act.

§810.404 Grades and grade requirements for Corn

Grade	Minimum test weight per bushel (pounds)	Maximum limits of:		
		Damaged kernels		Broken corn and foreign material (percent)
		Heat damaged kernels (percent)	Total (percent)	
U.S. No. 1	56.0	0.1	3.0	2.0
U.S. No. 2	54.0	0.2	5.0	3.0
U.S. No. 3	52.0	0.5	7.0	4.0
U.S. No. 4	49.0	1.0	10.0	5.0
U.S. No. 5	46.0	3.0	15.0	7.0
U.S. Sample Grade U.S. Sample grade is corn that: (a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, 4, or 5; or (b) Contains stones with an aggregate weight in excess of 0.1 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (<i>Crotalaria spp.</i>), 2 or more castor beans (<i>Ricinus communis</i> L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cockleburs (<i>Xanthium spp.</i>), or similar seeds singly or in combination, or animal filth in excess of 0.20 percent in 1,000 grams; or (c) Has a musty, sour, or commercially objectionable foreign odor; or (d) Is heating or otherwise of distinctly low quality				

Official
U.S.
Standards

§ 810.405 Special grades and special grade requirements.

- (a) *Flint corn*. Corn that consists of 95 percent or more of flint corn.
- (b) *Flint and dent corn*. Corn that consists of a mixture of flint and dent corn containing more than 5.0 percent but less than 95 percent of flint corn.
- (c) *Waxy corn*. Corn that consists of 95 percent or more waxy corn, according to procedures prescribed in FGIS instructions

For more information on U.S. Grade Standards for corn, please refer to USDA AMS publication: "U.S. Standards Subpart D – United States Standards for Corn"

<https://www.ams.usda.gov/sites/default/files/media/CornStandards.pdf>

MIXED GRAIN

Mixed Grain - Any mixture of grains for which standards have been established under the United States Grain Standards Act, provided that such mixture does not come within the requirements of any of the standards for such grains; and that such mixture consists of 50 percent or more of whole kernels of grain and/or whole or broken soybeans which will not pass through a 5/64 triangular-hole sieve and/or whole flaxseed that passes through such a sieve after sieving according to procedures prescribed in FGIS instructions.

§ 810.805 Special grades and special grade requirements.

(a) *Blighted mixed grain.* Mixed grain in which barley predominates and that contains more than 4.0 percent of fungus-damaged and/or mold-damaged barley kernels.

(b) *Ergoty mixed grain.*

(1) Mixed grain in which rye or wheat predominates and that contains more than 0.30 percent ergot, or

(2) Any other mixed grain that contains more than 0.10 percent ergot.

(c) *Garlicky mixed grain.*

(1) Mixed grain in which wheat, rye, or triticale predominates, and that contains 2 or more green garlic bulblets, or an equivalent quantity of dry or partly dry bulblets in 1,000 grams of mixed grain; or

(2) Any other mixed grain that contains 4 or more green garlic bulblets, or an equivalent quantity of dry or partly dry bulblets, in 500 grams of mixed grain.

(d) *Smutty mixed grain.*

(1) Mixed grain in which rye, triticale, or wheat predominates, and that contains 15 or more average size smut balls, or an equivalent quantity of smut spores in 250 grams of mixed grain, or

(2) Any other mixed grain that has the kernels covered with smut spores to give a smutty appearance in mass or that contains more than 0.2 percent smut balls.

(e) *Treated mixed grain.* Mixed grain that has been scoured, limed, washed, sulfured, or treated in such a manner that its true quality is not reflected by the grade designation U.S. Mixed Grain or U.S. Sample grade Mixed Grain.

For more information on U.S. Grade Standards for mixed grain, please

Official
U.S.
Standards

refer to USDA AMS publication: “U.S. Standards Subpart F – United States Standards for Mixed Grain”

<https://www.ams.usda.gov/sites/default/files/media/MixedGrainStandards.pdf>

OATS

Oats - Grain that consists of 50 percent or more of oats (*Avena sativa* L. and *A. byzantina* C. Koch) and may contain, singly or in combination, not more than 25 percent of wild oats and other grains for which standards have been established under the United States Grain Standards Act.

§810.1004 Grades and grade requirements for Oats.

Official
U.S.
Standards

Grade	Minimum limits-		Maximum limits-		
	Test weight per bushel (pounds)	Sound oats (percent)	Heatdamaged kernels (percent)	Foreign material (percent)	Wild oats (percent)
U.S. No. 1	36.0	97.0	0.1	2.0	2.0
U.S. No. 2	33.0	94.0	0.3	3.0	3.0
U.S. No. 3 ¹	30.0	90.0	1.0	4.0	5.0
U.S. No. 4 ²	27.0	80.0	3.0	5.0	10.0
U.S. Sample grade-- U.S. Sample grade are oats which: (a) Do not meet the requirements for the grades U.S. Nos. 1, 2, 3, or 4; or (b) Contain 8 or more stones which have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (<i>Crotalaria spp.</i>), 2 or more castor beans (<i>Ricinus communis</i> L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cocklebur (<i>Xanthium spp.</i>) or similar seeds singly or in combination, 10 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1-1/8 to 1-1/4 quarts of oats; or (c) Have a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or (d) Are heating or otherwise of distinctly low quality.					
¹ Oats that are slightly weathered shall be graded not higher than U.S. No. 3.					
² Oats that are badly stained or materially weathered shall be graded not higher than U.S. No. 4.					

For more information on U.S. Grade Standards for oats, please refer to USDA AMS publication: “U.S. Standards Subpart G – United States Standards for Oats”

<https://www.ams.usda.gov/sites/default/files/media/OatsStandards.pdf>

RYE

Rye - Grain that, before the removal of dockage, consists of 50 percent or more of common rye (*Secale cereale* L.) and not more than 10 percent of other grains for which standards have been established under the United States Grain Standards Act and that, after the removal of dockage, contains 50 percent or more of whole rye.

§810.1204 Grades and grade requirements for Rye

Grade	Minimum test weight per bushel (pounds)	Maximum limits of:				
		Foreign material		Damaged kernels		Thin rye (percent)
		Foreign matter other than wheat (percent)	Total (percent)	Heat damaged (percent)	Total (percent)	
U.S. No. 1	56.0	1.0	3.0	0.2	2.0	10.0
U.S. No. 2	54.0	2.0	6.0	0.2	4.0	15.0
U.S. No. 3	52.0	4.0	10.0	0.5	7.0	25.0
U.S. No. 4	49.0	6.0	10.0	3.0	15.0	--

U.S. Sample grade --
 U.S. Sample grade is rye that:
 (a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, or 4; or
 (b) Contains 8 or more stones or any numbers of stones which have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (*Crotalaria* spp.), 2 or more castor beans (*Ricinus communis* L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 2 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1-1/8 to 1-1/4 quarts of rye; or
 (c) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or
 (d) Is heating or otherwise of distinctly low quality.

Official U.S. Standards

For more information on U.S. Grade Standards for rye, please refer to USDA AMS publication: "U.S. Standards Subpart H – United States Standards for Rye"

<https://www.ams.usda.gov/sites/default/files/media/RyeStandards.pdf>

SORGHUM

Sorghum - Grain that, before the removal of dockage, consists of 50 percent or more of whole kernels of sorghum (*Sorghum bicolor* (L.) Moench) excluding nongrain sorghum and not more than 10.0 percent of other grains for which standards have been established under the United States Grain Standards Act.

There are four classes of sorghum: Sorghum, Tannin sorghum, White sorghum, and Mixed sorghum.

(1) *Sorghum*. Sorghum which lacks a pigmented testa (subcoat) and contains less than 98.0 percent White sorghum and not more than 3.0 percent Tannin sorghum. The pericarp color of this class may appear white, yellow, pink, orange, red, or bronze.

(2) *Tannin sorghum*. Sorghum which has a pigmented testa (subcoat) and contains not more than 10.0 percent non-Tannin sorghum. The pericarp color of this class is usually brown but may also be white, yellow, pink, orange, red, or bronze.

(3) *White sorghum*. Sorghum which lacks a pigmented testa (subcoat) and contains not more than 2.0 percent sorghum of other classes. The pericarp color of this class is white or translucent and includes sorghum containing spots that, singly or in combination, cover 25.0 percent or less of the kernel.

(4) *Mixed sorghum*. Sorghum which does not meet the requirements for any of the classes Sorghum, Tannin sorghum, or White sorghum.

§810.1404 - Grades and grade requirements for Sorghum.

Grading factors	Grades U.S. Nos. ¹			
	1	2	3	4
Minimum pound limits of				
Test weight per bushel:	57.0	55.0	53.0	51.0
Maximum percent limits of				
Damaged kernels:				
Heat (part of total)	0.2	0.5	1.0	3.0
Total	2.0	5.0	10.0	15.0
Broken kernels and foreign material:				
Foreign material (part of total)	1.0	2.0	3.0	4.0
Total	3.0	6.0	8.0	10.0
Maximum count limits of				
Other material:				
Animal filth	9	9	9	9
Castor beans	1	1	1	1
Crotalaria seeds	2	2	2	2
Glass	1	1	1	1
Stones ²	7	7	7	7
Unknown foreign substance	3	3	3	3
Cocklebur	7	7	7	7
Total ³	10	10	10	10
U.S. Sample grade is sorghum that:				
(a) Does not meet the requirements for U.S. Nos. 1, 2, 3, or 4; or				
(b) Has a musty, sour or commercially objectionable foreign odor (except smut odor); or				
(c) Is badly weathered, heating or distinctly low quality.				
¹ Sorghum which is distinctly discolored shall not grade higher than U.S. No. 3.				
² Aggregate weight of stones must also exceed 0.2 percent of the sample weight.				
³ Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, unknown foreign substances or cocklebur.				

Official
U.S.
Standards

§810.1405 Special grades and special grade requirements.

Smutty sorghum. Sorghum that has kernels covered with smut spores to give a smutty appearance in mass, or that contains 20 or more smut balls in 100 grams of sorghum.

For more information on U.S. Grade Standards for sorghum, please refer to USDA AMS publication: "U.S. Standards Subpart I – United States Standards for Sorghum"

<https://www.ams.usda.gov/sites/default/files/media/SorghumStandards.pdf>

TRITICALE

Triticale - Grain that, before the removal of dockage, consists of 50 percent or more of triticale (X Triticosecale Wittmack) and not more than 10 percent of other grains for which standards have been established under the United States Grain Standards Act and that, after the removal of dockage, contains 50 percent or more of whole triticale.

§810.2004 Grades and grade requirements for Triticale.

Grade	Minimum test weight per bushel (pounds)	Minimum limits of					
		Damaged kernels		Foreign material		Shrunken and broken kernels (percent)	Defects ³ (percent)
		Heat damaged (percent)	Total ¹ (percent)	Material other than wheat or rye (percent)	Total ² (percent)		
U.S. No. 1	48.0	0.2	2.0	1.0	2.0	5.0	5.0
U.S. No. 2	45.0	0.2	4.0	2.0	4.0	8.0	8.0
U.S. No. 3	43.0	0.5	8.0	3.0	7.0	12.0	12.0
U.S. No. 4	41.0	3.0	15.0	4.0	10.0	20.0	20.0

U.S. Sample grade --
 U. Sample grade is triticale that:
 (a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, or 4; or
 (b) Contains 8 or more stones or any number of stones which have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (*Crotalaria spp.*), 2 or more castor beans (*Ricinus communis L.*), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 2 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1-1/8 to 1-1/4 quarts of triticale; or
 (c) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or
 (d) Is heating or otherwise of distinctly low quality.

¹ Includes heat-damaged kernels.
² Includes material other than wheat or rye.
³ Defects include damaged kernels (total), foreign material (total), and shrunken and broken kernels. The sum of these three factors may not exceed the limit for defects for each numerical grade.

Official
 U.S.
 Standards

§ 810.2005 Special grades and special grade requirements.

- (a) *Ergoty triticale*. Triticale that contains more than 0.10 percent of ergot.
- (b) *Garlicky triticale*. Triticale that contains in a 1,000-gram portion more than six green garlic bulblets or an equivalent quantity of dry or partly dry bulblets.
- (c) *Light garlicky triticale*. Triticale that contains in a 1,000-gram portion two or more, but not more than six, green garlic bulblets or an equivalent quantity of dry or partly dry bulblets.
- (d) *Light smutty triticale*. Triticale that has an unmistakable odor of smut, or that contains in a 250-gram portion smut balls, portions of

smut balls, or spores of smut in excess of a quantity equal to 14 smut balls but not in excess of a quantity equal to 30 smut balls of average size.

(e) *Smutty triticale*. Triticale that contains in a 250-gram portion smut balls, portions of smut balls, or spores of smut in excess of a quantity equal to 30 smut balls of average size.

For more information on U.S. Grade Standards for triticale, please refer to USDA AMS publication: “U.S. Standards Subpart F – United States Standards for Triticale”

<https://www.ams.usda.gov/sites/default/files/media/TriticaleStandard.pdf>

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Philip A. Shull
President and Founder, The Philip Shull Group, LLC
Minister Counselor (Ret)
U.S. Department of Agriculture

ⁱ USDA Agriculture Marketing Service “Federal Grain Inspection Service”
<https://www.ams.usda.gov/about-ams/programs-offices/federal-grain-inspection-service> Sighted
12th March 2022

ⁱⁱ USDA Agriculture Marketing Service “Weighing Services”
<https://www.ams.usda.gov/services/fgis/weighing-services> Sighted 12th March 2022

ⁱⁱⁱ USDA Agriculture Marketing Service “Weighing Services”
<https://www.ams.usda.gov/services/fgis/weighing-services> Sighted 12th March 2022

^{iv} Biometrika. "Continuous Inspection Scheme". E. S. Page, (June 1954).
<https://academic.oup.com/biomet/article-abstract/41/1-2/100/456627?redirectedFrom=fulltext&login=true> Sighted 12th March 2022

Chapter 5

U.S. Grain Exports and Trade Flows

Until well into the 19th Century, grain was traded regionally in relatively small amounts. Over the course of the past one hundred years, this relatively minor trade has burgeoned into a massive industry that ships millions of metric tonnes every day of the year.

As a share of total consumption, the international grain trade has risen from less than 0.03% in the nineteenth century to more than 20% in 2021. According to USDA data, the global grain trade has increased exponentially to an estimated 576 million tonnes in 2021. Despite the explosion in the volume of trade over the decades, it is still just a handful of nations that provides the bulk of the exports.

Between World War I and World War II, trade in grain first rose sharply due to technological advances, and then fell sharply due mainly to government policies. Following World War I, rapid improvements in steam-powered transportation and telegraph communications triggered a wave of globalization and a revolution in international grain trade. During this period the amount of world wheat production that was exported went from negligible to 18%. Nearly 90% this trade originated from four countries: the United States, Canada, Argentina and Australia. But the sudden increase in globally available supplies resulted in sharply lower grain prices, which hurt many farmers. Many governments reacted by imposing high tariffs on grains and other products, and world trade plunged.

With the advent of World War II commodity prices rallied. Following World War II, global trade once again rose rapidly. World population growth and rising prosperity increased demand for goods, and a reduction in trade barriers greatly facilitated trade. By the 1970's the United States evolved into the world's primary grain-trade superpower. By the end of the 20th Century, the United States annually exported one-third of the internationally traded wheat and 70% of traded corn. Many countries around the world came to depend upon the United States for a growing percentage of their grain needs.

THE GREAT RUSSIAN GRAIN ROBBERY OF 1971-73, AND THE U.S. – RUSSIAN GRAIN EMBARGO” OF 1979

Volumes in the 1970s continued to rise dramatically, fueled in part by growing demand from the Soviet Union for grains and oilseeds. Two major events of the 1970s had a lasting impact on the international grain trade: the “great Russian grain robbery” of 1971-73, and the “U.S. – Russian grain embargo” of 1979.

By the 1960s, the U.S. and the U.S.S.R were deep in the middle of the Cold War. However, this did not stop the daily business of commercial trade between nations. By the late 1960s and early 1970s the United States was carrying uncomfortably large surpluses of grain that were a direct result of on-going government production subsidies and by prevailing government programs.

Given the combination of poor weather across the Soviet Union breadbasket (centered in the Ukraine), reoccurring crop failures, along with questionable agricultural policies, agricultural trade representatives from the Soviet Union often turned to foreign markets to make up shortfalls in seasonal production. In addition, the United States saw increased trade with the Soviet Union as a way to reduce Cold War tensions.

Great Russian Grain Robbery

Prior to the 1970’s, the Soviet Union had purchased only a small quantity of wheat from the United States in 1963. In 1971 the Soviet Union began a policy of importing grain every year to feed its people and increasing livestock herds.

With satellite imagery for crops still over a decade away, harvest estimates were largely dependent on extrapolations from weather reports and direct field observations. Despite reports of crop failures in the Soviet Union and elsewhere in the world, neither governments nor international organizations, nor the grain trade appreciated the magnitude of the pending global grain shortage.

The following year, in 1972, faced with increasing shortages and rising domestic prices, the Soviet Union unexpectedly and quietly bought 10 million tons of wheat, approximately one-fourth of annual total U.S. wheat production. Once the scope of these purchases became known, grain prices rallied sharply

Federal grain subsidies continued to favor bargains for the Soviets buying American wheat. As domestic supplies of U.S. wheat and other grains began to tighten as the large stockpiles of wheat and corn where sharply

reduced. Prices rose sharply, resulting in a “world food crisis” in the United States and elsewhere. In 1973 global food prices increased as much as 30%.

It was estimated in a 1973 paper for the Brookings Institution that the U.S. government wasted \$300 million in public funds by unwittingly subsidizing the Russian wheat purchases. It was also estimated a similar amount was lost in additional potential government revenue. This event became known as the “**Great Grain Robbery**”. However, in its wake, a new market and trade flow for U.S. grain had been created. The Soviet Union would continue to import grain for decades to come. Over the next 20 years the Soviet Union would annually import record volumes of grain, growing from 27 million tonnes in 1975 to a record-high of 47 million tonnes in 1985. These event marked the beginning of the agricultural boom of the 1970s.ⁱ

*U.S. –
Russia Grain
Embargo*

However, this trade was far from smooth or free from politics. Then, in late 1979, the Soviet Union invaded Afghanistan. Following, in January of 1980, in response to the invasion, U.S. President Jimmy Carter enacted a grain embargo against the Soviet Union. The embargo remained in effect until President Ronald Reagan upon taking the office in 1981.

The American farmer felt the brunt of these sanctions as it caused U.S. grain prices to fall sharply. At the same time, the effect of the embargo on the Soviet Union was minimal as they were able to purchase grain from other origins such as Argentina, Brazil and Venezuela. These sources were cheaper than the U.S. grain, as the cost of labor and other costs were much cheaper, though logistical supply chains were less developed.

Although the embargo was lifted the year after it was put into place, the damage had been done to the United States’ reputation as a reliable supplier of agricultural commodities, bringing the effectiveness of unilateral grain embargoes as a foreign policy tool into question as well.ⁱⁱ

Out of these unsettling agricultural and economic events of the 1970s, a number of increasingly robust reporting, monitoring and forecasting programs were established. In addition to several agencies within U.S. intelligence agencies, along with the U.S. Department of Agriculture (USDA), and the National Oceanic and Atmospheric Administration (NOAA), These organizations generate a number of periodic reports covering domestic and world crop production estimates, and sales reporting, along with trade flow and supply & demand analysis.

FLOATING EXCHANGE RATES

Under the post-World War II Bretton Woodsⁱⁱⁱ system of fixed exchange rates, the U.S. Dollar had a fixed value against gold. However, by the early 1960s the U.S. Dollar was becoming significantly overvalued against other currencies due to an increase in U.S. deficit spending driven primarily by both President Lyndon Johnson's Great Society programs and increases in military spending due to Cold War tensions and the Vietnam War. Through a series of events between 1968 and 1973 this establish system, known as the "gold standard", was dismantled.

Floating the U.S. Dollar

In August of 1971, U.S. President Richard Nixon announced a "temporary" suspension of the dollar's convertibility into gold. While the dollar had struggled throughout most of the 1960s remain within the parity levels established at Bretton Woods, this action marked the initial breakdown of the system. Subsequent attempts to revive the fixed exchange rates failed, and by March 1973 the major currencies began to float against each other.^{iv}

The floating of the U.S. Dollar resulted in a sharp decline in its value in relation to other currencies. This made U.S. grain relatively "cheaper" for importing countries to purchase.

Since the collapse of the Bretton Woods system in the early 1970s, International Monetary Fund (IMF) members have been free to choose any form of monetary exchange rate arrangement (except pegging their currency to gold); allowing the currency to float freely, pegging it to another currency or a basket of currencies, adopting the currency of another country, participating in a currency bloc, or forming part of a monetary union.

This devaluation and floating of the U.S. Dollar and other currencies has been a contributing factor, not only to the increase in the price of gold and other precious metals, but also to the general increase in price of commodities across the board.

THE RISE OF GLOBALIZATION SINCE WORLD WAR II

To avoid any misunderstanding lets define "**globalization**" as the spread of technology, products, goods, service and information, across nations. It takes place through a variety of interlinked forces that includes communications, economics, culture, communications, politics, and the environment.

Difference Between Globalization and Globalism

However, let us make a clear distinction between “globalization” and “globalism”. Although “globalization” and “globalism” are similar concepts, there is a difference between them. The primary difference between “globalization” and “globalism” is that globalization is the spread of technology, products, information, and jobs across nations; while globalism is an ideology based on the belief that people, information, and goods should be able to cross national borders unrestricted.^v

The rise of globalization, since the end of World War II can be seen as the result of a series of events. Each of these have had a notable impact on the global grain trade.

Initially, an effort of post-World War II reconstruction and to break down barriers to commerce and trade, culminated in the Bretton Woods conference. The subsequent agreement by world leaders led to a framework for international commerce and finance, along with the founding of several international institutions designed to oversee the processes of globalization. These institutions included the International Bank for Reconstruction and Development (the World Bank), and the International Monetary Fund (IMF).

WTO

Original efforts to remove restrictions on international trade and reduce barriers were carried out as a result of the General Agreement on Tariffs and Trade (GATT), signed on the 30th of October 1947 by 23 countries. This agreement was an effort minimizing barriers to international trade by eliminating or reducing quotas, tariffs, and subsidies while preserving significant regulations. These discussions led to a further series of related agreements.

The GATT Uruguay Round (1986 to 1994) led to a treaty to create the World Trade Organization (WTO) to establish a uniform platform for international trade and a system to mediate any arising trade disputes.

In 1995 the WTO was formally established, an organization for which GATT provided the initial foundation. The WTO is to be an intergovernmental organization that regulates and facilitates international trade between nations. Governments were to use the organization to establish, revise, and enforce the rules that govern international trade.

The efforts of these organizations were to promote free trade by:

- Reduction or elimination of tariffs; creation of free trade zones with

- low or no tariffs;
- Reduction or elimination of capital controls;
- Reduction or elimination of subsidies for local businesses;
- Harmonization of intellectual property laws across the majority of states, with more restrictions and penalties for violations;
- Supranational recognition of intellectual property restrictions (e.g. patents granted by China would be recognized in the United States and all other signatories to the agreement).

Along with these efforts we have also witnessed other bilateral, regional, and multilateral trade agreements, including sections of Europe's Maastricht Treaty 1992 (the foundation treaty for the European Union), and the North American Free Trade Agreement (NAFTA) 1994, among many others. In fact, many countries have found it easier and more feasible to pursue these smaller agreements than to try to update the WTO.

Globalization Globalization and liberalized regulations international business activities, supported an increasing trend in trade, was further driven by the growth of multinational companies. Many of these companies were initially based in the United States, Europe, and Japan, expanding later across Southeast Asia, China, and elsewhere. These multinational organizations facilitated the exchange of goods and services, along with developments in science and technology. In the wake of these events world grain exports rose from 8.5% in 1970, to 16.2% of total world production in 2001.^{vi}

Further advances in technology continued to accelerate the rapid pace of globalization. Since the 1990s, the growth of low cost global communication networks, reaching increasingly into lower income countries, has allowed greatly increased the speed, volume, and efficiency of and reduced the costs communication, financial transactions, and transfer of data, along with other relevant information.

Within the context of agricultural commodities and trade, globalization can be characterized by the interconnection of local private and public markets into one global arena, with a globally accepted set of rules and regulations.

Rapid economic development and population growth has triggered increasing demand for meat and poultry. This trend combined with a gradual opening of developing markets has resulted in sky-rocketing global demand for grain and oilseeds.

At the same time, the revolution in yields and grain production that began during the Green Revolution of the 1970's, and commercialization of biotechnology crops (GMO's) beginning in the late 1990's provided sufficient supply to meet this demand. This progress in productivity continues today as technological developments are being adopted at an increasingly rapid pace. Despite significant price fluctuations from year to year, global grain prices on average have not increased dramatically in real terms over the past several decades.

Over the first quarter of the 21st Century the United States continues to ship record amounts of grain, but has lost market share in whole grain exports as other countries increase their respective exports.

While the United States remains a key exporter, its No. 1 position in soybeans has been supplanted by Brazil, and by Russia as the No. 1 wheat exporter. The United States continues to feel competitive pressure in corn exports from Brazil, Argentina and the Ukraine, driving down its export share.

Globalization

In the 1970's Brazil emerged as a major soybean exporter and continues to play an increasingly significant role in global markets for other agricultural commodities. This role is likely to continue to grow in the decades to come.

Perhaps one of the greatest transformations in the grain trade in recent years can be seen in Russia. The nation moved from a net grain importer of 3 million tonnes per year on average from 1996-2000 to a net exporter of an estimated 49 million tonnes of wheat and coarse grains in 2020-21.

In the last 30 years, grain production in Russia increased by 66% as new land was brought into production. Average yields increased by 76%, further increasing production. By 2000, Russia began consistently producing exportable surpluses. Russia is now the world's largest wheat exporter exporting in 2020/21 39.1 million tonnes out of its 85.3 million tonnes harvest.

Canada was for many years the number one market for U.S. grain exports. While remaining a major market, the rapidly growing economies of Japan, Korea, Mexico and more recently China has been taking increasing volumes of U.S. commodity exports. Competition between major exporters for this business has increased as productivity in other countries has increased proportionately.

More recently, China's emergence as a consistent and major grain importer is a major development. With over one-fifth of the world's

population, it has only 7% of the world's arable land. Imports first surged in the 1990s, following economic reforms, and have continued to increase annually as the nation emerged from isolation. In the first decade following its 2001 accession into the World Trade Organization, China's imports were led by soybeans. By 2021 China had become the largest importer corn and soybean at over 29 million tonnes and 100 million tonnes, respectively, and buying over 10 million tonnes of both grain sorghum and wheat.

In recent years China has also become the primary destination for grain sorghum. This has been driven by their increasing domestic demand for feed grains, along with the growing consumption of Baijiu, a colorless liquor typically coming in between 35% and 60% alcohol by volume.

With one of the fastest-growing economies in the world in which animal protein is highly prized, imports of corn and other feed grains is likely to fix China as a dominant force for the foreseeable future.

SUPPLY CHAIN – STORAGE, HANDLING AND TRANSPORTATION

Globalization

Continuous improvements across the supply chain are another pillar supporting the explosive growth in grain trade since WWII. Advances in the storage, handling and transportation sectors increased operational efficiency. These developments created capacity for the large increase in volumes and a resulting drop in per unit costs.

An example of these improvements can be seen with the advent of the 100 car "unit train". Larger ocean vessels, improvements in loading and unloading technologies, and more reliable and efficient surface transportation, have greatly facilitated the global movement of agricultural commodities, as well as all goods.

One of the dramatic advances in transportation came with the introduction of shipping containers and the development of the inter-modal network. Although comprising only a small portion of total grain and other related agricultural commodities, shipping containers provide added traceability for specialty bulk grains such as higher value "Identity Preserved" or "Organic" grains that are purchased in smaller volumes. In addition, containers allow shipping of processed grains such as meal, starch, and flour.

Another key development supporting the expansion of the global grain trade has been the revolution in communication and technology. As explained in other chapters, the development of instantaneous global access to market, pricing, and other information has created international commodities markets in which traders around the world can conduct

business with confidence and reduced risk. As we progress through the 21st century, the demand for timely information will also continue increase along with the need for food, fiber and fuel.

LOOKING AHEAD...

When measured by volume, capacity, quality, and cost per unit, the international grain trade is unquestionably the most productive and efficient it has ever been.

Looking to the future, the global grain trade is likely to be shaped by the same combination of factors that shaped its past, including evolving production technology, changing population trends, changing demographics and dietary preferences, income growth, continuing advances in transportation, distribution, and communications, and the overriding impact of evolving government policies.

A recurring issue is the “**food versus fuel**” dilemma, i.e. whether to divert a certain portion of limited farmland or crops for the production of renewable biofuels instead of for food. This long-standing debate involves wide range of views over how to strike this balance. There is continuing disagreement on the significance of the issue, what may be causing it, as well as what can or should be done to remedy the situation. Especially in times of shortages and high prices, this debate can become quite heated and controversial. For example, the current global push for renewable biofuels and electric v. fossil fuel vehicles is likely to grow in coming years, along with the demand for improved diets.

*Looking
Ahead*

Another element that makes the “food v. fuel” debate so difficult to resolve is the fact that today’s food and agricultural production, processing, distribution and storage systems require tremendous amounts of fuel and other forms of energy to function.

In addition to the traditional factors discussed above, there are a number of new drivers on the horizon that appear certain to impact the trade flow of agricultural commodities. These include how governments and producers adapt to climate change, along with an increasing focus on the “sustainability of production.

Despite the technical advances that allow grain to be shipped in ever greater volumes, the age-old issues of protectionism, tariffs, quotas, scientifically unjustified technical trade barriers, and prohibitions on exports continue to constrain trade. As described above, the flow of commodities in and out of countries has fluctuated significantly as government policies evolved and changed. Primary drivers of freer trade were population growth (especially in developing countries), income

growth, and the desire to access cheaper food sources.

In the near future we can anticipate that changing population demographics are going to play a greater role in shifting demand. Changes in geographic distribution of populations, and a projected negative population growth rate, will dramatically impact demand for food, fiber and fuel.

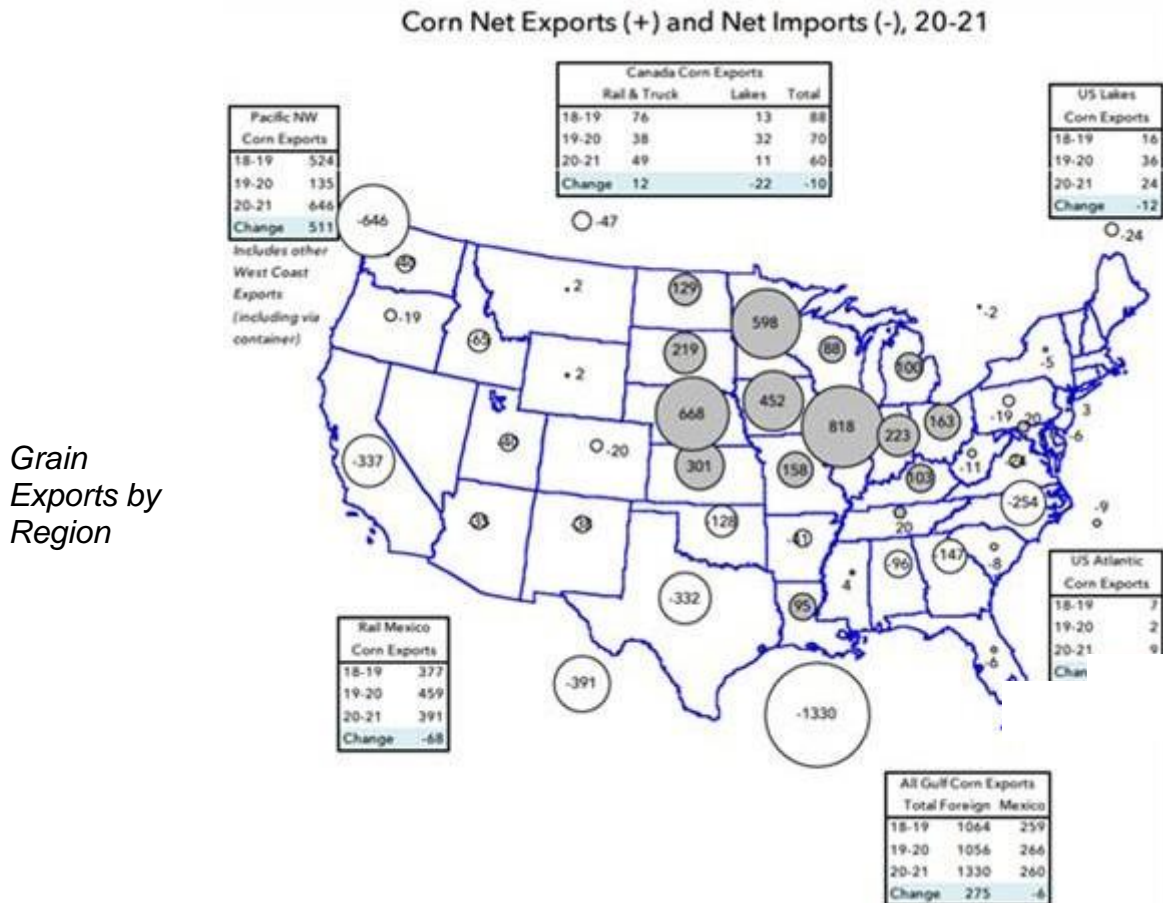
History has shown that grain flows will shift over time, sometimes rather quickly. Political events can impact global trade for years and even decades to come. There are lessons to be learned in studying events of the past.

While it's not possible to precisely identify what the next disrupting event may be and how trade flows may shift, we must always be alert to potential issues on the horizon.

UNITED STATES GRAIN EXPORTS REGIONAL AREAS

Changing global and domestic economic conditions drive the demand for food and agricultural products, providing the foundation for U.S. agricultural trade. The underlying drivers of these changes include world population, disposable income, economic growth, and trade policies. Other factors affecting agricultural trade include global supplies and prices, changes in exchange rates, and government support for agriculture. As such, the composition and pattern of both agricultural exports and imports shift to reflect changes

The U.S. is the world's second largest trader of agricultural commodities and products, following the European Union. U.S. agricultural exports and imports have both increased significantly over the last quarter century. This had been due to the economic ascension of many emerging economies, as well as the implementation of policies that have expanded U.S. access to foreign markets. Over that same period, the geographic and product composition of U.S. agricultural trade has shifted, as rising incomes and growing supply capacity of emerging economies have reshaped global supply and demand for agricultural and food products.



The United States has a significant exportable surplus of grains and oilseeds. The United States exports approximately 25 percent of the grain it produces and just under half of its soybeans.



Grain Exports by Region

This surplus is exported from every coast in the country, as well as from Canadian ports along the St. Lawrence Seaway and in the Pacific Northwest. In addition, notable volumes are exported across land borders to neighboring Canada and Mexico by both road and rail transport. These can be divided into seven geographical ranges:

- U.S. Gulf
 - Mississippi River / Center Gulf / NOLA
 - Texas / Western Gulf
 - East Gulf / Mobile
- Atlantic Coast
- Pacific Northwest
- Great Lakes
- Interior
 - Mexico
 - Canada
 - Los Angeles / Long Beach (*Container Ports*)

Each of the six export ranges handling grain export, (four via ocean ports and two by land crossings), have a unique relationship with one or more

interior producing regions. This relationship is characterized by its geography and the underlying mode of transportation used to bring these commodities into an export position.

The two largest grain exporting regions in the U.S. are the U.S. Gulf and the Pacific Northwest (PNW). Typically, a larger share of ocean-vessel loading activity (corresponding with a higher volume of grain exports) occurs in the U.S. Gulf.

*Grain
Exports by
Region*

However, there is a competitive pricing tension and market dynamics between these two important exporting regions. Generally, as ocean freight rates increase, the relative rates of shipping from the PNW relative to the Gulf (the freight spread), result in the more competitive rates from the PNW. This will cause some shippers to switch their export grain shipments from the Gulf to the PNW as it becomes the overall lowest cost pathway. As the “freight spread” continues to increase, even more shippers will switch from the Gulf to the PNW. This will be reflected in a drop in exports (along with a drop in vessel loading activity) through the Gulf and more through the PNW.

Conversely, as ocean freight rates decrease, the relative rates of shipping from the PNW relative to the Gulf (the freight spread), result in the more competitive rates from the Gulf.

It is also important to note here, the shipping time to east Asian destinations from the PNW is about two weeks less than that out of the Gulf when transiting the Panama Canal.

U.S. GULF

U.S. Gulf - An area that includes Mississippi Gulf, Texas Gulf, and East Gulf.

The U.S. Gulf, which spans the coast line of the Gulf of Mexico is divided into three areas that are generally referred to as the East Gulf, Center Gulf and the Texas or West Gulf.

- The East Gulf refers to the ports of Mobile, Alabama and Pascagoula, Mississippi.
- The Center Gulf refers to the Mississippi River in the general vicinity of New Orleans, Louisiana.
- West Gulf refers to ports in Texas.

Of these areas, the most important by far is the Center Gulf, which is located at the downstream terminus of the Inland Waterway. Soybean export shipments from the East Gulf each year are usually limited to locally grown soybeans for which the East Gulf represents the most convenient market.

MISSISSIPPI RIVER SYSTEM / CENTER GULF

Mississippi River / Center Gulf - A grain export region that includes export elevators along the Mississippi River at Ama, Belle Chasse, Convent, Darrow, Destrehan, Paulina, Port Allen, Reserve, and Westwego, LA.

The greatest number of U.S. export elevators and facilities are located upriver from the Gulf along the inland waterway system connected to the Mississippi River. These export elevators take advantage of barge transportation to ship bulk commodities efficiently at relatively low costs from the interior to ocean-vessel loading areas along the Gulf Coast.

Mississippi River / Center Gulf

This Center Gulf region, services the Mississippi River and its navigable tributaries that extend deep into the fertile heart land of North America's grain producing regions. The Mississippi River system is the primary waterway for moving agricultural products by barge. It is especially important for transporting bulk grains and oilseeds from the Midwest to export ports in the New Orleans region.

Long before the first European explorers reached the waters of the Mississippi River, Native Americans were using this network of rivers for travel and trade.

Over the past 500 years the Mississippi River and its tributary waterways have evolved into the largest navigable inland waterway system in the world providing a transportation gateway into fertile prairies and plains found in the interior of the United States.

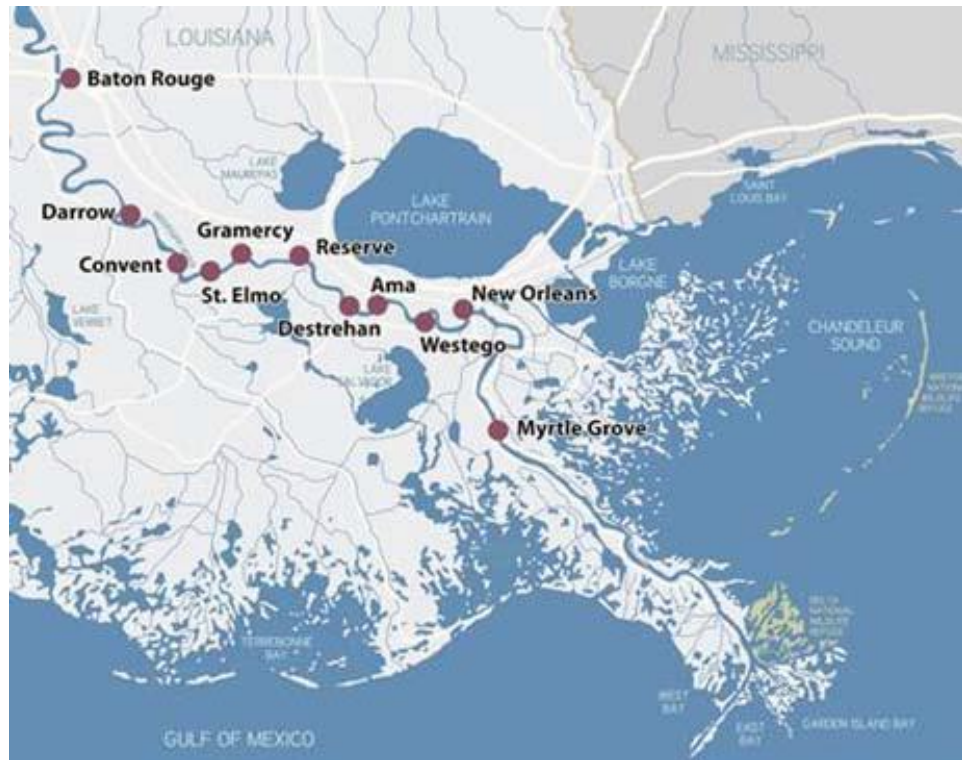
Today the Mississippi River system continues to be the primary artery for U.S. grain exports serving global markets for corn, sorghum, wheat, soybeans and other grain products.

The New Orleans Port Region is used to move a significant percentage of U.S. waterborne agricultural exports, 34 percent in 2023. The majority of these exports were bulk grains and bulk grain products, such as corn, soybeans, animal feed, and rice.

In a typical year, Mississippi Gulf ports ship over 20 million tonnes of grain to their final destinations around the world.

The New Orleans Port Region brings together all modes of transportation, including ocean vessels, barge, rail, and trucks. The Lower Mississippi is currently maintained to a navigable depth of 45 feet.

*Mississippi
River /
Center
Gulf*



Ocean-going vessels access to bulk loading facilities along the Mississippi River from Baton Rouge to Myrtle Grove, Louisiana; collectively referred to as the New Orleans Port Region. These ports are close enough together to act as single port complex. The grain elevators in the New Orleans Port Region are located from Mississippi River Mile Marker 228 through 61, including facilities at:

South Louisiana, includes:	
- Ama	▪ Baton Rouge
- Convent	▪ Darrow
- Destrehan	▪ Gramercy
- Reserve	▪ Myrtle Grove
- St. Elmo	▪ New Orleans
- Westwego	

There are nearly 6,000 miles of navigable river in the Mississippi River Basin serving the Mississippi, Missouri, Ohio, Illinois, Arkansas,

Tennessee, White, Cumberland, Alabama and Minnesota Rivers. Through this system, river transportation reaches into every Corn Belt state, providing easy access to 80 percent of U.S. corn production, more than 33 percent of sorghum production and up to 15 percent of barley production.

River terminals receive feed grains by truck or rail and transfer it into barges, each carrying approximately 1,500 tons, which are collected into tows of six or more barges and moved downriver to New Orleans or another river port.

Barge transportation is actively traded on a daily basis between suppliers and users. , quoted in percentage of tariff, and a cost schedule established with prices for each river shipping point.

*Mississippi
River /
Center
Gulf*

The U.S. Inland Waterway System utilizes an open market and a “percent of tariff” system to establish market based barge freight rates.

The tariffs rate were originally part of the Bulk Grain and Grain Products Freight Tariff No. 7, which were issued by the Waterways Freight Bureau (WFB) of the Interstate Commerce Commission (ICC).

Each location / city on the river has its own benchmark tariff rate, with the northern most cities, being a greater distance from New Orleans, La. having the highest benchmark tariff rates.

In 1976, the United States Department of Justice entered into an agreement with the ICC and made Tariff No. 7 no longer applicable.

Today, the WFB no longer exists and the ICC has become the Surface Transportation Board of the United States Department of Transportation. However, the barge industry continues to use the tariffs as benchmarks as rate units.

To calculate the rate in dollars per ton, multiply the percent of tariff rate by the 1976 benchmark.

For example, a 200% tariff for Minneapolis-St. Paul barge grain would equal 2.00 times the benchmark rate of \$6.19, or \$12.38 per short ton.

Once a barge arrives in port, a fast, modern, export terminals transfer grains from the barge into storage or waiting ocean vessels. There are over a dozen such terminals along the lower Mississippi from Baton Rouge, La. to the Southwest Pass. A good number of these facilities can load out more than 50,000 mts in a single day, drastically reducing the cost and the time a

vessel spends in port.

Not all grain moves by river barge to Mississippi export terminal, with supplement supplies moving by rail. Trains of up to 120 cars, carrying more than 10,000 mts, will also carry grains to these same export facilities.

Rail movement must compete with cheaper barge transportation to move grain from a range of diverse and over-lapping geographic regions. While the cost of rail freight is generally much higher, its time in transit is much shorter. Nonetheless, in a given year, an average of 10 percent of the grain delivered to Center Gulf ports will arrive by rail.

As grain can be delivered to these center gulf export facilities by barge, rail and road truck. Port terminal operators will originate deliveries utilizing a combination of transportation modes from a range of origins to not only minimize their sourcing costs, but to also maximize their operational efficiencies.

Reference to map of U.S. Mississippi - Center Gulf:
https://www.bluewatershipping.com/maps_ms.php

TEXAS GULF

Texas Gulf - A grain export region including export elevators located in Beaumont, Brownsville, Channelview, Galena Park, Galveston, and Corpus Christi, Texas.

Texas occupies a unique and strategic place in U.S. Grain transportation logistics. Its geography in the southwest along the Gulf coast, provides easy access to Mexico, Europe, West Africa, and Latin America countries, as well as access to Asia via the Panama Canal. The geographical location of Texas makes it a strategic hub for grain transportation.

Texas or West Gulf

There are several ports that handle grains along the Texas coast. Although they are principally wheat facilities designed to receive the trains of hard winter wheat that originate in Kansas, Oklahoma, Nebraska and Texas. They also service coarse grains, principally corn and grain sorghum, grown in these states as well.

This grain arrives mostly by rail, except for truck deliveries that originate in coastal areas of Texas where sorghum and corn are both produced. Rail in multi-car units moves along the BNSF, Missouri Pacific, Southern Pacific and Union Pacific railroads to facilities in Brownsville, Corpus Christi, Galveston, Houston and Beaumont in Texas. Occasionally, in times of extreme transportation squeezes at the Center Gulf because of

river problems or concentrated demand, corn will move from Nebraska and Iowa to Texas, but this is quite unusual.

Many of these facilities are, except for their reliance on rail delivery, as fast and efficient as their Center Gulf counterparts. They are also extremely fast in loading vessels and keeping waiting time to a minimum.

The top destination countries for grain exports from Texas ports were: China, Mexico, and Indonesia.

Reference to map of U.S. Texas Gulf:

https://www.bluewatershipping.com/maps_texas.php

EAST GULF

East Gulf - A grain export region, which includes the export elevator in Mobile, Alabama and Pascagoula, Mississippi.

The East Gulf is a coastal port region with direct access to 1,500 miles of inland and intracoastal waterways serving the Great Lakes, the Ohio and Tennessee river valleys (via the Tennessee-Tombigbee Waterway), and the Gulf of Mexico.

East Gulf

The major port in this region is the Port of Mobile, Alabama. The public and private terminals handle containerized, bulk, break bulk, roll-on/roll-off, and heavy lift cargoes. The bulk facilities have immediate access to two interstate systems and five Class I railroads. The Port of Mobile is maintained to a depth of 45 feet.

This port generally handles smaller and more specialized shipments of grain, particularly when extra capacity is required.

Reference to map of U.S. East Gulf:

https://www.bluewatershipping.com/maps_mobile.php

ATLANTIC COAST

Atlantic Coast- A grain export region that includes export elevators along the coastal waterways in Brunswick, GA, Albany, NY, and Chesapeake, VA.

Much like the Texas Gulf, elevation capacity on the U.S. Atlantic Coast has been contracting. Grain elevators in Philadelphia and Norfolk have been shut down or destroyed. Still the Atlantic Coast has the capacity to elevate grain with facilities in Baltimore, Md.; Norfolk, Va.; Charleston, S.C.; and Savannah, Ga. can receive grain by rail and truck for export.

U.S. Atlantic Coast

The export facilities in Norfolk compete with both the Center Gulf and Great Lakes ranges for corn origination out of the states of Illinois, Indiana, Michigan and Ohio.

When importers from Europe or North Africa are active corn buyers, the Atlantic Coast has an advantage over the Gulf because of its physical proximity to these destinations. For the most part, high rail transportation costs consume this freight advantage the Atlantic Coast has over the Gulf. Furthermore, each of the elevators that handle feed grains on the Atlantic has some kind of draft or vessel size restriction.

Reference to map of U.S. Atlantic Baltimore / Norfolk Coast:
https://www.bluewatershipping.com/maps_usec.php

PACIFIC NORTHWEST (PNW)

Pacific Northwest (PNW) - A major grain export region that includes Portland, Oregon; Kalama, Seattle Tacoma, and Vancouver, Washington. Located tributary to the Columbia River system in the Pacific Northwest, it is a major location of bulk grain and oilseed exports.

The Lower Columbia River, which empties into this port region of Puget Sound, is currently maintained at a 43 ft. draft, making it unable to accommodate the largest dry bulk ships.

However, the greatest advantage the PNW ports is their proximity to Asia relative to Gulf and Atlantic ports. Investments on the Lower Columbia River and Puget Sound are indicative of the region's geographical advantage and exporters' confidence in future growth in northeast Asia demand for bulk commodities.

Pacific Northwest

In addition, to feed this important export location, western railroads have made a significant investment into transportation assets linking the PNW with both coal fields in the western plains and grain producing areas of the Northern Plains and the Midwest.

The Pacific Northwest export facilities have a freight advantage over U.S. Gulf locations when shipping to destinations in east Asia or the Pacific. Due to the much shorter distance, this freight advantage works the same way as when the U.S. Gulf or Atlantic Coast locations are shipping to European and west Africa destinations and crossing the Atlantic Ocean. The much shorter distance, along with an approximate 12 day shorter transit time, from the PNW to Asian destinations, as well as the savings in costs of not having to transit the Panama Canal, allows importers to pay a substantially higher price for feed grains delivered from that coast.

Again, like the Atlantic, the Pacific Coast range must compete with the Mississippi River system to originate feed grains for export. The “price spread” between the two points of origin can be very dynamic at times as underlying market fundamental change. Even though the Pacific Coast has a large, consistent ocean freight advantage, it is still a good distance from significant volumes of inland grain production. The reach (drawing arc) of the PNW does may not begin to cover the bulk of feed grains production. The ocean freight advantage may only cover a portion of the cost when competing with grain from the U.S. Gulf and the interior river system.

Reference to map of U.S. Pacific Northwest Ports:

https://www.bluewatershipping.com/maps_pacific.php

GREAT LAKES

Great Lakes - A grain export region that includes U.S. export elevators in Duluth, MN; Milwaukee and Superior, WI; Chicago, IL; Portage, IN; Huron, Maumee, and Toledo, OH. The region also includes Canadian elevators in Windsor, in the Province of Ontario; and Baie Comeau, Montreal, Port-Cartier, Quebec City, Sorel-Tracey, Trois Riveieres, in the Province of Quebec.

The Great Lakes comprise a unique inland waterway system. Access to the Lakes' ports is through the St. Lawrence Seaway which consists of a lock system connecting Lake Superior and Lake Huron at Sault St. Marie and lakes Erie and Ontario (bypassing Niagara Falls) via the Welland Canal.

The Great Lakes

Great Lakes ports cannot directly benefit from larger vessel sizes as the Welland Canal and St. Lawrence Seaway locks (which can pass vessels 740' in length, 78' in width and drafting 26'9") are too small to accommodate even the older Panamax-sized vessels. A separate class of vessels has been built, since the completion of the Seaway, with the specific intention of plying the waters of the Great Lakes. Naturally, they have shallow drafts and narrow beams that just allow them to pass through the lock system. They are called Lakers and can carry about 25,000 mts of heavy grain. Grain loaded in these specialty vessels at lake ports is then discharged at export facilities in the St. Lawrence River.

Importers can charter a vessel to go into the seaway and load grain at a lake port, buy a portion of their cargo in the lakes (usually two-thirds) and load the balance at a St. Lawrence facility (the final third) or lift the entire cargo from a St. Lawrence facility.

However, economics will still present economic opportunities for export to Europe and other destinations. Differences in Laker freight, ocean freight, vessel size and port discharge capacity will determine which is most economical.

It is also important to note that the Lakes are closed during the winter due to ice, generally from mid-December to early April, because of ice.

One other significant difference compared to originating grain from other ranges is that the buyer must decide whether the grain will be purchased on certificates issued at the interior lake port or based on a new inspection (and/or new weighing) as it is transhipped. Although inspectors for the United States Department of Agriculture's (USDA) Federal Grain Inspection Service (FGIS) are in Canada, ordinarily a new inspection at the time of transshipment is not undertaken (and not unless specifically requested by the buyer). If a new inspection is not performed, the shipment is traded based on the original grade issued at the first load port; this is commonly known as "Western Inspection." This is, for the most part, a matter of indifference, but a buyer should be aware that a Western Inspection will be used unless a Seaboard Inspection at the time of transshipment is specified.

The price of lakes' freight, like barge and rail freight in the United States, trades freely over time and determines how competitive execution will be. Several the lakes' ports also double as points for delivery against the CME / CBOT corn and wheat contracts.

INTERIOR

Interior - An area that includes direct overland exports by road or rail to destinations in Mexico and or Canada. While there is some cross-border trade executed by road truck. The greatest portion of this volume is executed by rail to end user markets in Mexico, perennially one of the top two buyers of U.S. corn.

In the wake of the North American Free Trade Agreement (NAFTA), which was enacted in 1994 and created a free trade zone for Mexico, Canada, and the United States; grain and other agricultural commodities began to move quite freely between these three countries.

Interior

This important trade relationship was reaffirmed with the implementation of the United States–Mexico–Canada Agreement (USMCA) in July of 2020, and is sometimes characterized as "NAFTA 2.0", since it largely maintains or updates many provisions from its predecessor. This further improved the relationship between the three countries making the trade of agricultural commodities a rather seamless process between these important trading partners..

Rail is a major form of transportation modes for moving agricultural commodities. The U.S. has an extensive nationwide rail system capable of moving grain and soybeans to destinations throughout the U.S., as well as across borders to export destinations in Mexico and Canada.

Most grains are shipped by train in large hopper cars that carry 80 to 90 metric tons each. To achieve maximum efficiency many rail shipments, especially those to export points, are in trains of 100 to 120 cars carrying approximately 10,000 tons that are loaded, moved and unloaded together as a single “unit train” or “shuttle”. They are then returned as a single unit to be loaded again.

Many of these hopper cars are leased by exporters and dedicated to their use.

INTERIOR – INTERMODAL

Interior Intermodal – To accommodate a diverse customer base, U.S. grain exporters use both intermodal containers and dry bulk vessel modes of transport. Over the past three decades, containers moving through the intermodal network, have become a normal part of the grain export supply chain.

The United States moves less than 10 percent of its total grain exports by container each year.^{vii} The largest part of this are higher valued commodities such as soybeans and processed products of distillers dried grains (DDGS), animal feed, soybean meals, etc... Over the past several years the top containerized grain products has shifted between soybeans and distillers dried grains (DDGS). These products are generally moving to high value destination markets.

Generally, container shippers have an established service contracts either directly with an international ocean carrier or through a freight forwarder. These affreightment contracts provide a relatively stable rate structure over a period of time that protects shippers from sharp market rate fluctuations. However, these contracted rates are confidential.

In addition, container shippers will also utilize the spot freight market to take advantage of short term rate reductions to certain destinations to supplement additional export capacity. While these spot rates provide an overall trend of container rates, but they do not show the specific impact on individual commodities.

Intermodal

While freight and transportation costs for container shipments are generally higher than that for bulk vessel execution, other logistical costs, storage and handling charges, at the destination; along with financing considerations by the buyer, will often make purchases by container more attractive.

Intermodal containers are crucial for identity-preserved, specialty grain markets, and for customers with smaller volume demands. They tend to service niche markets larger volume bulk grain execution cannot service.

Over 90 percent of U.S. containerized grain is shipped to Asian markets such as Taiwan, Indonesia, Vietnam, and Korea. The chart below presents the top 12 destination markets for U.S. containerized grain exports. Use the filter function to view a particular year or month. Additionally, clicking a section of the chart will show the top grain products exported to that country.^{viii}

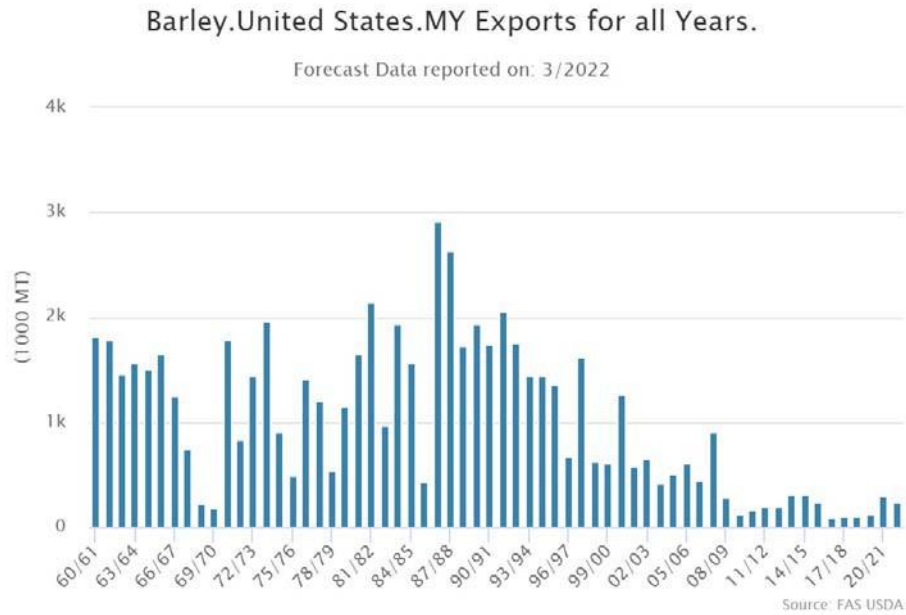
Containerized grain exporters use the Los Angeles and Long Beach port complex approximately 50 percent of the time, making this the busiest container port region in the country.^{ix}

This port region is advantageous to shippers because it typically has access to the widest range of ocean container freight services, the greatest vessel capacity, and often the lowest ocean freight rates from

ocean container carriers.

Additionally, regular rail service from Chicago and other mid-western locations makes Los Angeles and Long Beach significant partners for containerized grain exporters.

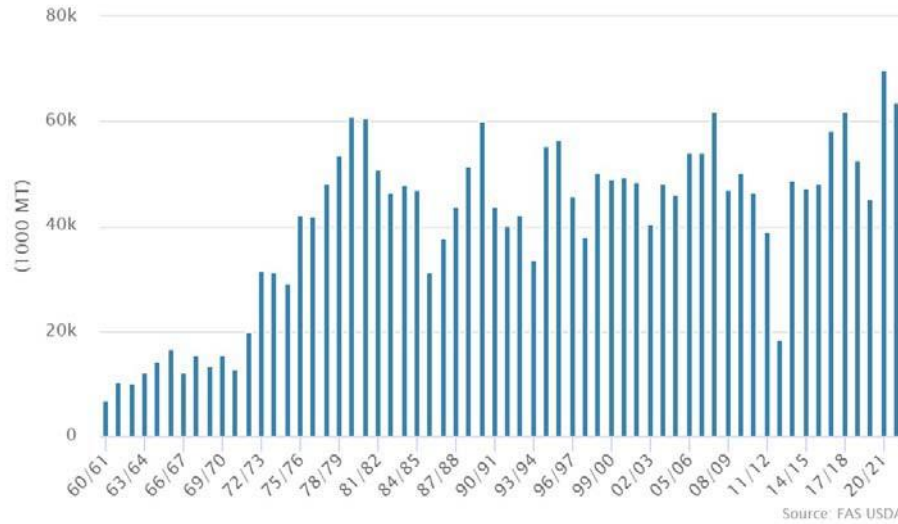
HISTORICAL UNITED STATES EXPORTS AND DESTINATION MARKETS



Barley

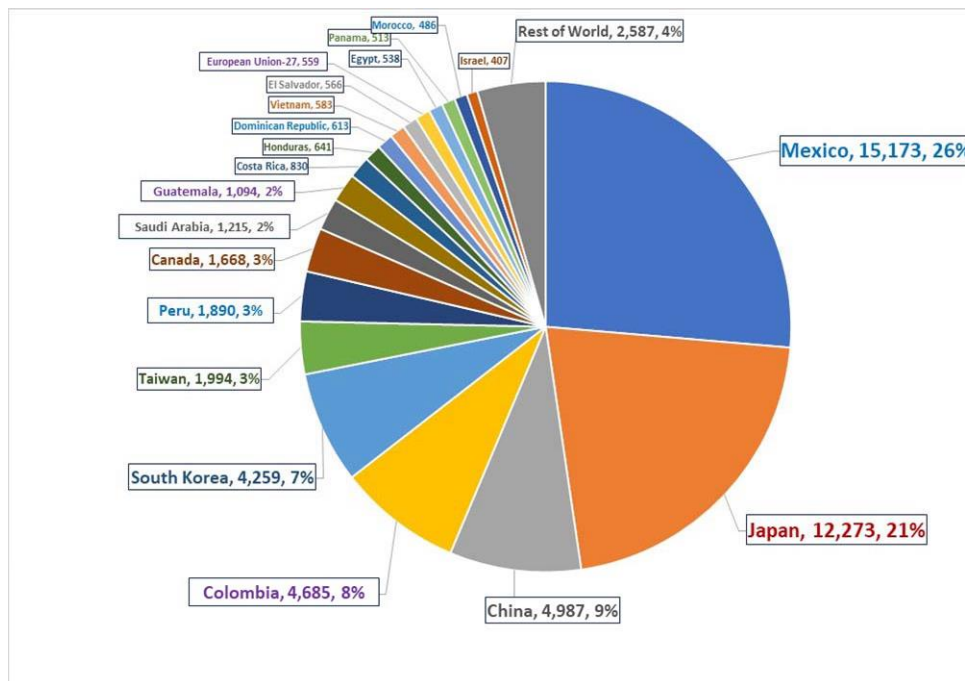
Corn.United States.MY Exports for all Years.

Forecast Data reported on: 3/2022



Corn

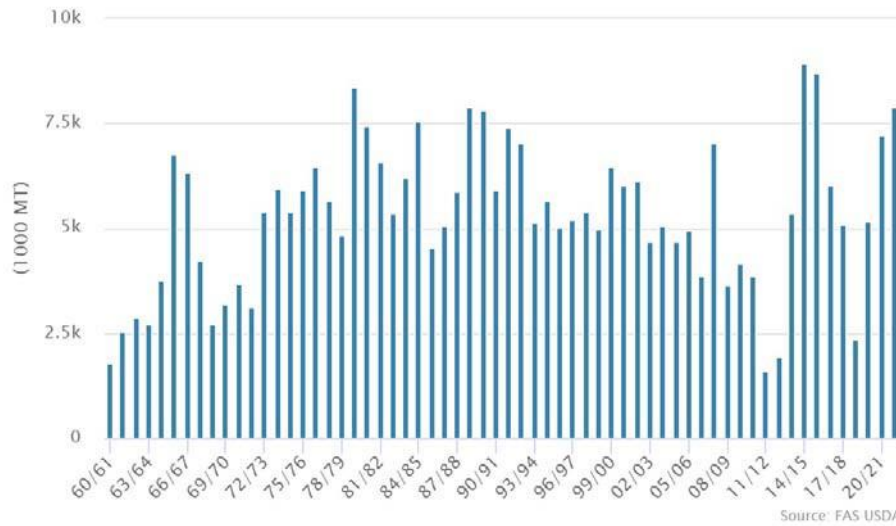
Top 20 U.S. Corn Export Buyers – Five Year Average MY 2016/17 - MY 2020/21



Source: USDA Feed Grain Yearbook (1,000 mt), March 23, 2022

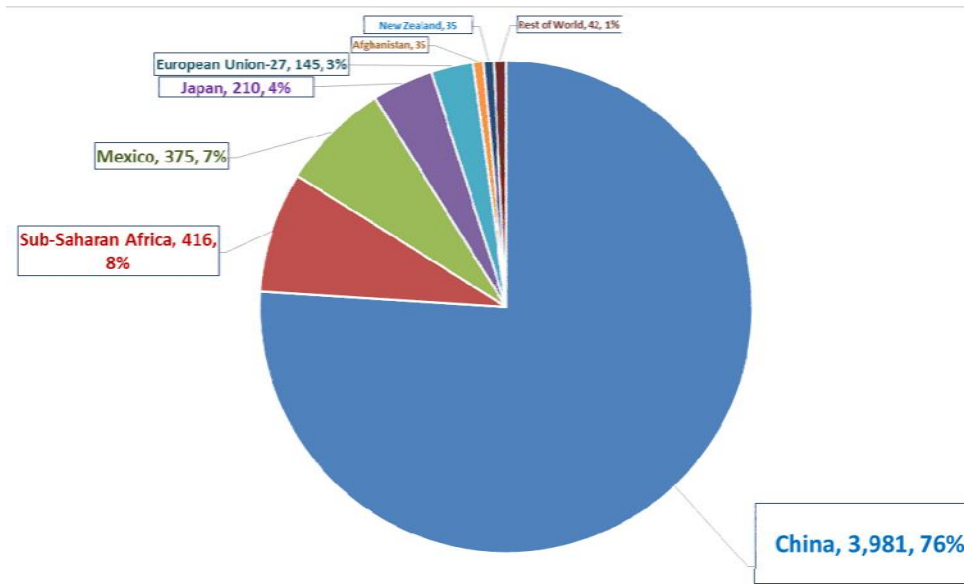
Sorghum.United States.MY Exports for all Years.

Forecast Data reported on: 3/2022



Sorghum

Top 7 U.S. Grain Sorghum Export Buyers – Five Year Average MY 2016/17 - MY 2020/21



Source: USDA Feed Grain Yearbook (1,000 mt), March 23, 2022

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Philip A. Shull
President and Founder, The Philip Shull Group, LLC
Minister Counselor (Ret)
U.S. Department of Agriculture

ⁱ "U.S. Embargoes on Agricultural Exports: Implications for the U.S. Agricultural Industry and U.S. Exports". U.S. International Trade Commission (December 1980)
<https://www.usitc.gov/publications/332/pub1461.pdf> Accessed 11 April 2022

ⁱⁱ "Lessons of the Grain Embargo". Foreign Affairs. Robert L. Paarlberg (1980) Accessed 21 March 2022

ⁱⁱⁱ "Creation of the Bretton Woods System ". Federal Reserve History.
<https://www.federalreservehistory.org/essays/bretton-woods-created> Accessed 31 March 2022

^{iv} "The end of the Bretton Woods System (1972–81)". International Monetary Fund.
<https://www.imf.org/external/about/histend.htm> Accessed 21 March 2022

^v "What is the Difference Between Globalism and Globalization". Pediaa. <https://pediaa.com/what-is-the-difference-between-globalism-and-globalization/> Accessed 31 March 2022

^{vi} "World Exports as Percentage of Gross World Product". Global Policy Forum.
<https://web.archive.org/web/20080712023541/http://www.globalpolicy.org/soecon/trade/tables/exports2.htm> Accessed 31 March 2022

^{vii} "U.S. Waterborne Containerized Exports" United States Department of Agriculture, Agriculture Marketing Service; <https://agtransport.usda.gov/stories/s/U-S-Waterborne-Containerized-Grain-Exports/33uv-zv7/> Accessed 21 March 2022

^{viii} "U.S. Waterborne Containerized Exports" United States Department of Agriculture, Agriculture Marketing Service; <https://agtransport.usda.gov/stories/s/U-S-Waterborne-Containerized-Grain-Exports/33uv-zv7/> Accessed 21 March 2022

^{ix} "U.S. Waterborne Containerized Exports" United States Department of Agriculture, Agriculture Marketing Service; <https://agtransport.usda.gov/stories/s/U-S-Waterborne-Containerized-Grain-Exports/33uv-zv7/> Accessed 21 March 2022

Chapter 6

Shipping Terms FAS, FOB, C&F, CIF

Many of the key terms of trade used in international grain contracts are standardized to communicate clearly and help ensure transactions proceed smoothly. These terms provide consistency, minimize confusion, and clarify the obligations of buyers and sellers. A small misunderstanding of contract or shipping terms can easily lead to a dispute including, the allocation of risk, or which party is responsible for certain costs, such as freight, insurance or other expenses involved in the delivery of goods.

In order to facilitate international trade, the International Chamber of Commerce (ICC) publishes and regularly updates a set of globally recognized terms that help to create a standard for trade terms commonly used in the sale of goods.ⁱ These terms are commonly referred to as “**Incoterms®**,” which is the abbreviation for International Commercial Terms.ⁱⁱ

Incoterms® rules are a globally recognized set of standards, used worldwide in international and domestic contracts. These rules have been developed and maintained by experts and practitioners brought together by ICC. The trade terms help traders avoid costly misunderstandings by clarifying the tasks, costs and risks involved in the delivery of goods from sellers to buyers.

The latest Incoterms® are referred to as Incoterms® 2020. They were launched in September 2019 and came into effect on the 1st of January 2020.

Please note that all contracts made under Incoterms® 2010 and any other previous editions remain valid and parties to a contract for the sale of goods can agree to choose any version of the Incoterms® rules. However, we recommend using the most current version of the rules, which today is Incoterms® 2020. It is important to clearly specify the chosen version.

For more information on the International Chamber of Commerce and Incoterms, please see: <https://iccwbo.org/about-us/who-we-are/>

For bulk commodities transported internationally over inland waterways or by

sea, there are four other Incoterms that are closely related to cost and freight and that are frequently used in contracts for the bulk grain trade. Each of the following terms must also state a place of delivery. These are:

↗ **Free Alongside Ship (FAS)** requires the seller to deliver grain, cleared for export, alongside the buyer's vessel at a named port, at which point risk of loss or damage to the grain transfers to the buyer.

↗ **Free On Board (FOB)** requires the seller to deliver grain, cleared for export, loaded on board the buyer's vessel at a named port, at which point risk of loss or damage to the grain transfers to the buyer.

↗ **Cost and Freight (CFR)** requires the seller to load grain onto a vessel and to arrange and pay for transport of the grain to a named port; however, the risk of loss or damage to the grain passes to the buyer as the grain is loaded onto the vessel, and the buyer can decide whether or not to insure against this risk.

Incoterms®

Note –The term C&F is frequently used in the bulk grain trade, although it is not a recognized Incoterm®. It has the same meaning as CFR.

↗ **Cost, Insurance and Freight (CIF)** is the same as C&F, but requires the seller to obtain and pay for cargo insurance meeting certain minimum standards. The buyer can claim under the cargo insurance if the grain is lost or damaged during the voyage.

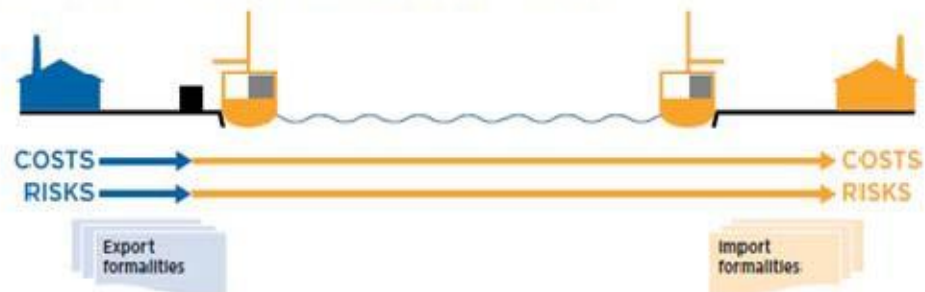
These four terms as defined by Incoterms® are primarily used in contracts for international trade in bulk commodities where transportation is entirely conducted by water. They are generally not suitable for shipments in shipping containers. Other Incoterms® are better suited to the sale of goods in containers, such as FCA (Free Carrier), CPT (Carriage Paid To) or CIP (Carriage Insurance Paid To).

Note that buyer and sellers are not required to use Incoterms® in the contracts for the sale of goods. Some standard contract forms, such as those developed by the Grain and Feed Trade Association (GAFTA) or the North American Export Grain Association (NAEGA), refer to their contracts as being “cost and freight” or “free on board” contracts. Their contract forms, however, spell out the obligations of the buyer and seller and when the risk of loss or damage to the goods passes in detail so that they do not need to refer to or incorporate the Incoterms®. Buyers and sellers are free to use these form contracts, or to incorporate the appropriate Incoterm, as they see fit and as they may agree.

Let's take a more detailed look at these four Incoterms® that are intended to cover the sale of goods by sea or inland waterway.

FAS Free Alongside Ship

(Insert named port of loading) Incoterms® 2020



Blue indicates seller's Gold indicates buyer's Green indicates mixed or shared

Source: ICC International Chamber of Commerce, Incoterms® 2020 Resources, “Chart - Transportation Obligations, Costs and Risks”, This chart is not intended to be used alone, and should always be used in conjunction with the Incoterms® 2020 rule book. ⁱⁱⁱ

“Free Along Side” (FAS): This contract term states the seller only has to deliver the cargo alongside the vessel nominated by the buyer at the stated port, at which point the risk in and responsibility for the goods shifts to the buyer.

This term is not as commonly used for sales of goods exported from the United States as it may be in some other countries.

Cost of Transportation: Under FAS terms, the seller bears the costs of transporting the grain to the port for loading. The buyer then bears the cost of loading the vessel, marine freight transportation, cargo insurance, and finally the unloading and transportation costs from the discharge port to ultimate destination of the goods.

If an importer buys grain FAS, the importer must bear the cost of chartering a vessel, loading the goods onto the vessel at the loading port, appointing agents to oversee loading of the vessel and securing related documentation, monitoring the vessel's progress as it sails, arranging and paying for discharge of the goods at the discharge port, and settling any claims related to the carriage of the goods with the vessel owner. As you can see, in an FAS sale the buyer bears significantly more responsibilities and costs than the seller.

Risk of Loss or Damage to the Goods: Under a FAS sale, the liability for risk of loss or damage to the goods is transferred from the seller to the buyer as the grain is delivered by the seller alongside the vessel at the agreed load port. It is at that point that the seller's responsibility and risk ends.

The FAS terms do require the seller to clear the goods for export, which is a change from previous Incoterms. If the parties, however, wish the buyer or its agent to clear the goods for export, this should be clearly stated in the contract.
iv, v

FAS

Cost of Insurance: Under FAS terms the buyer may, at its own cost, purchase cargo insurance covering the goods against the risk of loss or damage from the moment the seller delivers the goods alongside the buyer's vessel. The seller has no obligation to arrange or pay for this cargo insurance. The buyer can elect to not insure the goods against the risks of the voyage, though that decision could end up being penny wise and pound foolish.

In practice FAS terms are used only for sea transport, and, only for certain commodities and materials that are not packed and cannot be individualized, such as grain, feed, meal, timber, minerals, steel products, etc.

Export Clearance: The seller is responsible for clearing the goods for export, including paying any export fees, duties or taxes. Usually the buyer will clear the goods for export before placing them alongside the ship.

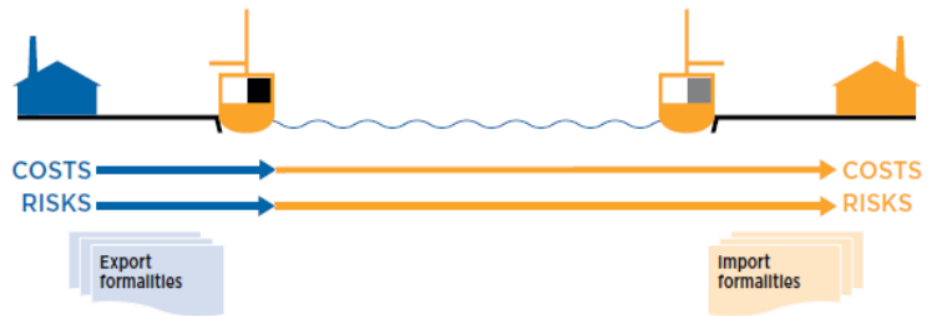
Other Considerations: In addition, in nearly all FAS (and FOB, CFR and CIF) sales in the grain and oilseeds trade, the seller must obtain a quality grade certificate. This is normally generated by the Federal Grain Inspection Service, satisfying one of the seller's contractual obligations of quality delivered to the buyer.

FAS should be used for situations where the buyer has direct access to the vessel for loading, e.g. bulk cargos or non-containerized goods. When using FAS, the buyer is responsible for arranging and paying for the cost of loading the goods on the ship. For this reason, the buyer or their load port agent must know the practices in the port of shipment.

Finally, FAS is a term generally used only for sea and inland waterway transport and usually for general cargo. When the goods are transported in containers, Incoterms 2020 rules recommends the use "Free Carrier", FCA.^{vi}

FOB Free on Board

(Insert named port of loading) Incoterms® 2020



Blue indicates seller's Gold indicates buyer's Green indicates mixed or shared

Source: ICC International Chamber of Commerce, Incoterms® 2020 Resources, “Chart - Transportation Obligations, Costs and Risks”, This chart is not intended to be used alone, and should always be used in conjunction with the Incoterms® 2020 rule book. ^{vii}

“Free on Board” (FOB): This Incoterm ® states the seller delivers the commodity to the buyer "at the discharge end of the loading spout, into the buyer's presented vessel in condition of readiness to load" (Incoterms ® 2010). The seller must also arrange for export clearance and/or any export permits and pay any export taxes. The primary difference between a FOB sale and a FAS sale is that in a FOB sale the seller must not only bring the goods alongside the buyer's vessel, but also arrange for and pay the cost of loading the goods onto the vessel. These loading costs are referred to in the grain trade as “elevation” costs, or “fobbing” costs. The seller's risk of loss or damage to the goods also carries through the loading process until the goods exit the loading spout in the vessel.

Cost of Transportation: The buyer is responsible for arranging and paying all costs of the marine freight transportation, any cargo insurance, and the costs for unloading from the goods at the arrival port.

In the case of a cargo moving by sea, this means the buyer charters the vessel. The buyer then presents (or nominates) the vessel to the seller as the vessel to load the cargo and may appoint agents at the load port to monitor the loading and the creation of the load documents.

Risk of Loss or Damage to the Goods: The risk of loss or damage to the goods is transferred from a seller to a buyer as the grain is loaded into the vessel's holds. This is why it is sometimes said that the risk of loss or damage to the goods passes from the seller to the buyer as the goods pass from the shore over the vessel's “rail,” i.e. the side of the vessel. It is at that point that the seller's responsibility for the goods, and risk of loss or damage to the goods, ends. The risk of loss or damage to the goods then shifts to the buyer.

Cost of Insurance: A FOB seller has no obligation to obtain or pay for cargo insurance covering the goods. As mentioned above, the risk of loss or damage to the goods passes from seller to buyer as the goods are loaded onto the vessel. It is up to the buyer then to obtain cargo insurance coverage for the risks of the voyage.

Export Clearance: As with FCA sales, the seller is responsible for clearing the goods for export, including paying any export fees, duties or taxes.

Other Considerations: Historically, FOB sale terms were used primarily on the sale of goods transported by ship. However, in the U.S., the term has expanded to include all types of transportation, including barges, rail and road. Incoterms®, however, recommends that for non-water borne transport the parties use instead the free carrier (FCA) term.

FOB

In a typical FOB sale of grain, the buyer will present at the load port an appropriate vessel of a type typically used for the carriage of the goods sold, which is inspected and cleared for readiness to load the grain. This presentation must occur within the contracted delivery period, at a port or ports stated in the contract. The seller and buyer may even agree in the contract to a specified loading facility or berth.

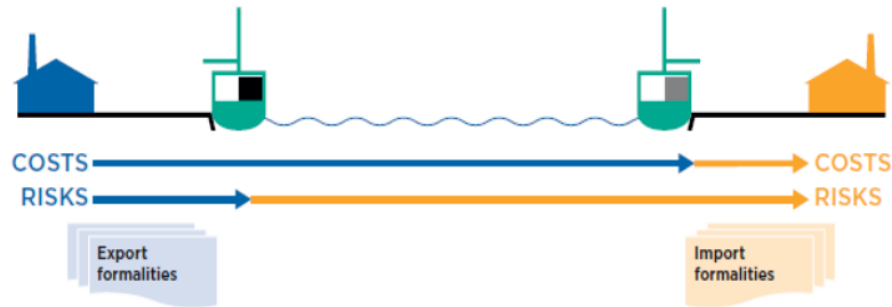
The seller then must deliver onto the vessel the quality and quantity of grain required by the contract. For grain exports from the USA the Federal Grain Inspection Service (FGIS) normally issues these certificates to the exporter..

The Seller may also be required to deliver to the buyer a number of other documents as agreed to in the contract, for example a phytosanitary certificate, non-gmo certificate, or a certificate of origin, etc.

In a typical FOB sale, once the seller has loaded contractual goods on the buyer's vessel within the agreed delivery period, and has presented to the buyer the documents required by the contract to evidence this delivery, the seller has completed its obligations and is entitled to be paid for the goods.

CFR Cost and Freight

(Insert named port of destination) Incoterms® 2020



Blue indicates seller's **Gold** indicates buyer's **Green** indicates mixed or shared

Source: ICC International Chamber of Commerce, Incoterms® 2020 Resources, “Chart - Transportation Obligations, Costs and Risks”, This chart is not intended to be used alone, and should always be used in conjunction with the Incoterms® 2020 rule book. ^{viii}

Cost and Freight (CFR) (though sometimes shortened as **C&F** or **CNF**): Deciding whether to buy or sell on an “F” term (e.g. FAS or FOB) or a “C” term (e.g. CFR or CIF) is significant. This is because “C” terms shift all the responsibility and cost of obtaining and paying for the ocean freight from the buyer to the seller. As a result, the seller must not just arrange and pay for transporting the cargo to a specified load port, cleared for export, and the loading of the goods onto an appropriate vessel (as required of an FOB seller). In addition, the seller must also arrange and pay for the vessel which will carry the goods to their contractual destination. The term cost and freight means that the seller must provide to the buyer two things;

- (1) the goods themselves, loaded on the vessel (the “cost”), and
- (2) the transportation of the goods to the discharge port (the “freight”).

An important element of a CFR sale contract is the shipment period, sometimes referred to as the delivery period. Remember that in a CFR sale the seller is responsible not only for getting contractual goods onto the vessel, but also charter in the vessel to take the goods to the discharge port. The buyer therefore often has very little insight into the arrival of the goods at the load port or progress of loading, or when the vessel sails from the load port. The buyer can, though, agree on a shipment period. The shipment period is the range of days during which the seller must complete loading the vessel with the contractual cargo. The bill of lading will show the date on which loading was complete (or if the vessel issues several bills of lading for the goods, the latest date shows the day on which loading was complete). The buyer can therefore easily determine if the vessel was loaded within the agreed shipment period.

Use of this term is generally restricted to goods transported by sea or inland waterway.

Cost of Transportation: As stated above, CFR terms state that, in addition to loading the vessel with the cargo, the Seller is responsible for the cost of marine transportation from the load port to the discharge port. This cost is therefore included in the sales price for the goods.

Risk of Loss or Damage to the Goods: Just as with grain that is sold on FOB terms, the risk of loss or damage to the goods transfers from the seller to the buyer when the goods are loaded onto the vessel at the load port. The seller is responsible for finding and paying for the vessel to carry the goods to the discharge port, but the buyer still has all of the risk of loss or damage to the goods during the voyage.

Cost of Insurance: Under CFR terms the buyer not only has the risk of loss or damage to the goods from the moment the goods are loaded onto the vessel, but the buyer also must decide whether to purchase cargo insurance to cover these risks, and if so how much insurance.

CFR

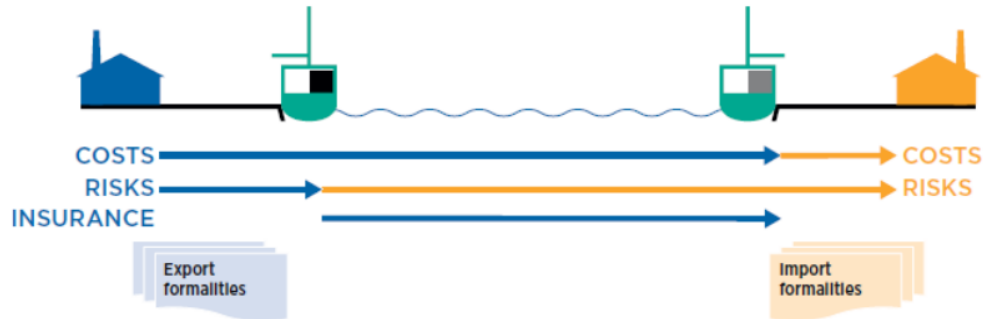
Other Considerations: In a CFR sale the seller's obligations are complete when they have loaded contractual goods on a contractual vessel within the agreed shipment period. The seller is then entitled to be paid for the goods. Payment typically occurs when the seller presents the buyer with a set of documents showing that goods meeting the contract requirements were loaded on a vessel destined for the discharge port. Typical documents include a bill of lading, the seller's invoice, and certificates of quality and quantity. English courts are fond of saying that CFR (and CIF) sales are not sales of goods, but sales of documents. Once the seller presents the documents required by the contract the buyer must pay.

Though the seller has the direct contract (known as a charter party) with the vessel for the carriage of the goods, once the bill of lading has been transferred from the seller to the buyer the buyer has rights against the vessel under the bill of lading and has the right to take possession of the goods at the discharge port.

CFR is a sea transport Incoterm used mainly for general cargo and large volumes of goods, including grain and oilseeds. When the goods are transported in containers and the seller is arranging and paying for the ocean transportation, Incoterms® 2020 rules advise to use CPT instead of CFR, as containers are usually delivered at the terminals of the load port, before being placed on board ships.^{ix}

CIF Cost, Insurance and Freight

(Insert named port of destination) Incoterms® 2020



Blue indicates seller's **Gold** indicates buyer's **Green** indicates mixed or shared

Source: ICC International Chamber of Commerce, Incoterms® 2020 Resources, “Chart - Transportation Obligations, Costs and Risks”, This chart is not intended to be used alone, and should always be used in conjunction with the Incoterms® 2020 rule book. ^x

Cost, Insurance, and Freight (CIF): This contract term used when freight is shipped via sea or waterway. Under CIF terms, the seller is responsible for everything a seller is responsible under a CFR sale (including arranging and paying for the vessel carrying the goods), plus the responsibility for obtaining and the cost of paying for the cargo insurance covering the risk of loss or damage to the goods during the voyage. As with a CFR sale, the buyer is responsible for all costs of unloading the goods at the destination port.

CIF is similar to carriage and insurance paid to (CIP), but CIF is used for goods transported by sea or inland waterway shipments, while CIP can be used for any mode of transport, such as by truck.

Cost of Transportation: This is the same as in a CFR sale. The Seller is responsible for the cost of the marine transportation from the load port to the discharge port. The seller therefore includes this cost in the sales price for the goods.

Risk of Loss of Damage to the Goods: This is also the same as in a CFR (and FOB) sale. The risk of loss or damage to the goods transfers from the seller to the buyer when the goods are loaded onto the vessel at the load port. The seller is responsible for finding and paying for the vessel to carry the goods to the discharge port, but the buyer still has all of the risk of loss or damage to the goods during the voyage.

Cost of Insurance: This is the difference between a CFR and CIF sale. Under both terms the risk of loss transfers to the buyer as the goods are loaded into the vessel. In a CFR sale the seller has no responsibility for obtaining or

paying for cargo insurance to cover the risks of the voyage. Under a CIF sale, however, the seller must obtain and pay for marine cargo insurance to cover the goods against loss or damage during the voyage. This cost, like the cost of the vessel, is included in the CIF sales price.

The CIF sale contract should state the minimum marine cargo insurance coverage that the seller must buy, and the minimum qualifications of the insurer or underwriter. The sale contract will also normally require that the seller, in order to be paid, must provide the buyer with a certificate of insurance showing that these requirements are met. Often the cargo must be insured for the value of the commercial invoice, including the value of the cargo plus freight costs from the port of shipping to the port of destination, plus 10%; (i.e., 110% of CIF value). The policy should be in the same currency as the contract. The beneficiary of this insurance and, therefore, the one that must apply to the insurer for compensation in case of loss or damage to the goods, is the buyer.

Incoterms 2020® made changes to the insurance coverage requirements under CIF agreements. Sellers are now required to obtain a higher level or more comprehensive insurance than what was required under Incoterms 2010.^{xi, xii}

CIF

Other Considerations: In practice, CFR and CIF terms should be used for situations where the seller has direct access to the vessel for loading, e.g. bulk cargos or non-containerized goods. The goods are shipped to the buyer's port nominated in the contract. Further, if the product requires additional customs duties levied by the country to export, export paperwork, or inspections, the seller must cover these expenses.

Once the cargo has arrived at the CFR or CIF destination port, the buyer assumes responsibility for the port conditions (draft, available berth, and so forth), discharging the vessel, and all costs of importing the goods.

As with CFR sale, an important element within CIF sale terms is the shipment period. This is the range of dates during which the goods must be fully loaded on the vessel. The date of loading stated on the bill of lading for the goods clearly shows if the seller has completed loading within the shipment period.

CIF is a widely used term. In addition to delivering the goods to the destination port of the buyer's country, the CIF value on the commercial invoice is most likely used by customs to apply tariffs and import taxes, facilitating the clearance of for import.

Occasionally, an exporter may load a cargo unsure of which sale the shipment may be applied to or without a sale, hoping to find a buyer once the grain is afloat. On these occasions, the seller will be self-insuring the cargo value and deliver it CIF once a sale has been arranged.

CIF

CIF is a term generally used only for sea and inland waterway transport and usually for general cargo of high value. When the goods are transported in containers, Incoterms 2020 rules recommends the use ‘Carriage and Insurance Paid’, CIP instead.^{xiii}

As you can see, small changes in these incoterms can have significant implications for the responsibilities, risks and costs of the seller and buyer. Every buyer and seller therefore should have a solid working understanding of contract terms and conditions. They should consult a lawyer well versed in international trade and maritime law, as well as local statutes, and have the proposed contracts reviewed before agreeing to the purchase or sale of grain or oilseeds.

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Todd Erickson
Senior Advisor with NAEGA and a NAEGA Special Grain Arbitrator
B.A. Carleton College 1981, J.D. Washington University in St. Louis 1985.
Minnesota Bar 1985

ⁱ International Chamber of Commerce. "Incoterms® Rules." <https://iccwbo.org/resources-for-business/incoterms-rules/> Accessed 5 November 2021

ⁱⁱ International Chamber of Commerce. "Incoterms® Rules." <https://iccwbo.org/resources-for-business/incoterms-rules/> Accessed 5 November 2021

ⁱⁱⁱ ICC International Chamber of Commerce, Incoterms® 2020 Resources, Chart – “Transportation Obligations, Costs and Risks”, This chart is not intended to be used alone, and should always be used in conjunction with the Incoterms® 2020 rule book. <https://iccwbo.org/publication/incoterms-2020-practical-free-wallchart/> Accessed 25 February 2022

^{iv} Trade Finance Global. "Incoterms® 2020 – 7 key changes you need to know [update]." <https://www.tradefinanceglobal.com/posts/incoterms-2020-7-key-changes-you-need-to-know/> Accessed 9 November 2021

^v ICC. "Incoterms 2020." <https://iccwbo.org/resources-for-business/incoterms-rules/incoterms-2020/> Accessed 9 November 2021

^{vi} International Chamber of Commerce. "Incoterms® Rules." <https://iccwbo.org/resources-for-business/incoterms-rules/> Accessed 5 November 2021

^{vii} ICC International Chamber of Commerce, Incoterms® 2020 Resources, Chart – “Transportation Obligations, Costs and Risks”, This chart is not intended to be used alone, and should always be used in conjunction with the Incoterms® 2020 rule book. <https://iccwbo.org/publication/incoterms-2020-practical-free-wallchart/> Accessed 25 February 2022

^{viii} ICC International Chamber of Commerce, Incoterms® 2020 Resources, Chart – “Transportation Obligations, Costs and Risks”, This chart is not intended to be used alone, and should always be used in conjunction with the Incoterms® 2020 rule book. <https://iccwbo.org/publication/incoterms-2020-practical-free-wallchart/> Accessed 25 February 2022

^{ix} International Chamber of Commerce. "Incoterms® Rules." <https://iccwbo.org/resources-for-business/incoterms-rules/> Accessed 5 November 2021

^x ICC International Chamber of Commerce, Incoterms® 2020 Resources, Chart – “Transportation Obligations, Costs and Risks”, This chart is not intended to be used alone, and should always be used in conjunction with the Incoterms® 2020 rule book. <https://iccwbo.org/publication/incoterms-2020-practical-free-wallchart/>

[2020-practical-free-wallchart/](#) Accessed 25 February 2022

^{xi} Trade Finance Global. "Incoterms® 2020 – 7 key changes you need to know [update]." <https://www.tradefinanceglobal.com/posts/incoterms-2020-7-key-changes-you-need-to-know/> Accessed 9 November 2021

^{xii} ICC. "Incoterms 2020." <https://iccwbo.org/resources-for-business/incoterms-rules/incoterms-2020/> Accessed 9 November 2021

^{xiii} International Chamber of Commerce. "Incoterms® Rules." <https://iccwbo.org/resources-for-business/incoterms-rules/> Accessed 5 November 2021

Chapter 7

Ocean Freight and Transportation

The United States' export supply chain and associated transportation networks consist of four major components: (road trucks, trains, barges, and ocean vessels). Each mode of transport is important, and their coordinated, timely interaction is vital to efficient operation of the supply chain.

For example; a cargo of corn might be moved from the field to the country elevator by truck. Subsequently, the grain may be loaded onto a unit train, and transported to another grain terminal on the Mississippi River, where it is loaded onto a barge; then, moved downriver to the port of New Orleans for transfer to an ocean vessel that is bound for its final country of destination.

Efficient and reliable transportation is integral to the successful functioning of the export supply chain for agricultural commodities, and is one of the key reasons the U.S. is a preferred supplier of grains to the world.

In addition to helping U.S. agricultural exporters serve their global customers, the ocean transportation network is an integral component of the agricultural supply chain and to the entire economy of the United States.

The maritime industry and U.S. ports provide access to overseas markets for agricultural products. Port facilities include services to handle dry bulk grains, shipping containers, palletized “break-bulk”, and liquid services. Bulk handling facilities move large volumes of products such as grain and fertilizer. Container facilities handle a wide range of agricultural products, including fruit, vegetables, meat, poultry, processed food products, grain, peas, and hay. Palletized break-bulk services handle fruit and frozen meat and poultry products, as well as specialized grains. Liquid services handle ethanol, oils, sweeteners and other bulk liquid products.

What Is a Dry Bulk Commodity?

The greatest part of exported agricultural commodities and their products

involved in international trade move from one country to another by means of an

ocean-going vessel. This is the least expensive method of transport over long distances. However, bulk agricultural commodities are just a small portion of total dry bulk commodities.

Some examples of “**major**” dry bulk commodities include iron ore, coal, non-ferrous ores, and grain. Coal, along with iron ore, is one of the most traded dry bulk commodities by volume in the world. These two commodities account for nearly two-thirds of global dry bulk trade. Countries most involved in the import of coal for their primary energy and electricity needs are India, China, and Japan. Grain is another major cargo in terms of seaborne dry bulk trade and accounts for less than 18% of the total dry bulk trade worldwide.

“**Minor**” dry bulk commodities include steel products, sugars, fertilizer, cement, and cover the remaining one-third of global dry bulk trade.

These commodities and products are transported long distances, in large unpacked parcels, by sea, in large cargo vessels, by companies that specialize in dry bulk delivery. For the most part, dry bulk cargoes consist of mostly unprocessed materials that are destined to be used in the global manufacturing and production process.

The transport of dry bulk commodities is highly regulated due to the possible impact that an in-transport accident could have on the environment. Since these commodities are unpacked, any spill is likely to place them directly into the environment and can render them extremely difficult to clean up with possible damage and destruction to the environment and possible endangerment of people and wildlife.

CATEGORIES OF VESSELS

Ocean vessels are classified in many categories. Those most relevant to agriculture are dry bulk vessels, which are contracted for individual shipments (tramps), or container ships, which usually operate on scheduled routes (liners).

Tramp ships are contracted on an as-needed basis and are unconstrained by a specific route or schedule. These vessels are usually deployed by their owners when and where they can find the greatest profit. Users charter specific vessels to haul cargos. Generally, smaller shipping companies and private individuals operate tramp ships.

Most tramp vessels are designed to carry dry bulk cargo such as grain, ore, coal, or fertilizer. Some are designed to carry either dry bulk cargo or liquid bulk cargo. The market for bulk shipments is highly competitive with many firms, all with little market power. Vessels move freely from commodity market to

commodity market in response to rate changes. Rates are known, fluid, and available to the highest bidder, usually on a voyage charter (contract) for a particular vessel. This chartering system increases the flexibility of bulk vessels to respond to varying demands.

Tramp Ships

Fleet capacity is determined by the rate at which old ships are scrapped and new ones built. High shipping rates slow scrapping and spurred building activity, thereby moderating freight rates. Shipping companies may respond to a downturn in freight rates by removing ships from service or laying them up.

Liner services operate on a fixed schedule with fixed tariff rates published by the shipping companies. Each trip a liner takes is called a voyage.

Shipping containers are moved around the world by means of liner services. Shipping containers haul all types of agricultural products, from bulk grains to frozen beef. More than half of U.S. agricultural exports by value move in marine shipping containers.

Liner Services

The development of the shipping container and vessel was instrumental in marketing high-value and valued-added U.S. commodities in international markets. This mode of transportation has revolutionized shipping offering shorter transit times, less pilferage, reduced handling, delivery of better quality for perishable products, and increased security in identifying the source. The evolution of the shipping container and the intermodal supply chain has allowed agricultural producers to economically access new markets with differentiated products.

As their name implies, container ships are constructed to carry containers. Their holds are cellular, with vertical frames and guides where standard 20 and 40-foot containers are slotted securely into place for shipment.

Container ships range in capacity from as small as 500 Twenty-foot Equivalent Unit (TEU) and as large as 22,000 TEU. Vessels can load both 20-foot and 40-foot containers. Often, smaller container vessels are used as feeder ships moving containers from smaller and shallower port adjacent to major container terminals. Smaller container ships may be geared, while the larger vessels are usually gearless and can achieve top speeds exceeding 25 knots in long voyages. These larger sizes ships allow tremendous efficiency generating economies of scale with a variety of products carried on the same shipment.

Shipping Containers

Containerships operate in a different manner than other dry vessels. They are most often chartered on “period time charters” from major liner companies. The liner companies offer fixed voyage prices, or a “contract of affreightment,” to end clients for each container movement.

Container rates are typically negotiated in confidential service contracts, with the

understanding that changes in rates are closely connected to changes in fuel costs and demand.

It is important to note here that the benefits of shipping by container has led to increased dependence on containers to ship grains and other agricultural commodities, This trend has led to a situation in which the availability of containers can be the greatest challenge facing many agricultural shippers. A decline in volumes of imported goods to the interior of the U.S. will reduce the availability of containers available to receive grain at inland elevators. This can cause delays and significantly increase costs for export cargos. The result can be a loss of sales and unreliable service to overseas buyers. As such, many agricultural shippers are dependent on import flows, the railroads' willingness to position the containers, and the international rate for the full "backhaul" movement.

CHARTERING A VESSEL

Chartering a Vessel

The transport of bulk grain by and ocean ship is facilitated by chartering a suitable vessel. Chartering is an activity whereby a shipowner hires out the use of their vessel to a "charterer". The contract for transport is called a "charterparty" (originating from the French term "charte partie", or "parted document").

The charter party will clearly and unambiguously set out the rights and responsibilities of the ship owner and the charterers, as well as how to settle any subsequent dispute which may arise between them in a court of law or any agreed forum with reference to the agreed terms and conditions as embodied in the charter party contract.

There are three main types of charter parties:

- Demise (Bareboat) Charter
- Time Charter
- Voyage Charter

DEMISE (Bareboat) CHARTER

A "Demise Charter" (or "**Bareboat Charter**") operates as a long lease of the vessel, with the charterer completely in charge.

A bareboat charter is an arrangement for the hiring of an ocean vessel or boat, whereby no administration or technical maintenance is included as part of the agreement. In addition, no crew or provisions are included as part of the agreement. Instead, the people who rent the vessel from the owner are

responsible for taking care of such things.

The charterer obtains possession and full control of the vessel along with the legal and financial responsibility for it. The charterer pays for all operating expenses, including fuel, crew, port expenses, as well as protection, indemnity (P&I) and hull insurance.

Below are some of the major points in the bareboat charter contract:

Bareboat Charter

1. Description of the parties involved: the owner, the charterer and the name of the vessel. A detailed vessel description is usually attached to the rider but charters can be negotiated that allow for a generic vessel type, a specific vessel "to be nominated" or TBN.
2. Establishment of the amount of time the named vessel is under charter.
3. Designation of the delivery point or range.
4. Stoppage of the time count if the vessel arrives at the initial load port and is not ready for loading.
5. Specifications that the owner will pay for all provisions, wages, insurance and regular maintenance.
6. Specifications that the charterer will pay all fuel costs and customary port charges.
7. Establishment of an amount, in dollars-per-day, that the charterer must pay the owner for the use of the ship, the payment schedule and the method exchange.
8. Establishment of return conditions, including where the owner regains control of the vessel after the time charter expires and with what notice it shall be done.
9. Specifications of the time frame in which the vessel has to be delivered from the owners to the charterer, for example, not before April 1 and not after April 20. If the vessel is not handed over on or before April 20, it is the charterer's option to cancel the time charter.

There are legal differences between a bareboat charter and other types of arrangements, such as voyage charters or time charters. In a voyage or time charter, the charterer charters the ship (or part of it) for a particular voyage or for a set period of time. In these charters, the charterer can direct where the ship will go, but the owner of the ship retains possession of the ship through its employment of the master and crew.

The giving up of possession of the ship by the owner is the defining characteristic of a demise or bareboat. With a demise or bare-boat charter the owner gives possession of the ship to the charterer and the charterer hires its own master and crew. In this type of charterer party the charterer is sometimes referred to a "desponent owner".

In some commercial bareboat chartering, the charter period may last for many years and may end with the charterer acquiring title and ownership of the ship. In this case, a bareboat charter is a form of "hire to purchase" from the owners, who may have well been the shipbuilders.

Demise or bareboat chartering is common for bulk carriers; however, less common in the bulk grain trade. More common in bulk grain shipments are voyage charters.

TIME CHARTER

A "Time Charter" is the hiring of a vessel for a specific period of time. In this arrangement the owner still manages and runs the vessel, but the charterer selects the ports and directs the vessel where to go. When in port the charterer becomes responsible for loading and unloading the ship within the agreed period of laytime. If the charterer exceeds the allowed laytime, demurrage may become payable. The charterer also pays for all fuel the vessel consumes, port charges, commissions, and a daily hire to the owner of the vessel.

Like much about the maritime trade, the standard time charter form or contract is old (1943), but it is used as a foundation by most participants. Nearly every ship owner and charterer have terms that they like to include in their negotiations. Many of these are included in a common rider that each party customizes to the party's view.

Below are some of the major points in the time charter contract:

Time Charter

1. Description of the parties involved: the owner, the charterer and the name of the vessel. A detailed vessel description is usually attached to the rider but charters can be negotiated that allow for a generic vessel type, a specific vessel "to be nominated" or TBN.
2. Establishment of the amount of time the named vessel is under time charter.
3. Designation of the delivery point or range.
4. Stoppage of the time count if the vessel arrives at the initial load port and is

not ready for loading.

5. Specifications that the owner will pay for all provisions, wages, insurance and regular maintenance.
6. Specifications that the charterer will pay all fuel costs and customary port charges.
7. Establishment of an amount, in dollars-per-day, that the charterer must pay the owner for the use of the ship, the payment schedule and the method exchange.
8. Establishment of return conditions, including where the owner regains control of the vessel after the time charter expires and with what notice it shall be done.
9. Specifications of the time frame in which the vessel has to be delivered from the owners to the charterer, for example, not before April 1 and not after April 20. If the vessel is not handed over on or before April 20, it is the charterer's option to cancel the time charter.

VOYAGE CHARTER

A “Voyage Charter” is the hiring of a vessel and crew for a voyage between a load port and a discharge port. In a voyage charter, the shipowner still runs the ship

In a voyage charter, the route is pre-arranged, and the charterer has little scope to interfere. In his arrangement the charterer pays the vessel owner on a per-ton or lump-sum basis. The owner pays the port costs, (excluding stevedoring), fuel costs and crew costs. The payment for the use of the vessel is known as freight.

In a voyage charter when in port the charterer becomes responsible for loading and unloading the ship within the agreed period of “laytime”. If laytime is exceeded, the charterer must pay “demurrage”. If laytime is saved, the charter party may require the shipowner to pay “dispatch” to the charterer.

Voyage Charter

The standard form for a freight contract, or voyage charter, is called the Baltimore Berth Grain Charter Party or BFC. It too is an old contract form, initially written in 1913, but it is the basis of most grain charters from the United States. However, the BFC does not cover many of the details in today's more complicated charter parties. As can be seen from the sample in Appendix I, some language in the BFC has been eliminated or changed and a rider is attached with additional terms. The rider and the BFC form make up the complete charter

party. Most of the recommended terms of the charter party are self-explanatory.

Another commonly used standard form freight contract, or voyage charter, is the North American Grain Charter Party or NOR Grain CP. This charter party was issued by the Association of Ship Brokers and Agents (USA).. The latest edition of this contract is NORGRAIN 89.

There may be other standard form charterparties available, but the BFC and NOR Grains are the two are most common forms used when shipping grain out of North America.

In comparison, a “time charter” is almost a halfway-house between a “demise charter” and a “voyage charter”, in that the charterer decides on the voyages and the ports, and instructs the shipowner's crew to comply. These differences can lead to legal issues of indemnity; whereas, the shipowner in a “voyage charter” takes responsibility for the ship, while in a “time charter” the shipowner may need to be indemnified against losses or liabilities proximately caused by the charterer.

CONTRACT OF AFFREIGHTMENT

A Contract of “Affreightment” (COA) is a binding agreement signed between a charterer and an ocean or water vessel carrier to secure space for shipping goods.

Under COA, the shipowner agrees to provide his vessel or vessels to the Charterers for a series of voyages. The price paid by the charterer is known as freight. ⁱ The charterer will pay the freight even if the goods are not ready to be shipped at the specified time. On the other hand, the shipowner is responsible for taking the goods to a specific destination at a specific time. If they fail to reach the destination on time, the carrier will be subject to a penalty for being late.

This type of Contract is suitable for carrying a pre-specified amount of cargo or performing a pre-specified number of voyages. In this case, the C/P terms will remain the same for each voyage with perhaps only the freight rates being adjusted for the prevailing market conditions.

A contract of affreightment sets forth the obligations and rights of the shipowner and the charterer. The main purpose of this document is to put the onus on the carrier to transfer a certain amount of goods at a certain time.

A bill of the agreement is receipt of goods taken on board for carrying to a specified destination. The ship owners or their agents sign this document acknowledging the shipment of a parcel of goods is received for transportation. This agreement explains the terms and conditions under which the shipment will

be carried to a pre-decided destination.

The bill of lading document assumes a triple identity. It works as a receipt of freight services, an agreement between a freight carrier and shipper, and a document of title. This document is important for moving a freight shipment. It provides all the details that are needed to process the freight shipment and invoice it correctly.

NON-NEGOTIABLE TERMS

1. Name of the parties entering into the contract and the vessel ("TBN" is acceptable but a negotiable term).
2. Type of commodity. The ship owner will want to know what type of commodity is going to be loaded into the vessel; i.e coal, iron ore, fertilizer, grain, salt, steel, etc. For grain it will be HGSS - Heavy Grains/Soybeans/Sorghum; for light grains, such as barley, it is simply barley.
3. All cargoes loaded in the United States must be loaded under the inspection of the National Cargo Bureau (NCB) in order to ensure proper and safe loading and stowage.
4. Payment of freight is made upon presentation of the Mate's Receipt, which is made immediately upon completion of loading. Once the freight is paid by the shipper a signed Bill of Lading will be issued.
5. A vessel is considered load ready when it has been entered at the local customs house and has passed the NCB and FGIS inspections. When either the charterer or the charterer's agents are notified of the vessel's readiness to load; NOR – Notice of Readiness, (which must be before 1600 hours on a weekday or 1200 hours on a Saturday), the vessel's laytime begins the following morning at 0700 hours (see laydays - item two under negotiable terms).
6. A charter party can be cancelled by the charterer if the vessel has not been presented as load ready by 1200 hours on the last day of the shipment period. However, the charterer must absorb the difference in the chartered rate and the replacement value - what the charterer has to pay for a vessel to replace the original charter. This can be either a loss or a gain.

NEGOTIABLE TERMS

Size of the Ship: This generally refers to the size of the cargo and the tolerances, but the actual deadweight size of the vessel can be negotiated too. It is critical to ensure that the charter party tolerances match the grain purchase contract tolerances. If the importer charters for a larger tolerance than the charterer has on the charter's FOB grain purchase, the charterer might be liable to the vessel owner for dead freight. The tolerance on a charter party is the owner's option.

The charterer should try to obtain a small tolerance and if a specific vessel is being considered, it is even possible to charter a specific quantity - no more and no less. This would be expressed, for example, as 25,000 MT min/max.

Laydays: This specifies the time period in which the vessel must be ready to load the cargo. Typically, laydays are from 6 to 20 days. Narrower laydays are better for the charterer because the charterer will have greater control over the actual shipment period of the cargo. For example, if the laydays are April 20 to 30, the vessel must be ready to load no later than April 30. The earliest that time can start counting for the charterer is April 20, even if the vessel is ready five days early.

If the vessel is not ready to load on or before April 30, the charterer may cancel the charter party. There is, however, no recourse for the charterer if the market freight level is higher than when the charter party initially was fixed.

Commodity: This specifies the types of products that are loadable at the freight rate in the charter party. Different commodities will take up more space per metric ton than others. For instance, the specific weight of corn is greater than barley; therefore, it stows better, taking up less space.

In some charter parties, the charterer can convert from paying a freight rate per metric ton to making a lump sum payment. The "conversion" gives the charterer the right to load commodities not covered in the charter party, such as seeds.

Load/Discharge Ports: This stipulates how many load ports/berths and discharge ports/berths are included in the freight rate. Since more complicated load conditions - for example, three load ports compared to one - prolong the length of time the vessel is tied up in the charter, multiple port/berth options demand premium rates.

Typically, feed grains charters require only one berth at the loading point and one or two discharge ports/berths at the destination. Options for multiple discharge ports/berths at the destination are at a negotiated premium, declarable, for example, when the vessel completes loading.

From a freight standpoint, lifting a large cargo is more economical. Since the marginal cost of operating a 65,000 ton deadweight vessel is little different in these modern days than a 20,000 ton deadweight vessel. It is necessary for the

charterer to combine as much cargo as is possible, putting different products, even destined for different discharge ports (within geographic reason), on the same vessel. In most cases, the premium for multiple load or discharge ports/berths will be much less than the savings from chartering the larger vessel.

Freight Rate: This is expressed in dollars per metric ton, or long ton. Also defined in the freight rate is who arranges and pays for the trimming of the cargo. A few definitions follow:

- FIOT: Free In/Out Trimmed - the charterer pays all of the trimming expenses.
- FIOST: Free In/Out Spout Trimmed - the charterer pays all of the trimming expenses except when special machine or hand trimming is required.
- Gross Load - the vessel owner pays all of the trimming costs.

The most common way to charter in the feed grains trade is FIOST, since the vast majority of vessels used are self-trimming bulk carriers and only require spout trimming. Tween-deckers and tankers require special machine trimming and consequently cost the charterer extra trimming charges.

Demurrage/Despatch: Demurrage is the daily penalty rate the charterer pays the owner if the vessel has not been loaded within the time allowed in the charter party. Despatch is the daily rate the owner pays the charterer on the number of days/hours the vessel is loaded faster than the time allowed. To some extent, demurrage rates reflect the daily value of a vessel and will, over time, vary with the freight market. For example, a 50,000 MT vessel with a daily value of approximately 14,000 USD should reflect a demurrage rate of about 12,000 USD to 20,000 USD per day. When the freight markets are depressed, the demurrage rate could be only 8,000 USD to 9,000 USD. The standard despatch rate is half of the demurrage rate and gives the charterer the incentive to load the vessel as quickly as possible.

RIDERS

Riders are contract extension clauses which are attached to standard contracts. They may include the following provisions:

1. The Baltimore Grain Charter Party (BFC) and the North American Grain Charter Party (NOR Grain) specify all situations in which the vessel owner is not responsible for damage to the cargo. Therefore, often times a rider will include that marine insurance is required.
2. The rider will specify who is to appoint agents at the load and discharge

ports. In either case, the owner pays all agent fees.

3. The BFC Saturday clause is used in all charters originating in the United States and specifies the conditions under which Saturdays may count as laydays. Saturdays ordinarily are not considered laydays unless stated as such in a rider.
4. The "lighterage" clause specifies the maximum weight the vessel is allowed to have at its destination port. If the vessel is too heavy, the owner must pay the cost of lightening the vessel. If conditions have changed at discharge so the vessel cannot unload, it is the charterer's responsibility to pay for lightening the vessel.
5. The owner must pay for any securing and strapping of the cargo. Only natural separations are allowed; charterers pay for artificial separations.
6. Overtime is paid by whoever orders it - owners or charterers, unless ordered by the port, in which case the charterer pays for it.
7. The vessel cannot be loaded or discharged in Cuba, Libya or North Korea, and cannot enter into ports in those countries before or during the charter party.
8. Any dispute between the owner and charterer is to be settled by the nominated dispute resolution process; or a three-person arbitration panel. Each party appoints one commercial arbitrator. Together, the parties and the arbitrators then appoint a third arbitrator. The three make a final decision.

ROLE OF AN AGENT

A charterer generally appoints an agent to execute an FOB contract. The agent's responsibilities include the following:

1. With local authorities:
 - ✓ customs requirements
 - ✓ immigration
 - ✓ plant protection and quarantine (PPQ)
 - ✓ hold inspection
 - ✓ pilots, tugs, lines and so forth
 - ✓ U.S.C.G. (United States Coast Guard)
 - ✓ documentation
2. With owners:
 - ✓ bunkers

- crew business
- repairs
- cargo
- invoices and documentation

3. With charterers:

- cargo
- documentation
- invoices

The following charges, including agents' fees, are normally paid for by the shipowner:

- pilots
- tugs
- lines
- customs
- immigration
- plant protection and quarantine (PPQ)
- inspection
- repairs
- bunkers
- tonnage tax

Role of the Agent

An important part of the agent's work is to discuss with the master of the ship specific issues of the cargo, such as the stow plan of the vessel, load rotation (when the vessel will go into berth) and expected cargo lift. The agent will also obtain the master's permission to sign bills of lading.

Sometimes two agents will be involved - one appointed by the charterer and one appointed by the owner to protect his interests. The owner's agent will be involved with the specific issues of the vessel owner, such as repairs, crew and bunkers.

One of the agent's most important jobs is to secure the documentation necessary to permit the cargo to be loaded onto the vessel. This documentation includes:

National Cargo Board (NCB) Loading Pass: When the vessel arrives at port, the first vessel inspection is by the NCB which studies the master's stow plan and inspects the vessel to ensure that the vessel is structurally safe to load. The NCB also checks the stability of the cargo based on the stow plan and judges if the stowage is safe for the voyage. If all is to the satisfaction of the NCB, it issues a pass allowing the vessel to load the cargo.

USDA Pass: After the NCB inspection, USDA inspects the cargo spaces for cleanliness. If the space is clean to the USDA's satisfaction, it issues a pass to the

vessel's agent.

NOR (Notice of Readiness): After the vessel has passed the NCB and USDA inspections, it will tender its NOR to the charterer's agent and the agent will then file an application for berth with the loading elevator. This has to be done by 1600 hours on weekdays or 0900 hours on Saturdays, and time will commence for the charterer the following workday at 0700 hours. The agent passes the NOR to the loading elevator.

Final USDA Pass: As the cargo is being loaded, USDA (or its designated state inspectors) supervises the weighing and grading and issues weight and grade certificates for the completed cargo.

Mate's Receipt: As soon as loading is completed, the master of the ship issues a mate's receipt and signs it. The mate's receipt is a temporary title of ownership to the cargo given to the seller. The seller surrenders it to the agent who in turn issues the bill of lading (B/L). The charterer pays the freight cost against a release of a signed B/L.

Bills of Lading: While the cargo is being loaded on the vessel at the port elevator, the agent will draft bills of lading. The B/L specifies the amount of goods delivered to the ship, the parties involved, load port and destination, and the date of vessel completion. The B/L date determines the shipment date. As soon as the owner's agency confirms freight payment, the agent signs the B/L and releases it to the seller who in turn surrenders the mate's receipt.

In buying CNF or CIF, the buyer avoids all of the complications of chartering vessels, arranging logistics and executing an FOB purchase. The buyer only has to specify the shipment period and discharge terms; the seller arranges the rest. It is clearly an easier but not necessarily economical way to purchase grain.

SHIP TYPES

Car Bulkers: These are designed to transport vehicles, but they can also transport grain in a way similar to a self-trimming bulk carrier. A car bulker might bring cars from Japan to the United States, remove the cars and load U.S. grain for the return trip to Japan.

Oil/Bulk/Ore Carriers (OBO): These are used to transport these three commodities. A special trimming cost would be incurred if an OBO transported grain. Before chartering a vessel, one should pay special attention to the type of cargo carried previously. For example, if the vessel carried oil, it might require special cleaning procedures.

Ship Types

Self-Trimming Bulk Carriers (STBC): These are the most commonly chartered vessels in the U.S. grain trade business. They are especially suited for grain transport because their bulkheads slope at an approximate 45-degree angle to the horizontal, preventing empty spaces from developing in the wings of the hold.

The self-trimming bulk carrier is the most economical vessel to charter because the holds are easy to clean and loading does not require special trimming, which would make stevedoring expensive. Some vessels are referred to as PANAMAX type, which simply means the vessels can transit the Panama Canal. The term is typically reserved for bulk carriers in the 50,000-70,000 MT dead weight tonnage (DWT) range.

Tankers: As vessels designed to transport petroleum products, chemicals or other liquids, tankers are rarely used to transport grain because their design makes loading bulk grain difficult and expensive. The charter rate of a tanker would have to be at a substantial discount to that of a STBC to allow the charterer to recoup the costs.

Tween-Deckers: These vessels are suited for loading general cargo, not necessarily grain. They have two decks which are separated, allowing for multiple products transport. The disadvantage is that loading and discharging a tween-decker takes longer and costs more than loading an STBC that is the same size.

Vessels are built under the supervision of a classification society which approves the builders' plans, supervises the actual construction and certifies the vessels. This extensive supervision is done for safety and insurance reasons. The most active class societies are Lloyds Register, London, United Kingdom; American Bureau of Shipping, New York City, USA; Norski Veritas, Oslo, Norway; Bureau Veritas, Paris, France. The societies also inspect the vessels annually.

SHIP SIZES – DRY BULK CARRIERS FOR GRAIN

Dry bulk carriers transport large quantities of dry goods. These vessels vary in size, with the choice of size depending on the commodity being shipped, limitations of both the loading and unloading port capacities, and demand within the market.

There are several different types of bulk carriers with the main distinction between each other being their size. The smaller bulk carriers, from mini-bulkers up to ultramaxs usually, but not always, are geared while the larger bulkers from panamax to ULOC are almost always gearless. However, note here there are also a few geared panamax and kamsarmax bulkers.

Smaller bulkers can carry all the types of bulk cargoes as well as some general cargoes and usually used in shorter distances. Panamax and capesizes, on the other hand, are used to load mainly grains, coal, iron ore, and other minerals. Ultra Large Ore Carriers (ULOC) and Valemax are used to carry iron ore.

Accordingly, vessels can be divided in to the following categories:

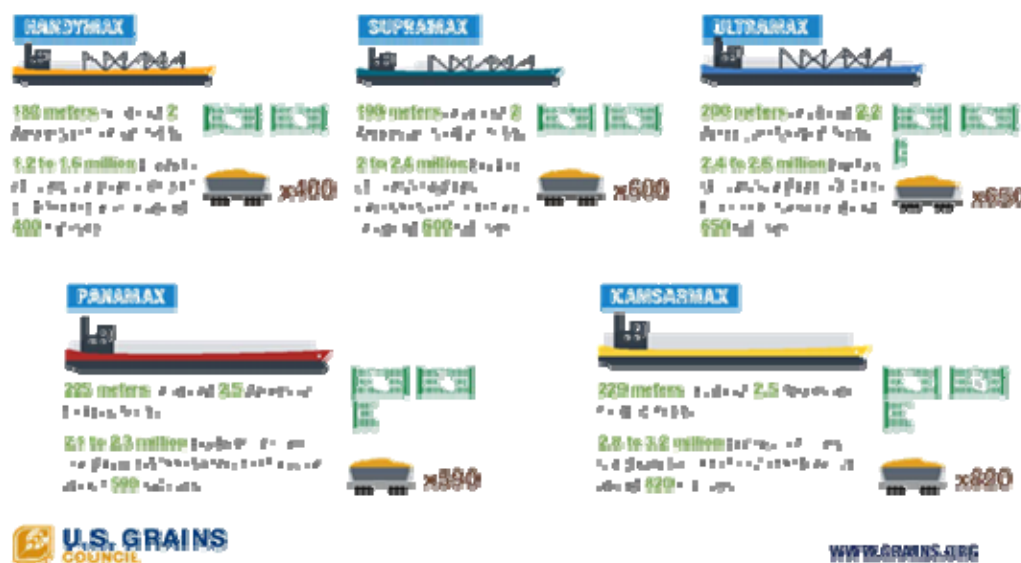
Type	DWT mts	Draught mts	LOA mts	Beam mts	Geared	Number of Holds
Handysize	35,000	10.2	150	28.40	Yes	5
Handymax	48,000	12.2	199	28.40	Yes	5
Supramax	52,000	12.2	199	32.20	Yes	5
Ultramax	62,000	13	200	32.24	Yes	5
Panamax	75,000	14.1	225	32.26	No	7
Kamsarmax	82,000	14.5	229	32.26	No	7
Post-Panamax	98,000	14.6	240	28	No	7
Capesize	172,000	17.95	289	45	No	9
ULOC (Valemax)	400,000	23	362	65	No	9

Source: Open Sea. Proⁱⁱ

Read More: <https://opensea.pro/blog/ships-types-and-sizes>

The capacity of a ship is measured in “Deadweight” tonnage (DWT), and is the measure of how much weight a ship can carry. DWT is often used to specify a ship's maximum permissible capacity when it is fully loaded so that its Plimsoll line is at water level. *(The Plimsoll line is a reference mark located on a ship's hull that indicates the maximum depth to which the vessel may be safely immersed when loaded with cargo.)* DWT is the sum of the weights of cargo, fuel, fresh water, ballast water, provisions, passengers, and crew.

Ship Sizes



Mini Bulkers: These vessels have a carrying capacity of up to about 15,000 DWT. They are mainly used in short sea trades however most vessels of this size are either general cargo ships or short sea specialized vessels rather than common bulk carriers.

Handysize: These vessels have a carrying capacity of 15,000 to 35,000 DWT, and range in length from 130 to 150 meters, with a 10 meter draught. They typically contain five cargo holds for diversified storage with four on-deck cranes. Their shallow draught and small size allow them to operate in most ports across the world, making them the most common bulk carrier over 10,000 DWT.

Handymax: These vessels with more modern builds can carry between 35,000 and 48,000 DWT, and range in length from 150 to 200 meters, with a draft of 11 to 12 meters. They generally have five cargo holds and four on-deck cranes, making them popular for unloading cargo in ports without sophisticated infrastructure.

Handysize vessels can carry a variety of dry bulk cargo, including iron ore, coal, cement, phosphate, finished steel products, wooden logs, fertilizer, and grains. These vessels are typically built in Japan, South Korea, China, Vietnam, India, and the Philippines.

Ship Sizes

Supramax: These vessels are medium-sized vessels with a carrying capacity between 48,000 and 60,000 DWT, and a length of up to 199 meters, with a typical draught of 12.2m.

Because of their smaller size, Supramax vessels can enter and exit smaller ports.

Ultramax: These vessels are medium-sized bulk carriers. They have a carrying capacity generally between 60,000 to 65,000 DWT. These vessels are considered an upgrade over the smaller Supramax carriers.

Panamax: These vessels are medium-sized bulk carriers with a carrying capacity of 65,000 and 80,000 DWT. These vessels each have seven cargo holds and are designed to fit the locks of the Panama Canal.

Post-Panamax vessels are larger vessels with carrying capacities between 85,000 and 110,000 DWT. Revised size regulations set by the Panama Canal Authority mean these vessels can now reach dimensions of 366m in length, 49m in width, and 15.2m in depth.

Panamax vessels are the size most commonly used for agricultural products. They is the largest size vessel capable of traversing the Panama Canal. However, this size vessel is also active in transporting grain from the U.S. Gulf and PNW ports to Asian markets.

Kamsarmax: These vessels are medium-sized vessels with a carrying capacity between 80,000 and 85,000 DWT.

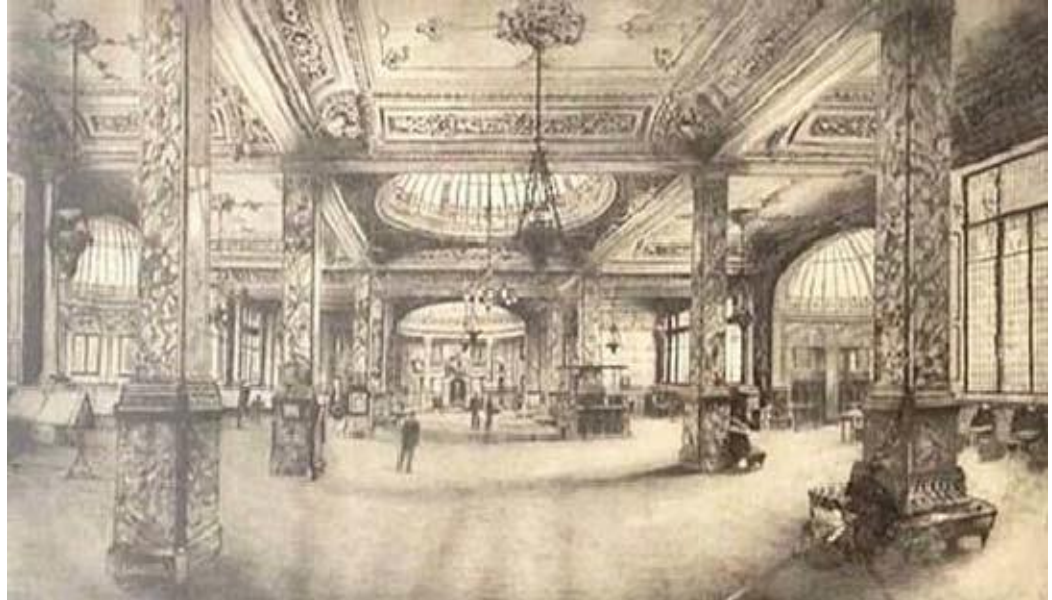
These vessels are specialized in that they designed to fit both through the Panama Canal, as well as fit within Port Kamsar in West Africa.

Capesize: These vessels are the largest dry bulk carrier. Their carrying capacity is between 110,000 and 200,000 DWT. They measure roughly 230 to 270 meters long, with a draft of 17 meters, with nine cargo holds.

Due to their larger size, not every port can accommodate such a vessel while fully loaded. Capesize vessels are used in the transportation of coal, iron ore, and commodity raw materials.

Ultra Large Ore Carriers: (ULOC) These are bulkers which are larger than capesizes and they are mainly used to load iron ore. The largest vessels in this category are the Valemax (or Chinamax) vessels which have a capacity as high as 400,000 DWT.

Due to their larger size, only a few ports can accommodate such a vessel while fully loaded. ULOC vessels are used in the transportation of coal, iron ore, and commodity raw materials, primarily between Australia and China, and Brazil and China.



Photograph of engraving by Joseph Finnemore of the Baltic Exchange dated 1918ⁱⁱⁱ

LONDON BALTIC EXCHANGE^{iv}

The Baltic Exchange is a London-based exchange that provides real-time maritime shipping information to traders for settling physical and derivative shipping contracts. The exchange has regional offices in Singapore, Shanghai, and Athens.

History^v

The Baltic Exchange was started in 1744 at a coffee house, where shipowners and merchants gathered to transact business, in Threadneedle Street in London.

To bring order to informal trades, membership and rules of trades were devised in 1823. As England's trading connections and prowess grew, the exchange also gained in the number of its members and transactions.

It was acquired by the Singapore Exchange SGX in November 2016.

WHAT IS THE BALTIC DRY INDEX?

Today, the London based Baltic Exchange issues the daily Baltic Dry Index as a market barometer and leading indicator of the shipping industry.

The exchange publishes five major Baltic Indices. These are the:

- Baltic Exchange Dry Index (BDI),
- Baltic Exchange Capesize Index (BCI),
- Baltic Exchange Panamax Index (BPI),

- Baltic Exchange Supramax Index (BSI),
- Baltic Exchange Handysize index (BHSI),

The Baltic Dry Index is considered a leading indicator for economic activity because a rise in dry bulk shipping signals a surge in raw production materials that stimulate growth.

A shipowner uses the index to monitor and protect against a drop in freight rates. Charters, on the hand, use it to mitigate the risks of rising freight rates.

The index also provides investors with insight into the price of moving major raw materials by sea but also helps price freight derivatives.

How it works...

These indices are estimates of moving cargoes of raw materials for 20 shipping routes measured by a time charter across the seas by leading shipbrokers. The routes are meant to be representative, i.e. large enough in volume to matter for the overall market. Every working day, a panel of international shipbrokers submits their assessment of the current freight cost on various routes to the Baltic Exchange.

To derive the aggregate Baltic Dry Index (BDI) three different sizes of ocean- going dry bulk transport vessels are taken into consideration. These rate assessments are then weighted together to create both the overall BDI.

Following consultation with members, as of March 2018 the Baltic Exchange implemented changes to the Baltic Dry Index (BDI), re-weighting the BDI to the following ratios of time charter assessments:

- 40% Capesize,
- 30% Panamax
- 30% Supramax
- *no longer includes the Handysize time charter average*

The indices are used to settle physical contracts as well as derivatives based on those contracts.

OCEAN FREIGHT DERIVATIVES AND FORWARD FREIGHT AGREEMENTS (FFA)

Freight derivatives include exchange-traded futures, swap futures, forward freight agreements (FFAs), container freight swap agreements, container freight derivatives, and physical deliverable freight derivatives.

Forward Freight Agreements (FFAs) are commodity derivatives which derive from the underlying physical shipping markets and the future levels of freight rates for dry bulk carriers and oil tankers. The instruments are settled against various freight rate indexes published by the Baltic Exchange and the Shanghai Shipping Exchange.

Freight derivatives were first traded by dry bulk shipping companies in the mid-1980s. Today they are widely used in the dry bulk and tanker sectors.

Cleared contracts, in contrast, are margined on a daily basis through the designated clearinghouse. At the end of each day, investors receive or owe the difference between the price of the paper contracts and the market index. Clearing services are provided by leading exchanges, including the NASDAQ OMX Commodities, European Energy Exchange, and Chicago Mercantile Exchange (CME), to name a few.

With shipping markets bearing more risk, freight derivatives have become a viable method for shipowners and operators, oil companies, trading companies, and grain houses to manage freight rate risk and hedge against price volatility in the supply chain.

As with any derivative, market speculators, (like hedge funds and retail traders) care engage in both the buying and selling of FFA contracts providing for a new, more liquid, marketplace.

In a volatile market, FFAs give companies the ability to manage their freight risk. They also provide a mechanism for companies to take on price risk through an exposure to global trade and are an important element of the shipping markets.

FORWARD FREIGHT AGREEMENTS (FFA)

Forward Freight Agreements (FFAs) are commodity derivatives which derive from the underlying physical shipping markets and the future levels of freight rates for dry bulk carriers and oil tankers. The instruments are settled against various freight rate indexes published by the Baltic Exchange and the Shanghai Shipping Exchange.

FFAs were developed for shipping in the early 1990s. FFAs are traded both over-the-counter (OTC) and exchange-traded. Trades are often unpublished and done on trust alone.

FFAs are traded over the counter on the terms and conditions of the Forward Freight Agreement Broker Association (FFABA) standard contracts. The primary

terms of an FFA agreement include the agreed route, time of settlement, contract size, and the rate at which differences are settled.

When the contract expires on the settlement date:

- If the agreed price is higher than the settlement price the seller pays the difference to the contract buyer.
- If the agreed price is lower than the settlement price, the buyer pays the seller the difference.

The settlement and contract price difference is then multiplied by the cargo size or the voyage duration.

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Howard Jay O’Neil
Senior Economist – International Grains Program “Emeritus”
Kansas State University

Philip Shull
Senior Diplomat (Ret)
U.S. Department of Agriculture

ⁱ Walton, Joseph (1911). "Affreightment". In Chisholm, Hugh (ed.). *Encyclopædia Britannica*. Vol. 1 (11th ed.). Cambridge University Press. pp. 302–306 Accessed 2 March 2022

ⁱⁱ Source: OpenSea.Pro <https://opensea.pro/blog/ships-types-and-sizes> Accessed 15 November 2021

ⁱⁱⁱ Baltic Exchange <https://balticexchange.com/en/who-we-are.html> Accessed 5 March 2022

^{iv} Baltic Exchange <https://balticexchange.com/en/who-we-are.html> Accessed 5 March 2022

^v Baltic Exchange <https://balticexchange.com/en/who-we-are.html> Accessed 5 March 2022

Payment and Financing of U.S. Grains

This chapter identifies some of the payment and financing options involved in international grains transactions, and ways companies can help protect themselves against these risks. It also introduces USDA credit guarantee programs traders may use to facilitate sales of U.S. grains and processing equipment to emerging markets.

International grain transactions present both the exporter and importer with a variety of risks. These risks will fall into the broad categories of:

- Contract Performance Risk,
 - a. Quality
 - b. Quantity
 - c. Payment
 - d. Time or Period
- Location or Shipping Port,
- Transportation Risks
- Geo-Political Risk.

The buyer and seller will work together to minimize and mitigate these risks will facilitate the transaction and help build confidence and trust between the parties.

Contract Performance is the most fundamental risk for both the importer and the exporter. The importing company needs to know that the supplier will perform on the contract as agreed. This includes items like the grain that is purchased meets the agreed quality, quantity, specifications, that the cargo is delivered or shipped on time, and stipulated in the contract

Similarly, the exporting company needs to feel secure that it will receive payment according to the terms and timing set out in the contract.

The greater the risk of payment or delivery problems, the greater the chance the exporter may include a “**risk premium**” in the price. The larger the payment risk is to the exporter, the greater the risk “premium” the importer may pay as part of the purchase price. A higher payment risk may also result in the exporter requiring a more secure or “tighter” method of payment.

Different payment methods carry different levels of risk. The level of perceived risk may change over time for a wide variety of reasons. For example, perceived risk may decline as trust grows between the parties. On the other hand, perceived risk may rise due to external factors such as economic or geo-political uncertainties.

Following are summaries of payment and financing methods commonly used in the international grain trade. These include: Letters of Credit, Open Account transactions, the Cash Against Documents payment form, the barter (countertrade) method and other lesser used payment options.

The purpose of this summary is to help importers become familiar with various payment options, and to understand the advantages and disadvantages of each.

LETTERS OF CREDIT

The most generally accepted method of payment for an international grain transaction is by a Confirmed Irrevocable Documentary Letter of Credit, payable at “sight”.ⁱⁱⁱ This type of payment is very secure and may facilitate several common forms of import financing.

Letters of Credit (often abbreviated as L/C or LC) have been a preferred method of payment in the international grain trade for many decades. Time and experience have proven this payment option to be a reliable way to address the many variables and risks that are inherent in international transactions. These variables and risks include distance, differing laws and regulations among countries, shipping and delivery issues, and any lack of confidence or trust between the buyer and seller.

A Letter of Credit is a financial contract between a bank, a bank's customer (importer) and a beneficiary (exporter). Generally issued by an importer's bank, the letter of credit guarantees the beneficiary (exporter) will be paid once the conditions of the letter of credit have been met.

In other words, a Letter of Credit is a written commitment by a bank to make payment of a defined amount of money to the beneficiary (exporter) according to the terms and conditions specified by the importer (applicant). The Letter of Credit will also establish a time limit for completion and specify which documents are needed to confirm the transaction's fulfillment.

Simply put, Letters of Credit minimize risk in international trade transactions. For example, if you are an importer, using a Letter of Credit can ensure that your company only pays for goods after the supplier has provided evidence that the goods have been shipped.

It is important for both parties to understand that this “documentary Letter of Credit” is a legally binding condition of the contract that covers payment terms of the transaction. It is separate from the original grain contract.

Letter of Credit

For a Letter of Credit to be valid, it must contain the following basic components:

Applicant: The party applying for the Letter of Credit, usually the importer in a grain transaction.

The Issuing Bank: The bank that issues the Letter of Credit and assumes the obligation to make payment to the beneficiary, usually the exporter.

Beneficiary: The party in whose favor the Letter of Credit is issued, usually the exporter in a grain transaction.

Amount: The sum of money, usually expressed as a maximum amount, of the credit defined in a specific currency.

Terms: The requirements, including documents that must be met for the collection of the credit.

Expiry: The final date for the beneficiary to present against the credit.

In addition to the above, a Letter of Credit state terms under which the terms may be amended or cancelled.

While there are several types of Letters of Credit, a Confirmed Irrevocable Documentary Letter of Credit, payable at “sight”ⁱⁱⁱ is the most generally accepted method of payment for international grain

Letter of Credit

transactions. This type of payment is very secure and may facilitate several common forms of import financing.

WHAT IS AN IRREVOCABLE LETTER OF CREDIT?

An Irrevocable Letter of Credit (ILOC) is a guarantee for payment issued by a bank for goods and services purchased, which cannot be cancelled during some specified time period.

An Irrevocable Letter of Credit is most commonly used to facilitate international trade. A Confirmed Irrevocable Letter of Credit offers additional risk protection for the seller by providing a guarantee of payment from both the buyer's bank and the seller's bank.

A **revocable** Letter of Credit allows the issuing importer's bank (at the applicant's / importer's request) to amend or cancel the credit at any time without the approval of the beneficiary / exporter. This flexibility creates significant payment risk for the exporter; and as such is seldom used.

By contrast, an **irrevocable** Letter of Credit cannot be amended without the consent of all parties - the issuing bank, the beneficiary / exporter and the applicant / importer.

WHAT IS A CONFIRMED LETTER OF CREDIT?

A Confirmed Letter of Credit refers to an additional guarantee to the original letter of credit from a second bank. Requiring a Confirmed Letter of Credit decreases the risk of default for the exporter.

The exporter's confirming bank guarantees payment if the issuing bank fails to do so. Exporters may be required a confirming bank of their choice if there are concerns about the creditworthiness or domicile of the issuing bank.

HOW DOES A LETTER OF CREDIT WORK?

Once the exporter and importer have concluded the successful negotiation of a contract that calls for payment by Letter of Credit, the importer makes application for a Letter of Credit to be drafted as per terms of the contract, which will issue the credit. This "issuing" bank ultimately pays the exporter once the Letter of Credit's terms are met.

The importer (applicant) will give the issuing bank instructions that cover such items as:

- The full, correct name, address and contact information of the beneficiary, usually the exporter.
- A brief description of the grain involved, including the quantity, quality and unit price.
- The method, place and form of shipment, the location of the final destination and other shipping issues including transshipment, partial shipment and the latest shipping date.
- The full, correct description of the documents required, including the period of time after the documents are issued within which they must be presented for payment. In addition, the credit should specify if payment is to be immediate (at sight) or with some degree of deferment (i.e., four days after acceptance).
- Details of the Letter of Credit itself, including the amount (usually expressed as a maximum), the expiry date, how the credit will be made available and the transferability of the credit.
- The type of credit, the revocable credit, the irrevocable credit or the confirmed irrevocable Letter of Credit.

Letter of Credit

Upon the issuing bank's approval of the credit application, the beneficiary / exporter is advised that the Letter of Credit has been opened. The advisement may be given by the issuing bank to the exporter's confirming bank.

Once the importer and exporter are satisfied that the Letter of Credit has been successfully opened, the exporter ships against the contract and presents the required documents and a draft (the instrument by which the exporter directs the importer to make payment) to the confirming, correspondent or issuing bank.

Upon checking the documents for accuracy, the bank(s) passes the documents to the importer and makes payment against the sight draft^{iv} to the exporter. The seller's risk is limited with a sight draft. This is because the importer's bank would not release the documents needed to take possession of the goods before payment is made. At worst, the seller would have to find another buyer or pay to have the goods redirected.

WHAT ARE THE ADVANTAGES / DISADVANTAGES OF A LETTER OF CREDIT?

Letter of Credit

The confirmed, irrevocable documentary Letter of Credit payable at sight is the most commonly used type of Letter of Credit in international grain transactions. This credit presents the exporter with the least risk.

Generally, the importer bears the cost of opening the Letter of Credit. (The cost of confirming the Letter of Credit is an item of negotiation in the original grain contract.)

Letters of Credit can frequently be the highest cost payment alternative for the importer. On the other hand, an importer who agrees to work through a first-class commercial bank to pay by Letter of Credit is less likely to be charged a risk premium.

THE TIME OF ACCEPTANCE LETTER OF CREDIT

The “time of acceptance” Letter of Credit is similar to a “sight” Letter of Credit except that the exporter agrees to receive payment at some later date, usually a term of 180 days or less.

The exporter, as beneficiary of the Letter of Credit, may present a draft drawn from his bank or other negotiating bank and discount the proceeds; that is, receive immediate payment less some fee that the bank charges for the time value of money and the payment credit risk.

HOW DOES THE TIME OF ACCEPTANCE LETTER OF CREDIT WORK?

An importer/exporter follows the same steps as in the Letter of Credit payment. The importer's bank opens a Letter of Credit at the request of the importer. The importer's bank informs the exporter's bank of the credit. The exporter's bank advises the exporter of the credit. Shipment occurs, and the documents are presented to the exporter's bank. These are documents that include a draft calling for payment at the agreed date - a time draft. Assuming the documents are in order, the exporter's bank may add its acceptance to the time draft and discount the time draft, making payment to the exporter. The importer's bank then receives the documents and releases them to the importer, who makes payment for the grain on the agreed date.

Deferred Payment Letter of Credit

WHAT ARE THE ADVANTAGES / DISADVANTAGES OF A TIME OF ACCEPTANCE LETTER OF CREDIT?

An importer involved in the processing of feed grains finds this form of financing advantageous, as it allows the importer the time necessary to process and/or market the resulting products and use the funds generated to pay the exporter. Additionally, the exporter may be able to make sales to importers otherwise not possible without the financing arrangement. However, these benefits must be weighed against the premium the exporter may build into the exporter's price representing the cost of discounting the draft.

DEFERRED PAYMENT LETTER OF CREDIT

A “deferred payment” Letter of Credit differs from a “time of acceptance” Letter of Credit in two very important ways.

First, the “deferred payment” Letter of Credit can postpone payment by the importer for a longer time period, usually up to 360 days.

Secondly, this type of financing does not provide the exporter with the ability to discount the draft since the exporter cannot present the draft until the future date specified in the Letter of Credit.

HOW DOES THE DEFERRED PAYMENT LETTER OF CREDIT WORK?

The “deferred payment” Letter of Credit operates just like a “sight” Letter of Credit payment with the only procedural difference being that the exporter receives the payment from his bank at the agreed upon future date, rather than on sight.

WHAT ARE THE ADVANTAGES / DISADVANTAGES OF A DEFERRED PAYMENT LETTER OF CREDIT?

A “deferred payment” Letter of Credit postpones payment for the importer. However, the exporter may charge a premium for this deferment. As such, importers who wish to delay payment may want to investigate other financing alternatives (e.g. GSM-102) which may be less expensive.

PAYMENT AGAINST DOCUMENTS

The Cash Against Documents or Documentary Collection is a payment method used in international transactions between an exporter and an

importer. Documentary collection is less common than other forms of trade finance, such as letters of credit and advance payment.

Documentary collection is so-called because the exporter receives payment from the importer in exchange for the shipping documents. Shipping documents are required for the buyer to clear the goods through customs and take delivery. They include a commercial invoice, certificate of origin, insurance certificate, and packing list.

A key document in a documentary collection is the Bill of Exchange or Draft, which is a formal demand for payment from the exporter to importer.

Typically, Cash Against Document is when an exporter instructs his bank or agent to release shipping documents to the importer upon the full payment of shipment. After the payment is received, the importer receives the documents. This method is beneficial to both parties. For the exporter, it guarantees the payment of goods. In the case of the importer, it ensures that the precise products paid for are received.

HOW DOES A PAYMENT AGAINST DOCUMENTS WORK?

Under the original grain contract, the exporter makes shipment and sends the shipping documents to the exporter's bank for collection. The exporter's bank then sends the shipping documents, along with a collection letter, to the importer's bank, which then sends a collection notice to the importer.

Payment Against Documents

The importer then: 1) makes payment upon receiving the notice at sight and prior to possessing the shipping documents; 2) makes a Cash Against Documents arrangement; or 3) the importer accepts a time draft obligating the importer to pay at a future date (i.e., a documents against acceptance arrangement).

Only after the exporter receives payment or acceptance of a time draft does the importer receive the original shipping documents.

WHAT ARE THE ADVANTAGES / DISADVANTAGES OF PAYMENT AGAINST DOCUMENTS?

The major advantage of the use of a Cash Against Documents payment is that it is less expensive than using a Letter of Credit. Also, the exporter can receive full payment prior to releasing control of the documents.

However, this advantage is offset by greater risk for the exporter, in that the importer could reject the documents. In addition, since the grain cargo would already be loaded (to generate the documents), the exporter has little recourse against the importer in cases of non-payment.

For this reason, contracts with Payment Against Documents terms are generally limited to transactions between parties who have developed trust or are located in countries with strong legal systems and contract enforcement.

COUNTERTRADE

One of the oldest methods of payment in international trade is the countertrade arrangement. The term covers a wide range of business arrangements where payment is received in forms other than cash.

The various types of business arrangements commonly called countertrade and used in the international grain trade can be divided into the following categories: barter, counter-purchase and compensation.

WHEN AND WHY IS COUNTERTRADE USED?

The use of countertrade arrangements by importers has increased recently, due in part to poor demand for some countries' large amounts of base commodities, the lack of convertible currencies and/or a desire to help stimulate or comply with regulations of importing countries' economies. Countertrade is most often used by importers operating in a planned economy.

Countertrade

Also, countertrade arrangements are complex, usually involving three or more separate contracts or protocols, often necessitating parties other than the importer and exporter, and call for additional payment and finance terms as part of the transaction. Great care should be exercised when utilizing a countertrade arrangement.

WHAT FORMS OF COUNTERTRADE EXIST?

WHAT ARE THE ADVANTAGES / DISADVANTAGES OF EACH FORM?

Barter: This oldest form of countertrade involves the direct exchange of goods having equal or offsetting value with no exchange of cash between the two parties involved, the importer and the exporter. Barters

are transaction specific and handled under one contract that calls for an exchange of specified goods - without assigning a value to them - within a short time period. The exchange of goods takes place directly between importer and exporter without the need for a third party, such as a bank.

The use of barter involves considerable risk to the exporter and the importer as goods are shipped and documents exchanged directly, often with one party executing an obligation prior to the other party taking an action. This risk can be reduced by the posting of standby bank letters of guarantee on behalf of the parties. While barter can be potentially advantageous to the importer, as the importer receives the commodity without any outlay of foreign exchange, not all exporters find the risk acceptable or have the expertise to handle the goods received from the importer.

Counter-purchase: This most frequently used form of countertrade involves the use of two separate contracts - the commodity sales contract between the exporter and the importer, and a separate, although technically related, contract between the importer and the exporter that obligates the exporter to buy a defined value of goods (or services) from the importer's country over a fixed time period. As opposed to barter, counter-purchase arrangements call for each transaction to be independent of the other. Thus, an exporter would ship grain to the importer and invoice for the commodity under a normal Letter of Credit, while the exporter might then arrange to handle a cargo of the importer country's goods, such as coffee, under a separate commitment to pay, thus satisfying the counter-purchase obligation. This may involve the need for a third party, such as the coffee exporter, in addition to the use of one or more commercial banks.

Countertrade

As opposed to a standard trade contract, a counter-purchase arrangement is really two trade contracts, each with its own payment term. That makes this form of countertrade quite cumbersome and subject to long delays. In fact, the transaction may not be completed for a period of months or years.

An additional disadvantage is the need for the importer to use foreign exchange, although this is offset with the revenue from the counter-purchase.

Although it is cumbersome, counter-purchase trade appeals to many importing countries as a means of assuring a more positive trade balance, and many countries require its use in some form.

Compensation: This type of countertrade involves payment for the imported commodity by delivering a resultant or related product. For example, an importer would pay for a shipment of corn with a previously agreed upon amount of compound feed. Like counter-purchase, compensation arrangements involve two separate, independent contracts and are usually tied to a long-term industrial development or facility. Once again, payment by the importer to the exporter normally is handled under a Letter of Credit or similar method.

While compensation has many of the same advantages and disadvantages as counter-purchase, compensation arrangements can help favorably influence a lending institution to provide financing to establish a proposed industrial complex by providing the importer with a steady source of supply and a fixed buyer of output.

Another advantage of a compensation agreement worth noting is that it may help achieve financing from lenders to construct or establish an industrial complex. This results from the capacity it provides the importer with a steady source of supply and provides the exporter with a fixed buyer.

OTHER PAYMENT METHODS

Consignment: Under this method of payment, an exporter usually ships and stores grain in a bonded warehouse in the importer's country. While the commodity is consigned to the importer, the exporter retains title to the goods until local sales are made. Often under consignment arrangements, a private or government bonded warehouse company or commercial bank serves as "custodian" of the goods and handles the administrative details. As this type of payment arrangement involves a great deal of administrative and managerial time and effort, while also presenting the exporter with a high level of payment risk, most exporters enter into a consignment sale only with an overseas subsidiary, joint venture company or an importer very well-known to the exporter.

Open Account: While this payment term involves the fewest restrictions and the lowest cost for the importer, it also presents the exporter with the highest degree of payment risk and is only employed between an importer and an exporter who have a long-term relationship involving a great level of mutual trust. Upon shipment under the

Other Payment Methods

original export grain contract (usually on FOB terms), the exporter prepares the normal documents, such as bills of lading and original invoices, as well as weight and grade certificates. The exporter presents these to the importer directly, thus avoiding the involvement of a commercial bank. The importer then pays the exporter directly, usually via wire transfer, upon receipt of the documents. Under an Open Account payment method, title to the grain passes from the exporter to the importer prior to payment and subjects the exporter to default risk. Furthermore, there is a time delay in payment, depending on how quickly documents are exchanged between exporter and importer.

Cash in Advance: This payment method is virtually the opposite of the Open Account option. The importer, after purchasing the commodity under the original grain contract, sends the exporter a cash advance or prepayment for either the entire shipment or a portion of the shipment. The exporter, upon receipt of the cash advance, makes shipment to the importer and provides all the necessary shipping documents. While this method of payment involves direct importer/exporter contact without direct commercial bank involvement and is therefore inexpensive, the importer faces a very high degree of payment risk under a cash in advance payment, while retaining little recourse against the exporter for poor quality goods or incorrect or incomplete documentation.

FINANCING OPTIONS AND METHODS

In its simplest form a transaction for the importation of grain, the importer would purchase the commodity desired from the exporter and, upon shipment of the cargo, would immediately make cash payment in full. However, some importers want (or need) to make payment at a later date, or over an extended period. It is in these situations that the importer will need to understand the various financing options available. In the following section we take a closer look at other financing options.

Just as various options were discussed in the previous payment section involving a Letters of Credit, with various levels of payment risk and ways to manage this risk, other financing methods can also address the risks presented by payment at a deferred point in time.

Financing the importation of grain can occur by methods that do not involve a Letter of Credit. The exporter may agree to accept terms with the importer using an Open Account arrangement with the additional

stipulation of payment at a future date, creating a receivable for the exporter.

Similar to the “time of acceptance” Letter of Credit, the exporter can then discount the draft with a bank willing to accept the receivable and the inherent credit risk. The discounting can occur on a non-recourse basis, where the exporter accepts no responsibility for repayment, or on a recourse basis, where the discounting bank can make a claim against the exporter in the event the importer does not pay. While this method allows the exporter to receive immediate payment for the feed grain, the payment risk to the exporter (or to the discounting bank in the case of non-recourse discounting) is very high and may cause the exporter to include a large risk premium in the exporter's price.

Finally, there are a variety of conditions under which the importer's bank may agree to refinance. For example, the importer may have a revolving credit arrangement used to finance inventories. While simply another form of draft or receivable discounting, the payment risk is normally transferred from the exporter to the exporter's bank.

USDA EXPORT CREDIT GUARANTEE PROGRAMS

In order to better facilitate grain and commodity exports, the U.S. government also recognizes the need to minimize payment risks to exporters.

The U.S. Department of Agriculture administers two credit guarantee programs (GSM-102 and Facilities Guarantee Program) whose purpose is to facilitate exports of U.S. grain agricultural products to emerging markets.

The GSM-102 program provides USDA credit guarantees for approved U.S. Dollar-denominated Letter of Credit contracts to approved markets. In case of payment default, the U.S. Commodity Credit Corporation will pay the creditor (exporter or exporters' bank) up to 98% of the contract price. This 98% guarantee significantly reduces lending risk for the exporter and may create new and expanded markets for U.S. exporters.

Because the loans are guaranteed by the U.S. Government, banks can make loans to the importer's bank (foreign financial institution or “FFI”) at very favorable rates. This allows (but does not guarantee) that the FFI will pass on some of these benefits to the importer.

Below is a general description of the program taken from USDA's website:

<https://www.fas.usda.gov/programs/export-credit-guarantee-program-gsm-102/about-export-credit-guarantee-program-gsm-102>

ABOUT THE EXPORT CREDIT GUARANTEE PROGRAM (GSM-102)

The U.S. Department of Agriculture's (USDA) Export Credit Guarantee Program (GSM-102) provides credit guarantees to encourage financing of commercial exports of U.S. agricultural commodities. By reducing financial risk to lenders, credit guarantees encourage exports to importers in countries, (mainly developing countries) that have sufficient financial strength to have foreign exchange available for scheduled payments.

The GSM-102 program guarantees credit extended by the private financial sector in the United States (or, less commonly, by the U.S. exporter) to approved foreign financial institutions using dollar-denominated, irrevocable letters of credit for purchases of U.S. food and agricultural products by foreign importers. USDA's Foreign Agricultural Service (FAS) administers the program on behalf of the Commodity Credit Corporation (CCC), which issues the credit guarantees. GSM-102 covers credit terms of up to 18 months; maximum terms may vary by country.

The CCC guarantees payments due from approved foreign financial institutions to exporters or financial institutions in the United States. However, the financing must be obtained through normal commercial sources. Typically, 98 percent of principal and a portion of interest are covered by a guarantee. Any follow-on credit arrangements between the foreign financial institution and the importer are negotiated separately and are not covered by the CCC guarantee. The FAS website provides information on specific country and commodity allocations and other program information and requirements.

Eligible Countries or Regions

Interested parties, including U.S. exporters, foreign importers, and financial institutions, may request that CCC establish a GSM-102 program for a country or region. Prior to announcing the availability of guarantees, CCC evaluates the ability of each country and foreign

*GSM
Financing*

financial institution to service CCC-guaranteed debt. New financial institutions may be added, or levels of approval for others may be increased or decreased, as information becomes available.

Eligible Commodities

CCC selects agricultural commodities and products according to market potential and eligibility based on applicable legislative and regulatory requirements.

Participation

CCC must qualify exporters for participation before accepting guarantee applications. Financial institutions must meet established criteria and be approved by CCC. CCC sets limits and advises each approved foreign financial institution on the maximum amount CCC will guarantee for that bank. Requirements for exporter and U.S. and foreign financial institution participation are available in the program regulation and on the FAS website.

GSM Financing

Once approved to participate, the exporter negotiates terms of the export sale with the importer.

Once a firm export sale exists, the qualified U.S. exporter must apply for a payment guarantee before the date of export. The exporter pays a fee calculated on the dollar amount guaranteed. Fee rates are currently based on the country risk that CCC is undertaking, including country-specific macroeconomic variables; risk of the foreign obligor (bank); the repayment term (tenor); and repayment frequency under the guarantee.

Financing

The CCC-approved foreign financial institution issues a dollar-denominated, irrevocable Letter of Credit in favor of the U.S. exporter, ordinarily advised, or confirmed by the financial institution in the U.S. agreeing to extend credit to the foreign financial institution.

The U.S. exporter may negotiate an arrangement to be paid as exports occur by assigning to an approved U.S. financial institution the right to proceeds that may become payable under the CCC's guarantee.

The exporter is required to provide a report of export to CCC for each shipment that occurs under the payment guarantee. If the exporter has assigned the payment guarantee to a U.S. financial institution, the

*GSM
Financing*

exporter would provide these export reports and other transaction- related documents required by the U.S. financial institution.

Defaults and Claims

If the foreign financial institution fails to make any payment covered by the GSM-102 guarantee, the holder of the payment guarantee must submit a notice of default to CCC within the timeframe required by the program regulations. A claim for default also may be filed within the required timeframe, and CCC will pay claims found to be in good order.

For CCC audit purposes, the U.S. exporter must obtain documentation to show that the commodity arrived in the eligible country or region, and the exporter and the assignee must maintain all transaction documents for five years from the date of completion of all payments.

Additional Information

As details of this program change over time, (e.g., the list of eligible countries, approved banks, and available credit) importers may want to consult the below website for the latest information.

For more information, contact:

Credit Programs Division, Global Programs, FAS/USDA
Stop 1025, 1400 Independence Ave. SW, Washington, DC 20250-1025
Tel.: (202) 720-6211; Fax: (202) 720-2495.

Export credit guarantee program information, such as country and regional allocations, fee rates, and commodities eligible for coverage, is available on the FAS Web site:

www.fas.usda.gov/programs/export-credit-guarantee-program-gsm-102

General information about FAS programs, resources, and services can be found at: www.fas.usda.gov

WHAT ARE THE ADVANTAGES / DISADVANTAGES OF EXPORT GUARANTEE PROGRAM?

The use of the GSM-102 financing programs can reduce risks for the exporter and may reduce the selling price to the importer as the seller's risk exposure is reduced.

In addition, the ability for the exporter to secure a guarantee make increase the possibility of completing business.

However, the use of the GSM-102 financing programs can be slightly more costly to the importer than a contract calling for a sight Letter of Credit payment due to the number of parties involved and the need for a guarantee fee.

FACILITY GUARANTEE PROGRAM

The U.S. Department of Agriculture's Facility Guarantee Program (FGP) provides payment guarantees to aid the financing of agricultural- related equipment and services exported from the United States to improve or establish agriculture-related facilities in emerging markets.

FGP Program

The FGP is designed to expand sales of U.S. agricultural products to emerging markets where projected demand for these products would grow as a result of improvements to emerging market food and feed infrastructure. This includes equipment and services that strengthen any aspect of agriculture sector logistics from port facilities and storage to processing and distribution.

Like GSM-102, the FGP is a USDA Commodity Credit Corporation (CCC) credit guarantee program administered by the Foreign Agricultural Service (FAS). FGP regulations are a subpart of the Export Credit Guarantee Program (GSM-102).

Details and latest program announcements (including available credit) or changes may be found on the USDA website:

<https://www.fas.usda.gov/programs/facility-guarantee-program>.

OTHER U.S. GOVERNMENT PROGRAMS

Export-Import Bank of the United States

The Export-Import Bank of the United States (EXIMBANK) also offers programs which may be utilized for U.S. agricultural commodity exports. Most of these programs are insurance policies which the exporter or the U.S. bank takes on to reduce their financial exposure. This coverage protects against both political and commercial risk and

may cover either single or multiple shipments under the same contract. EXIMBANK also occasionally offers credits or credit guarantees to selected countries or regions. Most exporters will know which EXIMBANK programs could potentially apply to a given situation and should be utilized as a resource when investigating financing options.

In addition to USDA credit guarantee programs, other government, NGO, or international organization programs to facilitate grain imports may be available. For the latest information, please contact the Grains Council office in your country, or the Foreign Agricultural Service office at the U.S. Embassy.

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Philip Shull
Senior Diplomat (Ret)
U.S. Department of Agriculture

ⁱ At sight is a payment due on demand where the party receiving the good or service is required to pay a certain sum immediately upon being presented with the bill of exchange. This type of payment is also known as a "sight draft" or a "sight bill."

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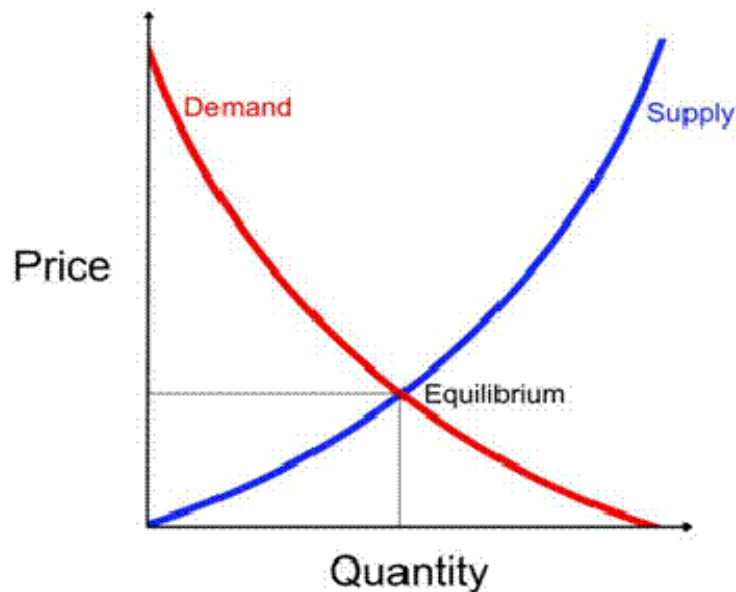
^{iv} A Sight Draft is a written demand requesting payment under a letter of credit presented by the beneficiary of the letter of credit to the issuing bank. When a beneficiary presents a sight draft, it is paid immediately after processing by the issuing bank.

Price Discovery and Cash Markets

PRICE DISCOVERY

Price discovery is the process of finding out the value or price of a given asset or commodity. It is the central function of a marketplace. Simply put, price discovery happens when a buyer and a seller agree on a price and a transaction occurs.

UNDERSTANDING PRICE DISCOVERY



According to classical economics, price discovery is the process of finding where supply and demand curves intersect. This point of intersection is the price at which a transaction occurs.

While the term “**price discovery**” is relatively new, it is a practice that has existed for millennia. The ancient marketplace in the Middle East, Europe, the Indian subcontinent, and China have historically brought

together large collections of buyers and sellers to trade and determine

price of goods. This process is still very relevant today.

In more modern times, price discovery for many of the primary commodities involved in international trade is undertaken by in the “pits” or “on the screen of derivative and futures markets like the Chicago Mercantile Exchange (CME), and other organized exchanges. Originally traders standing in trading “pits” on a trading floor, used verbal “open outcry “ along with hand signals, to signal their bids and offers in an effort to determine price and transact business for a given commodity. This process has further evolved into electronic trading platforms, with computers, a screen and a keyboard replacing the manual processes. The evolution of the process has, over time, increased trading volumes and liquidity.

PRICE DISCOVERY AS A PROCESS

The price discovery process and the facilitation of trade is the central function in any marketplace. The regulations governing the process associated with an organized market or exchange are central to its integrity.

The purpose of a marketplace is to bring potential buyers and sellers together in a public place where they can transact business. Each participant is likely have differing interests and reasons for participating in the market, as well as varying approaches.

In the 21st Century, a marketplace may be anything from a digital platform for electronically traded financials instruments, to a physical location where people gather, to a local auction house or farmer's market. By providing a venue or platform where traders can interact, individual buyers and sellers can agree to a consensus price and quantity to transact. As the number of transactions grows and the volume increases, price discovery becomes more efficient. If timely information (i.e. bids, offers, volumes, time of delivery, and transacted price, along with other relevant information) is made publicly available, the price discovery process is becomes increasingly transparent.

Price discovery is influenced by a wide variety of tangible and intangible factors, including:

- supply and demand (i.e. scarcity/abundance),
- transaction size and volume,

- transaction costs
- the underlying market structure and liquidity,
- information flow and availability,
- the overall economic environment,
- geopolitical issues,
- attitudes and appetites for risk on the part of the buyer and seller,
- market sentiment and buyer/seller psychology.

While there is no one formula that can successfully predict how all these factors and take all these factors into consideration, the result of their interaction is seen with each agreed price.

The formula is a dynamic process that constantly changes as new information becomes available to participants. To the extent relevant market information becomes inaccessible or insufficient, that specific market becomes less efficient.

MARKET NEWS AND INFORMATION



Market news and information has an impact on prices and business decisions across the supply chain

Market news and information play a critical role in price discovery. As new information (or even rumors) enters the market, prices can change. These price changes are a result of the reaction of market participants to the new information. In many cases, the news that changes market prices is not hard data, but simply information that changes expectations.

For example, the news that planting is delayed due to cold and wet conditions may push corn prices up, even though no one will know the size of the harvest until after harvest several months later.

Because of power and ability of information to move markets, market

participants have an insatiable thirst for timely news and information. Public and private market information services and systems are used by grain farmers, livestock producers, traders to gather, analyze and disseminate information about prices and other relevant information. As such, these services and systems play a key role not only in price discovery, but to the functioning of the entire supply chain.

As new information becomes available, it influences a market participant's assessment market value, and therefore the strategic decision of buying / selling price, as well as the volume they may be willing to trade. Market participants with the most current and highest quality information will have a comparative advantage and the ability to make better decisions. As "time is of the essence", they are able to act before others, gaining a first mover advantage.

"In the market, there is no reward for those arriving late, as the opportunities are fleeting as the price discovery process moves quickly upon the arrival of new information."

With the advancement communication technologies, news and information that drives market prices and business decisions is being delivered at a rapid pace and on an increasingly timely basis. With the development of the internet and the advancement of electronic commerce, the market has a robust capacity to react to new information through an efficient price discovery process. All participants throughout the market from producer to end user, and hedger to speculator, benefit from this process. It has leveled the field from small to large participants. As the access, timeliness, quality and volume of information has increased, the price discovery process has become increasingly efficient.

OECD countries have traditionally emphasized the importance of providing information to the agricultural sector. One of the world's best examples of this is the service provided by the United States Department of Agriculture (USDA). For over a century, USDA's continuous flow of free information and services to the entire supply chain has fostered transparency and confidence in the market.

In addition to local market information, merchandisers and traders are also likely to seek information on global supply and demand. The USDA and other government agencies in the United States and other countries regularly forecast worldwide supply and demand for a range of commodities. The private sector also produces copious, detailed information and analysis on the flow of grain across the globe. Market participants should keep in mind that the quality of analysis and the accuracy of forecasts can vary widely, even from reputable sources.

There is a wide variety of market information services or systems available to the public. Some important sources of market information include:

Private

- Internal Analysis & Research
- Proprietary Services & Research
- Electronic & Internet
- Word of Mouth

Government

- ABARE / ABS
- Stats Canada
- USDA
- ERS - Economic Research Service
- FAS - Foreign Agricultural Service
- AMS - Agricultural Marketing Service
- NASS - National Agricultural Statistics Service
- WAOB - World Agricultural Outlook Board

USDA Reports - Weekly

- Crop Condition Reports
- Planting Progress Report
- Crop Condition Report
- Harvest Progress Report
- Export Sales – FAS
- Export Inspections – AMS
- Grain Transportation Report – AMS

USDA Reports - Monthly

- WASDE – World Agriculture Supply & Demand Estimates
- US Crop Production – NASS
- World Agricultural Production – FAS
- Grains: World Markets and Trade – FAS
- Wheat Outlook – ERS
- Rice Outlook – ERS
- Feed Outlook – ERS
- Oilseeds: World Markets and Trade – FAS
- Oil Crops Outlook – ERS
- Cotton World Markets and Trade – FAS
- Cotton and Wool Outlook – ERS
- Livestock and Poultry World Markets and Trade – FAS
- Meat Price Spreads – ERS

- Dairy Monthly Tables – ERS
- Cattle on Feed – NASS
- Poultry Slaughter – NASS

USDA Reports - Quarterly

- Quarterly Stocks Report
- Flour Milling Products
- U.S. Bioenergy Statistics

MARKET TRANSPARENCY

Market transparency typically refers to the extent to which information about the bid prices, ask prices, and trading quantities for a specific stock is available. It also refers to the availability of other information that can affect prices. The opposite of a transparent market is an opaque market. The degree to which a market is free and efficient is determined by its transparency.

The internet has greatly improved price transparency. All types of market information and current prices are readily available through a few clicks on the computer. Large multi-national corporate traders, small proprietary business, and individual producers have equal, virtually instant access to pricing information on the major exchanges. The widespread use and relative affordability of mobile devices has further leveled the playing field. With readily available information, individuals can compare prices across different markets to help them make the best informed decisions.

Electronic trading has greatly improved the efficiency of markets, allowing traders to make more informed and faster decisions, and capture real-time pricing opportunities.

For example, the CME Group provides information on the bids and offers across each contract month for each particular commodity.

Importers looking to procure and purchase a range of products can go online and easily see where and when these products may be available, compare the price and quality between origins and with other products, and determine the best deal for their situation.

In standard economic theory, market participants all have perfect information, which creates complete price transparency. Markets with greater price transparency are considered to be "freer" markets with lower

information costs.

MARKET EFFICIENCY

Market efficiency refers to the degree to which market prices reflect all available, relevant information. If markets are efficient, then all information is already incorporated into prices, and so, there is no way to "beat" the market because there are no undervalued or overvalued assets available.

Market efficiency is the ability of markets to incorporate information that provides the maximum opportunity to buyers and sellers to effect transactions without increasing transaction costs.

There are three degrees of market efficiency:

- The Weak Form
- The Semi-Strong Form
- The Strong Form

The **Weak Form** of market efficiency is that past price movements are not useful for predicting future prices. If all available, relevant information is incorporated into current prices, then any information relevant information that can be gleaned from past prices is already incorporated into current prices. Therefore, future price changes can only be the result of new information becoming available.

Based on the Weak Form hypothesis, such investing strategies such as momentum or any technical analysis based rules used for trading or investing decisions should not be expected to persistently achieve above normal market returns. Within this form of the hypothesis there remains the possibility that excess returns might be possible using fundamental analysis.

The **Semi-Strong Form** of market efficiency assumes that market prices adjust quickly to absorb new public information, such that an investor cannot benefit over and above the market by trading on that new information.

This form implies that neither technical analysis nor fundamental analysis would be reliable strategies to achieve superior returns, because any information gained through fundamental analysis will already be available

and thus already incorporated into current prices. Only private information unavailable to the market at large will be useful to gain an advantage in trading, and only to those who possess the information before the rest of the market does.

The **Strong Form** of market efficiency says that market prices reflect all information both public and private and builds on incorporating both the weak form and the semi-strong form hypothesis.

Given the assumption that prices reflect all information (both public and private), no trader, including a corporate insider, would be able to profit above the average investor even if he were privy to new insider information.

Whether or not commodity markets are efficient, or to what degree, is a heated topic of debate among academics and practitioners.

MARKET VOLATILITY

Volatility is a statistical measure of how large an asset or commodity price moves around the mean price. In other words, it is a statistical measure of its change in price over time.

Volatility is often measured as either the standard deviation or variance between the change in price over time for that same asset or commodity. There are several ways to measure volatility, including beta coefficients, option pricing models, and standard deviations of returns. One way to measure an asset's volatility is to quantify the daily change in price (percent move on a daily basis).

In the commodity markets, volatility is often associated with big swings in prices in either direction. More volatile commodities are often considered to be riskier than less volatile commodities because the price is expected to be less predictable.

Volatility can also refer to the amount of uncertainty or risk related to the size of changes in an asset's price. This means that the price of the commodity can change unpredictably and dramatically over a short period of time. A lower volatility implies that a commodity's price does not fluctuate as dramatically and prices tend to be more constant.

Historical Volatility is based on historical prices and represents the

degree of variability in the price of a commodity. This number is expressed as a percentage. As such, volatility can be quantified on a daily, weekly, monthly, or annualized basis.

Implied Volatility refers to a metric that captures the market's view of the likelihood of changes in a given price. Traders can use implied volatility to project the likelihood of future price moves, and is employed in the pricing of options contracts.

Implied volatility is not the same as historical volatility (also known as realized volatility or statistical volatility), which measures past market changes and their actual results.

CASH MARKETS AND TRADE

To assist in procuring and purchasing agricultural inputs, grain importers need a mechanism that will assist them in securing supplies and discovering the market price for these commodities.

Generally speaking, prices of major agricultural commodities can be found in two separate, but related markets.

- Physical Cash Markets
- Derivative and Futures Markets

Initially, it is the physical cash market to which we usually look to discover the price of a commodity. These can be found across a large number of pricing points found throughout the network of established supply chains where buyers and sellers transact business and the commodity changes ownership.

The second are established commodity exchanges which facilitate the trade in derivatives such as futures, options and other related financial instruments. It is important to understand that these markets have a well defined and understood relationship to an underlying physical market.

The CME Group is a primary example of an established exchange for agricultural commodities and includes the Chicago Mercantile Exchange (CME), Chicago Board of Trade (CBOT), New York Mercantile Exchange (NYMEX) and Commodity Exchange Inc. (COMEX).

PHYSICAL CASH MARKETS

Generally speaking, “physical” or “cash” markets are where buyers and sellers exchange physical commodities for immediate / “spot” or forward delivery. This can be commonly found at country elevators, feed lots, processing facilities, and transloading terminals.

A physical cash market is a means by which importers secure a physical supply of grains and other agricultural commodities. The purchase or sale of the physical commodity in the cash market for delivery at a specified later date is the most common form of trade.

A “spot” market indicates the commodity is ready for immediate delivery or shipment, while a “forward” market indicates the commodity contracted of delivery or shipment at some point in the future. Both arrangements are entered into by means of a contract between the buyer and the seller.

A cash contract is distinguished from the other tools discussed in this chapter in that:

1. A cash forward contract involves a direct contractual relationship between two identified, specific parties. Such a contract establishes a seller’s obligation to deliver or ship, and a buyer's obligation to accept, the agreed amount of a commodity at an agreed time and place.
2. Each contract’s price and other relevant specifications, terms and conditions are determined by negotiation between the two parties, and without the assistance of an auction-style price discovery process.
3. The nature of a cash trade is that each transaction is unique to each deal and may vary to local customs of the trade. While terms and conditions of a proforma contract, or underlying trade rules, may be incorporated into the transaction, cash contracts are not standardized as to specifications, terms and conditions.
4. Cash contracts is not subject to the rules or regulations of an organized or regulated futures exchanges. That said, it is frequently the case, if overtly agreed to by both the buyer and the sell, the contract may be subject to trade rules, terms and conditions of a governing trade association. This terms and conditions may also extend into an agreed dispute resolution process and arbitration process. This is frequently done to expedite the dispute resolution process and avoid costly

litigation.

5. A cash contract cannot be automatically “cancelled” or “washed out”. However, in certain instances the buyer and the seller may be willing to negotiate an offsetting contract, that allows a washout to occur, but the individual nature of the trade does not allow this flexibility.

It is common practice that both buyers and seller in grains and other agricultural commodity markets to utilize both physical cash markets in tandem with related futures and options markets to develop a comprehensive procurement and purchasing strategies. These activities often extend into effective risk management consideration.

Depending on underlying market conditions, liquidity of trade, the governing rules of trade and the availability of quality trading partners, the cash grain trading markets may be used as risk management tools.

BROKERS

A grain broker is an independent individual, firm or electronic platform who acts as an intermediary between the buyer and seller. They facilitate trade in physical cash markets on behalf of the clients, assisting in negotiating terms under instructions from Buyers and Sellers, and charges them a commission for his services.

This type of an intermediary or broker can typically be found in grain markets that have reasonable volume and liquidity in locations around the world.

A person is not a Broker:

- who has possession and absolute control of goods supplied to him or her to sell and collect the price. (Therefore, a commission agent to whom a commodity is consigned for sale is not a Broker.)
- who only acts for one Principal to the exclusion of all others.

It is important to distinguish the difference between a Broker and an Agent. An Agent means a person who is not a Broker and who is authorized to act on behalf of a Principal and typically has constructive control of the goods.

A broker for physical cash grain should be delineated from an “**Introducing Broker**”. An “Introducing Broker (IB) is a broker in the

futures markets who has a direct relationship with a client, but delegates the work of the floor operation and trade execution to another futures merchant, typically a Futures Commission Merchant (FCM). The IB is usually affiliated with a FCM, either as an independent entity that is partnered with that merchant firm or as a direct subsidiary of that FCM. Activities of an IB are typically regulated by the affiliated exchange, as well as other regulatory agencies.

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Philip Shull
Senior Diplomat (Ret)
U.S. Department of Agriculture

Derivative Markets

Futures, Options, OTC's and Swaps

The following chapter is meant to be a general introduction to derivative markets, including futures, options, OTC's and swaps. It is by no means intended to be comprehensive or exhaustive on the subject. The information and data contained in this chapter are taken from sources believed to be reliable, but does not warrant their accuracy or completeness.

The origin of the trading of futures and derivatives can be traced back to ancient history. In Ancient Mesopotamia, circa 1750 BC, the sixth Babylonian king, Hammurabi, created one of the earliest legal codes, the "Code of Hammurabi". The Code of Hammurabi allowed sales of goods and assets to be delivered at an agreed price at a future date, requiring contracts to be in writing and witnessed. Furthermore, it allowed the subsequent assignment of these contracts. The code facilitated the first derivatives in the form of forward and futures contracts. An active derivatives market existed, with trading carried out at temples.ⁱ

One of the earliest written records of futures trading can be found in Aristotle's Politics. There he tells the story of Thales, a poor philosopher from Miletus who developed a "financial device, which involves a principle of universal application". Thales used his skill in forecasting and predicted that the olive harvest would be exceptionally good in the autumn. Confident, he made agreements with local olive-press owners to guarantee him exclusive use of their olive presses at harvest. When the harvest arrives, and a sharp increase in demand for the olive presses outstripped supply, he sold his contracted use of the olive presses at an attractive rate, making a large amount of money.ⁱⁱ

Another early recognized futures trading exchange was the Dojima Rice Exchange, established in 1730 in Japan for the purpose of trading rice futures. The Tokugawa shogunate authorized a spot market to trade rice

bills and a futures market to trade representative brands of rice on a book in Dojima. This marked the inception of an official market known as Dojima Rice Exchange, which was equipped with a membership system and clearing function similar to exchanges in the modern era and is widely known as the forerunner to organized futures exchanges in the world.ⁱⁱⁱ

Early Nineteenth-Century U.S. agricultural producers and consumers were subject to drastic seasonal fluctuations in supply, reoccurring gluts and shortages, along with associated fluctuations in commodity prices. During this time production was unpredictable, storage and handling facilities were primitive, and markets were disorganized. It was through this period that centers of agricultural commerce at key transportation centers began to emerge, creating a stable regional market for producers and end users.

By 1848, the completion of Illinois & Michigan Canal and tributary railroad infrastructure centered around Chicago and linking the Great Lakes with the Mississippi River. Chicago soon became a key hub for agricultural commerce.^{iv}

The United States had the earliest official commodity trading exchange in the west, the Chicago Board of Trade (CBOT), formed in 1848, which would become the preeminent grain exchange. The CBOT arose in the aftermath of railroads and the telegraph connecting the agricultural marketplace hub of Chicago with New York and other cities in the eastern U.S.^v

The establishment of a central grain exchange allowed farmers and grain producers to sell their crops at set prices throughout the months between harvests, and allowed consumers to purchase grains at transparent prices throughout the year. After an initial period providing trading in forward contracts, the CBOT introduced standardized futures contracts in 1865. These centrally cleared contracts, secured with the payment of performance bond or margin payments by clearing members, introduced a level of reliability and security to buyers and sellers that stabilized markets against the possibility of default. The first traded futures contracts in the U.S. were for corn. Wheat and soybeans subsequently followed, and these three basic agricultural commodities still account for the bulk of trading business conducted at the CBOT.^{vi}

The next large market to begin trading futures contracts was the cotton market. Forward contracts in cotton began trading in New York in the 1850s, leading eventually to the establishment of the New York Cotton Exchange (NYCE) in 1870.^{vii} Futures contracts for other products developed over time, including commodities such as cocoa, orange juice

and sugar. Massive U.S. cattle production in the led to cattle and pork futures contracts.^{viii}

The Chicago Produce Exchange was established in 1874 as a dedicated exchange for the cash trade of butter and eggs, with defined product grades and rules of trade. To ensure quality, each keg of butter was individually smelled and tasted on the spot, and a price agreed upon. Surplus butter was salted and stored in the basement for future sale, which drove the introduction in 1882 of the “time contract”. In 1898, members of the Chicago Produce Exchange formed the Chicago Butter and Egg Board. Following World War I, in 1919, the Chicago Butter and Egg Board reconstituted as the Chicago Mercantile Exchange (CME), to form an organization to permit public participation under carefully supervised commodity trading regulations.^{ix}

The 1970s saw a large expansion in the futures trading markets.^x The Chicago Mercantile Exchange (CME) started offering futures trading in foreign currencies. The New York Mercantile Exchange (NYMEX) began offering trading in various financial futures, including U.S. Treasury bonds (T-bonds) and eventually futures in stock market indexes. The Commodities Exchange provided futures trading in gold, silver and copper, and later added platinum and palladium when gold ceased to be pegged to the U.S. dollar. The rapid expansion of trading in financial futures led to the creation of futures contracts on the Dow Jones and S&P 500 stock indexes.^{xi}

Today, agricultural derivatives, futures, options, over-the-counter and swap products are traded on exchanges around the world. However, the U.S. based exchanges remain the most widely traded. This is due in large part to the fact that the most heavily traded markets are based in the U.S. and widely supported by both domestic and international activity.

However, this approach to risk management is not limited to agricultural commodities. Many industries use the risk management potential of futures and options to manage price risk across a variety of assets, and for both essential inputs and production.

For example, the transportation industry may want to lock in the price of fuel for the next year, just as as the construction industry may want to do the same for key building materials such as steel and concrete. Knowing the cost of key inputs allows businesses to set prices with much more confidence.

Beyond physical goods (e.g. agriculture, energy, minerals, construction materials, etc.), businesses also can use the futures market to manage risks on foreign exchange rates and interest rates.

WHAT IS A DERIVATIVE?

In the most general sense, derivatives are financial instruments in which a buyer and seller establish a contract whose value is dependent on an underlying asset, group of assets, or benchmark.

A broad definition of a derivative would include products traded on established futures exchanges, both futures and options, as well as swaps and specially designed “over-the-counter” (OTC) products. A derivatives contract can be traded on an organized exchange or can be established between two or more parties in an OTC arrangement.

The market uses derivatives to access specific markets and trade different assets and asset classes. The price or value of a derivative is derived from fluctuations in value of an underlying asset, or combination of assets. The most common underlying assets for derivatives are stocks, bonds, commodities, currencies, interest rates, and market indexes. Contract values depend on changes in the prices of the underlying asset. Derivatives are based on a wide variety of transactions and have many more uses. There are even derivatives based on weather data, such as the amount of rain or the number of sunny days in a region.

Derivatives

In the trade, derivatives can be used as both a speculative, as well as a hedging tool to mitigate the risk of changes in price. The type of products offered across derivatives markets are diverse and varied. They continue to grow, offering products that can be designed to fit nearly any need or risk tolerance.

WHAT DO WE MEAN BY “LEVERAGED”?

Many derivative instruments are leveraged, which means a small amount of capital is required to have an interest in a large amount of value in the underlying asset. The ability to leverage may remind you of buying stocks on margin. However, in equity markets, buying on margin means you borrow money to make the purchase.

In the futures markets, your performance bond is not partial payment for the product. It is good-faith money you post to ensure you are able to meet the day-to-day obligations of holding that position. Both buyers and sellers in futures post performance bonds. Positions are then marked-to-market on a twice daily basis, where profits are credited, and losses are debited from your account.

As such, trading of derivatives can be very risky and a trader should have

a thorough understanding of the instrument to be used.

The most common types of derivatives are futures, options, and OTC swaps. The following is an overview of each of these types of derivatives.

EXCHANGE TRADED DERIVATIVES AND FUTURES

The most commonly traded derivatives are “futures” contracts traded on an organized exchange. Futures contracts are financial instruments that allow market participants to offset or assume the risk of a price change of an asset over time. A futures contract (commonly called “futures”) is a standardized contract, or agreement between two parties for the purchase and delivery of an asset at an agreed price at a future date.

A futures contract is distinct from a forward cash contract in two important ways: ^{xii}

First, a futures contract is a legally binding agreement to buy or sell a standardized asset on a specific date or during a specific month. An exchange-traded futures contract specifies the quality, quantity, physical delivery time and location for the given product. This product can be an agricultural commodity, such as 5,000 bushels of corn to be delivered in the month of March.

Exchange Traded Futures

The specifications of the contract are identical for all participants. This characteristic of futures contracts allows buyer or seller to easily transfer contract ownership to another party by way of a trade. Given the standardization of the contract specifications, the only contract variable is price. Price is discovered by bidding and offering, also known as quoting, until a match, or trade, occurs.

Second, futures contracts are products created by regulated exchanges. Therefore, the exchange is responsible for standardizing the specifications of each contract. Exchange traded futures contracts are centrally cleared. This means that when a futures contract is bought or sold, the exchange becomes the buyer to every seller and the seller to every buyer. This greatly reduces the credit risk associated with the default of a single buyer or seller. The exchange thereby eliminates counterparty risk and, unlike a forward contract market, provides anonymity to futures market participants.

By bringing confident buyers and sellers together on the same trading

platform, the exchange enables participants to enter and exit the market with ease, making futures markets highly liquid and optimal for price discovery.

The fact that futures contracts are standardized and exchange-traded makes these instruments indispensable to commodity producers, end users, traders and investors.

Traders use a futures contract to mitigate or “hedge” their price risk or speculate on the price of an underlying asset. The parties involved are obligated to fulfill a commitment to buy or sell the underlying asset.

Feed Mill Example

For example, on the 1st of September a feed mill knows it will need to receive a large supply of corn in December, but is afraid the corn price will rise by then. The feed mill decides to eliminate this price risk by buying a futures contract for corn at a price of \$6.25 per bushel that expires on the 15th of December. The feed mill does this because it needs corn in December and is concerned that the price will rise before the company is able to buy the physical grain in the cash market at an unknown price.

Exchange Traded Futures

Buying a corn futures contract hedges the company's risk as the seller is obligated to deliver corn to the futures delivery market for \$6.25 per bushel once the contract enters its delivery period. In addition, the price of corn in the futures market is likely to change in correlation to the change in the price of corn delivered to the feed mill.

Let's assume corn prices rise to \$7.00 per bushel by the 1st of December. The feed mill can either then; a) accept delivery of the corn into the futures delivery market and pay \$6.25, or, b) purchase local corn for delivery to the feed mill and simultaneously sell the original futures contract. In doing this any profits (or loss) from the change in price of the futures contract will offset any change in price of corn bought into the feed mill.

In this example, the futures buyer has hedged their price risk. The feed mill needed corn in the future and wanted to offset the risk that the price may rise before December with a long position in a corn futures contract.

The seller may have been an Illinois corn farmer who was concerned about falling corn prices and wanted to eliminate the risk of falling prices by selling or shorting a futures contract. By doing so, the farmer fixed the price he would receive in December.

It is also possible that one of the parties may have been a speculator with the opposite opinion about the direction of December corn. In this case, one party may have benefitted from the change in the contract price, while the other was hedging the price risk.

For example, a futures contract for CBOT December Corn that trades on the CME and represents 5,000 bushels of No. 2 Yellow Corn. If the price of corn rose from \$6.25 to \$7.00 per bushel, the trader with the long futures position, i.e. the buyer, would have profited \$3,750 $[(\$7.00 - \$6.25) \times 5,000 = \$3,750]$ However, the trader with the short position, i.e. the seller, would have a loss of \$3,750.

EXCHANGE TRADED OPTIONS

An option on a futures contract, or commonly referred to as an “**option**”, is similar to a futures contract in that it is an agreement between two parties to buy or sell an asset at a predetermined future date for a specific price.

Traders and investors buy and sell options on futures contract for several reasons. As with futures, options may be used to hedge or speculate on the price of the underlying asset. Options speculation allows a trader to hold a leveraged position in an asset at a lower cost than buying the asset. Commercial traders use options to hedge or reduce the risk exposure on their physical positions.

Options on futures are contracts that represent the right, not the obligation, to either buy (i.e. go long, also known as a “Call”) or sell (i.e. go short, also known as a “Put”) a particular underlying futures contract at a specified price on or before a specified “expiration date”.^{xiii}

Note the difference: on the futures delivery date a physical commodity (e.g. wheat or corn) or financial instrument will change hands. On an option’s expiration date it is a futures contract that may change hands.

The key difference between options and futures is that with an option, the buyer has the right, but not the obligation, to exercise their agreement. Unlike futures, the holder is not required to buy or sell the asset if they decide against it. In this context, options can be thought of as an insurance policy.

Options are versatile financial products. These contracts involve a buyer and seller, where the buyer pays a “**premium**” for the rights granted by the seller, or “**writer**”, of the contract.

*Exchange
Traded
Options*

Each options contract will have a specific expiration date by which time the holder must decide whether they wish to exercise their option, or not. The options contract also has a stated price at which the contract may be exercised known as the “**strike price**”.

Calls and Puts

There are two types of option contracts, Calls and Puts. Buyers are long option contracts, and hold (or own) these long positions. Buyers with long options are sometimes referred to as “holders” or “owners.”^{xiv}

A **Call option** conveys to its buyer the right to buy (go long) a particular underlying futures contract, at a stated strike price, on or before a specified date in the future.

A **Put option** conveys to its buyer the right to sell (go short) a particular underlying futures contract, at a stated strike price, on or before a specified date in the future.

Only the option buyer can “exercise” an option. If the option holder decides to actually exercise the option, [i.e. (buy/go long) the underlying futures contract at the strike price, in the case of a Call option, or, (sell/go short) the underlying futures at the strike price, in the case of a Put option], the right to do so must be exercised. This requires instructing their brokerage firm of their intention to exercise their long option contracts. This decision is totally up to the option holder.

American-Style vs. European-Style^{xv}

All options have an expiration date, after which the options cease to exist; option buyers no longer have rights and sellers no longer have obligations. The last day to exercise, and therefore the last day on which assignment may be made, depends on an option’s exercise style. There are two styles: American and European.

American-Style option contracts may be exercised/assigned on any trading day up to and including the expiration date.

European-style option contracts may be exercised/assigned only on the expiration date.

Whether an option is American- or European-style depends on its contract specifications which are set by the exchange. Most commodity, stocks and exchange-traded funds have American-style options, while equity indices, including the S&P 500, have European-style options.

Why use options?

Traders and investors buy and sell options for several reasons. As with futures, options may be used to hedge or speculate on the price of the underlying asset. Options speculation allows a trader to hold a leveraged position in an asset at a lower cost than buying the asset. Commercial traders use options to hedge or reduce the risk exposure on their physical positions.

Exchange Traded Options

For grains consumers and producers, the most common use of options is as a form of price insurance. Strategies can be constructed in many differing ways. Some of the more common uses are to manage the maximum price an end user might pay for an input commodity, or, the minimum price a producer might receive for season production of corn.

In sum, options can be a multi-faceted risk management tool which can create opportunity and profit for both buyers and sellers of grain if used properly. An exchange traded option can minimize risk, while leaving open potential reward for risk managers in the feed grains market.

Note – It is the intent here to introduce subject of options, and not to provide a comprehensive understanding of the subject. Further information and understanding needs to be attained by the reader.

OVER –THE-COUNTER PRODUCTS AND SWAPS

Another common form a derivative and risk management tool available to market participants are Over-The-Counter (OTCs) or Swaps.

The principal value of swaps is their ability to hedge previously unhedgeable risks. Swaps and OTC derivatives are a private contract between two parties, they carry differing risk profiles. As such, they can be customized to fit a particular situation and to effectively manage specific risks. Unlike most standardized options and futures contracts, swaps are not exchange-traded instruments. Financial institutions dominate the swaps market, with few (if any) individuals ever participating. Retail investors do not generally engage in swaps.

OTS and swap products can be quite complex. They require a good understanding of both how the product is constructed, as well as a good understanding of the underlying markets incorporated into the product structure. A thorough assessment of risk implications and potential financial impacts also need to be undertaken.

*OTC's
and
Swaps*

The only limitation one has in creating a swap is imagination and the willingness of another party to accept the risk that is being bought or sold. It is the ultimate freestyle contract which may include customized terms, with individually tailored size and specifications. Swaps may use indices as obscure as published values in trade journals or broker's quotes for settlement. They are ultimately flexible and therefore can be useful in managing risk. As such, there is a large variety of products which may be available to the market, and too numerous to list and discuss here.

Because swaps occur on the OTC market, there is always the risk of a counterparty defaulting on the swap.

Swaps have several advantages over futures and cash contracts. They may be constructed so as to hedge risks that may not be covered by exchange or cash traded instruments.

Following is an incomplete list of both advantages and disadvantages.

Advantages

- can be tailored to meet specific and unique, needs of a particular situation;
- Can be used to lock in price outcomes and hedge against risk
- Can be leveraged;
- Can be used to diversify a portfolio.

Disadvantages

- Can be complex to difficult understand;
- Sensitive to a more complex range of supply and demand factors;
- Can be difficult to value or mark to market at any point in time, and subject to counterparty's valuation of the market (if OTC).
- Are an illiquid financial instrument and can be difficult to liquidate or trade out of;
- Subject to greater counterparty risk and default (if OTC);

OTC and swaps are between two private parties and are less regulated than exchange trade futures. To hedge this risk, the investor could purchase a currency derivative to lock in a specific exchange rate. Derivatives that could be used to hedge this kind of risk include currency futures and currency swaps.

Due to the potential scope of risks associated with OTC's and swap products, not all parties are eligible to use some OTCs and swaps as a risk management tool. The following legal guidelines exist for participation in these markets in the United States:

- Broker-Dealers
 - Futures Commission Merchants
 - Individuals with total assets exceeding \$10 million.
 - Corporations or other entities with total assets exceeding \$10 million or net worth exceeding \$1 million who are entering into swap transaction in conjunction with the conduct of their business.
 - Employee benefit plans subject to ERISA with total assets exceeding \$10 million.
- * These regulatory limitations may change from time to time.*

The limitations and restriction placed on OTC and swap instruments by the Dodd-Frank Act of 2010 led to a significant decline in the number of institutions willing to participate in these types of products, and a sharp decline in their use.

ORGANIZED FUTURES EXCHANGE

An organized futures exchange is a marketplace where a diverse range of commodities futures, index futures, and options on futures contracts are bought and sold.

The function of a futures exchange is to standardize and promote futures trading for as many participants as possible. The incentive mechanisms for those who run the exchange are roughly based on the volume and dollar value of what is traded, i.e. the more the better. That means they work to bring in as many participants making as many trades as is possible. This has led to many innovations in recent years, driving increased participation through electronic networks.

Those who are allowed access to the exchange are brokers and commercial traders who are members of the exchange. Members need to be registered with the National Futures Association (NFA) and the Commodity Futures Trading Commission (CFTC). Individuals who want to trade futures contracts must do so by establishing an account with a registered broker. Futures exchanges also provide clearing and settlement functions.

Futures exchanges used to be physical places where business took place on a trading floor during strictly specified hours. Examples of famous exchanges include the Chicago Board of Trade (CBOT), the Kansas City Board of Trade (KCBT), Chicago Mercantile Exchange (CME) or the New York Mercantile Exchange (NYMEX).

With the advent of automation, trading now happens on an electronic platform and computer of anyone connected through the internet to an exchange-member broker. This has made trading a highly decentralized global activity occurring nearly 24 hours a day during the week, around the world.

Organized exchanges provide pricing information, disseminated by information vendor. Pricing information, including price, bids, and offers, and volume is publicly available. This information sharing allows for transparency in price, volumes, and trading activities promoting a fair and open market to all.

To encourage as much participation and liquidity as possible, contracts trading on an exchange have standardized sizes, expiration dates, and, for options, strike prices. This standardization is in contrast to over-the-counter (OTC) contracts where buyers and sellers agree to highly specialize bespoke terms.

U.S. AGRICULTURAL COMMODITY EXCHANGES

The major organized exchanges in the United States which trade agricultural commodities, are domiciled in Chicago and New York with several exchanges in other locations within the country. Due to historical precedent, each exchange specializes in its own contracts. All of the exchanges are constantly developing new risk management tools which compete for trading business with the other exchanges and the off-exchange markets.

Organized Futures Exchange

CME Group Inc.

The **CME Group Inc.** (*Chicago Mercantile Exchange, Chicago Board of Trade, New York Mercantile Exchange, The Commodity Exchange*) is an American global markets company. It is the world's largest financial derivatives exchange, and trades in asset classes that include agricultural products, currencies, energy, interest rates, metals, stock indexes and cryptocurrencies futures. The company offers futures contracts and options on futures using its CME Globex trading platforms, fixed income trading via BrokerTec and foreign exchange trading on the EBS platform.

In addition, the CME Group operates a central counterparty clearing provider, CME Clearing. With a range of pre- and post-trade products and services underpinning the entire lifecycle of a trade, CME Group also offers optimization and reconciliation services through TriOptima, and trade processing services through Traiana.

On the 17th of October 2006, The **Chicago Mercantile Exchange** announced a merger with its historic rival the **Chicago Board of Trade** for \$8 billion in stock, joining the two financial institutions as **CME Group Inc.** The merger agreement was modified on 20 December 2006, 11 May 2007, 14 June 2007 and on 6 July 2007. The merger was approved by shareholders of both CME and the Chicago Board of Trade on the 9th of July 2007 and closed on the 12th of July 2007, and the overarching holding company began life as CME Group.

The Chicago Board of Trade (CBOT) was established in Chicago in 1848. Commodities traded on the CBOT include corn, gold, silver, soybeans, wheat, oats, rice, and ethanol. The Chicago Mercantile Exchange (CME) traded commodities such as milk, butter, feeder cattle, cattle, pork bellies, lumber, and lean hogs.

On the 17th of March 2008, the **New York Mercantile Exchange** (NYMEX) (owner of both the NYMEX exchange and the **Commodity Exchange** (COMEX)) accepted an offer from CME Group, to purchase NYMEX for \$8.9 billion in cash and CME Group Stock. The acquisition was formally completed on 22 August 2008, and the NYMEX systems were fully integrated by 30 September 2009. Also in 2007, NYMEX in a joint venture with partners on the Arabian Peninsula opened the **Dubai Mercantile Exchange** (DME).

Organized Futures Exchange

The New York Mercantile Exchange (NYMEX) trades commodities on its exchange such as oil, gold, silver, copper, aluminum, palladium, platinum, heating oil, propane, and electricity.

On the 10th of February 2010, CME announced its purchase of 90% of **Dow Jones Indexes**, including the Dow Jones Industrial Average. The CME subsequently contributed Dow Jones Indexes to the formation of **S&P Dow Jones Indices** in exchange for a 24.4% ownership interest. In April 2013, CME purchased the remaining 10% interest in Dow Jones Indexes for \$80.0 million. As a result, CME's interest in S&P Dow Jones Indices increased from 24.4% to 27.0%.

On the 17th of October 2012, CME Group announced it would acquire the **Kansas City Board of Trade** (KCBT) for \$126 million in cash. KCBOT was the dominant venue for the sale of hard red winter wheat. The Chicago Board of Trade was the leading trade platform for soft red winter wheat.

On the 29th of March 2018, CME Group announced that it was buying London-based NEX Group for \$5.5 billion. The acquisition was completed on the 2nd of November 2018.

Intercontinental Exchange

The **Intercontinental Exchange** (ICE) operates global exchanges, clearing houses and provides mortgage technology, data and listing services. The company owns exchanges for financial and commodity markets, and operates 12 regulated exchanges and marketplaces. This includes ICE futures exchanges in the United States, Canada and Europe, the Liffe futures exchanges in Europe, the New York Stock Exchange, equity options exchanges and OTC energy, credit and equity markets.

Formerly known as the **New York Board of Trade** (NYBOT), ICE Futures U.S. commodities include coffee, cocoa, orange juice, sugar, and ethanol trading on its exchange.

ICE also owns and operates six central clearing houses: ICE Clear U.S., ICE Clear Europe, ICE Clear Singapore, ICE Clear Credit, ICE Clear Netherlands and ICE NGX. ICE has offices in Atlanta, New York, London, Chicago, Bedford, Houston, Winnipeg, Amsterdam, Calgary, Washington, D.C., San Francisco, Tel Aviv, Rome, Hyderabad and Singapore.

Minneapolis Grain Exchange

Organized Futures Exchange

The **Minneapolis Grain Exchange** (MGEX) is a commodities and futures exchange of grain products. It was formed in 1881 in Minneapolis, Minnesota, United States as a regional cash marketplace to promote fair trade and to prevent trade abuses in wheat, oats and corn.

MGEX offers five financially settled agricultural index products: Hard Red Spring Wheat Index (HRSI), Hard Red Winter Wheat Index (HRWI), Soft Red Winter Wheat Index (SRWI), National Corn Index (NCI) and National Soybean Index (NSI). Futures are traded exclusively and electronically on the CME Globex platform. Options are traded side-by-side.

MGEX has been the principal market for Hard Red Spring Wheat (HRSW) since 1881, offering futures and options contracts based on its unique commodity. HRSW is one of the highest-protein wheats. It is found in bagels, pizzas, high-quality breads and cereals, and some noodles and cookies. It is planted mostly in the U.S. Northern Plains and the Canadian Prairies.

In an agreement with Data Transmission Network (now Telvent DTN), a business-to-business electronic commerce and information services company in Omaha, Nebraska, MGEX has exclusive rights to DTNs

agriculture and weather data bases, which the exchange uses to develop index products.

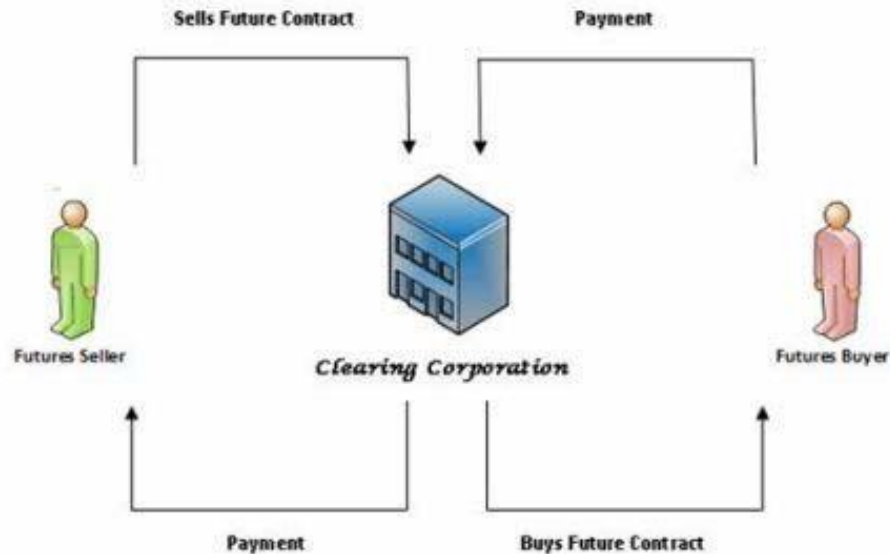
WHAT IS THE FUNCTION OF THE CLEARING HOUSE?

Another very important aspect of an organized exchange are the clearing services they provided. Each futures exchange has its own clearing house through which all members of an exchange are required to match each day's purchases and sales, clear their trades at the end of each trading session, and keep records of transactions between exchange members.

An exchange's clearinghouse is made up of "Clearing Members". These are not limited to individual living persons as is exchange membership, but is also open to corporations and partnerships.

Functions of a Clearing House

The clearinghouse stands between buyers and sellers and acts as the guarantor of each contract. In this way the clearing house guarantees all matched transactions occurring through the exchange. Due to the way the clearinghouse system operates, futures buyers do not know who might be responsible for providing the commodity they have agreed to purchase; and similarly, sellers do not know who might receive their commodity if they actually deliver it. This anonymity exists because the clearinghouse acts as the seller to each buyer and as the buyer to each seller.



A clearing house is an intermediary between buyers and sellers in the derivatives market. As the intermediary, or counterparty, to every trade, the clearing house acts as the buyer for every seller and the seller for

*Functions
of a
Clearing
House*

every buyer for every trade. By acting as the counterparty for every trade, clearing helps you mitigate counterparty risk by maintaining a matched book and risk-neutral position.

Clearing also establishes and monitors financial requirements for clearing members and sets minimum performance bond levels for all products traded on markets for which it provides clearing services. At the end of each trading day the clearinghouse balances every customer's account.

Clearing maintains a risk management framework and financial safeguards to provide stability to market participants though changing market conditions. The clearing functions enables market participants to significantly mitigate and manage their risk exposures. You do not have to worry about the counterparty risk of your trades. The clearing function lets novated off setting purchases and sales.

In addition, clearing ensures that market participants do not have to worry about the financial risk of their trade's counterparty failing to deliver or meeting their financial obligations.

While a number of firms, or clearing members, may provide these clearing services, the exchange standardizes the charges and the performance of that service. In addition, clearing member collect all deposit any sums of money sufficient to cover margining requirement, as well as to distribute moneys in excess of margining requirements.

These supporting activities make trading derivatives and futures on an organized exchange a very simple proposition for all, and encourages short-term speculators continued participation in the market.

Clearing Members: Clearing members provide access to clearing for customers and must be registered as a **Futures Commission Merchant (FCM)**. The FCM guarantees the financial obligations of the customer to CME. Collateral deposited by customers must be segregated from an FCM's own funds.

Performance Bonds: Clearing collects performance bonds (initial margins) on a daily basis, collateralizing the risk of potential future losses on positions and performs daily mark-to-market of all open positions to eliminate the accumulation of debt obligations in the market.

Performance bonds are good-faith deposits to guaranty performance of open positions against potential future losses. Performance bond requirements provide coverage for a minimum of 99% of market volatility for a given historical period. Requirements are recalculated

twice daily for most products, and at least once daily for all products.

Clearing members collect performance bond from their customers and CME Clearing collects performance bond from clearing members. Performance bond requirements vary by product and reflect changes in market volatility.

Mark-To-Market: A mark-to-market prevents the accumulation of exposures on positions. Clearing member positions are marked-to-market at the end of each clearing cycle, resulting in the movement of cash for gains and losses on clearing member and customer portfolios.

Net mark-to-market positions must be met with cash. However, some exchanges allow performance bond requirements to be met with cash, non-cash collateral, or a diverse portfolio of liquid assets as collateral.

MARGINING REQUIREMENTS^{xvi}

Functions of a Clearing House

The term “**margin**” is used across multiple financial markets. However, there is a difference between securities margins and futures margins. Understanding these differences is essential, prior to trading futures contracts.

For securities, margin is the money you borrow as a partial down payment, up to 50% of the purchase price, to buy and own a stock, bond, or ETF. This practice is often referred to as buying on margin.

Futures margin is the amount of money that you must deposit and keep on hand with your broker when you open a futures position. It is not a down payment, and you do not own the underlying commodity.

Margins serve to act as performance bonds for all trading at U.S. futures exchanges. They are managed by clearing firms and commission merchants and their customers to facilitate trade and manage the credit risk inherent in all futures trading.

In futures markets, margin is the amount of money that you must deposit and keep on hand with your broker when you open a futures position. It is not a down payment and you do not own the underlying commodity.

For futures markets, the margin requirements generally represent a smaller percentage of the notional value of the contract, typically 3-12% of the value of a futures contract. This compares to up to 50% of the face value of securities purchased on margin.

Margin requirements may fluctuate based on market conditions. When markets are changing rapidly and daily price moves become more volatile clearinghouse margin methodology may result in higher margin requirements to account for increased risk. In contrast, when market conditions and the margin methodology warrant, margin requirements may be reduced.

Initial Margin - Initial margin is the amount of funds required by CME Clearing to initiate a futures position. While CME Clearing sets the margin amount, your broker may be required to collect additional funds for deposit.

When market conditions and the margin methodology warrant, initial margin requirements may be change; i.e increased or reduced.

Maintenance Margin – Maintenance margin is the minimum amount that must be maintained at any given time in your account. If the funds in your account drop below this level, you may receive a margin call requiring you to add funds immediately to bring the account back up to the initial margin level. This will change each day as market values change.

*Functions
of a
Clearing
House*

If the “marked-to-market” value of an account drops below the requirement, the customer will not be obligated immediately to deposit additional margin. The customer will receive a "margin call," meaning the customer will be called upon to deposit additional funds into the related account to bring the balance back up to the current required level.

For example, suppose the initial margin on a trade is \$1,000 and the maintenance margin set by the rules of a particular exchange for that trade is \$800. Then suppose the value of the futures contract held by the trader falls to a level that is only high enough to provide \$810 worth of margin guarantee. Nothing happens because the trader has not fallen through the maintenance margin level. But if the contract value declines further and is only high enough to provide \$790 worth of margin guarantee, the customer will get a margin call for \$210 - enough to bring the customer back to the initial \$1,000 margin level.

If the funds in your account drop below the maintenance margin level, a few things can happen:

- You may receive a “margin call” where you will be required to add more funds immediately to bring the account back up to the initial margin level.

- If you do not or cannot meet the margin call, you may be able to reduce your position in accordance with the amount of funds remaining in your account.
- Your position may be liquidated automatically once it drops below the maintenance margin level.

It is important to note that futures positions are highly leveraged. A small change in a futures price can translate into a huge gain or loss, so understanding how futures margin works is essential to maximize the capital efficiencies that futures afford.

Margin requirements for “spread” trades are lower than those for hedgers and speculators, as price movements between two futures contracts in a bought vs sold position are usually less volatile than fluctuations in the absolute flat price of a commodity.

UNDERSTANDING CLEARING FIRM ACCOUNTS

A clearing firm may have one or more house accounts, which are used to manage that firm’s proprietary trading activity.

Functions of a Clearing House

Pursuant to CFTC regulations, all customer position and performance bond accounts are segregated from the house accounts of clearing members and their affiliates. Clearing’s Financial and Regulatory Surveillance (FRS) department operates a financial surveillance program to monitor compliance with customer segregation requirements.

It is pertinent an understanding is attained of the required account structure and its role as it relates to clearing and risk management function for clearing. The basic account structure associated with a clearing firm to pursue “normal clearing” includes these four account types: 1) position account, 2) performance bond account, 3) settlement account and 4) asset accounts. These coincide with the account organizational structure within the exchange clearing house.

Let’s take a closer look at the setup of the accounts within the account structure and see how these different accounts are related to the functions performed when a trade is executed and cleared.

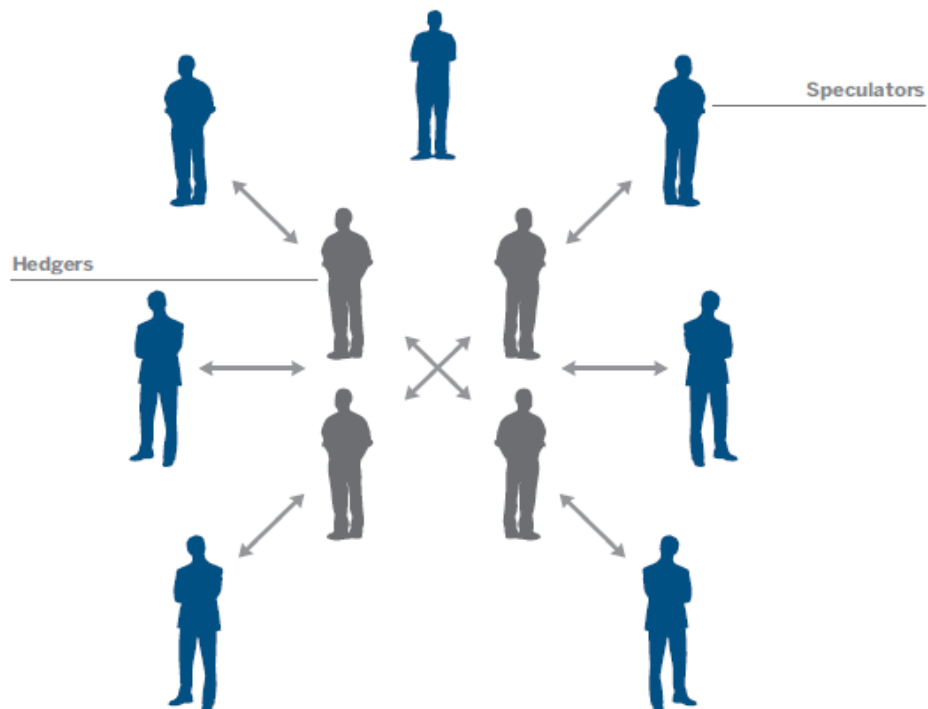
Position Account: The position account contains your position details. Futures mark-to-market and options premium are calculated at the position account level by the clearing house. Each of the clearing firm’s position accounts must be associated with a performance bond account and a settlement account.

Performance Bond Account: Performance bond accounts hold performance bonds and are used for the purpose of calculating performance bond requirements. Performance bond deposits, also known as initial margin, are held at the exchange's clearing house to ensure that clearing members have sufficient funds to meet obligations. Performance bond calculations vary by asset class and fluctuate with market volatility.

Settlement Account: Settlement accounts hold funds used during the settlement cycle. Unless specified otherwise in the contract terms, the exchange's clearing house determines settlement prices for each active contract. Settlement pricing data can be derived from cleared prices, pricing data from market participants, the settlement prices of related products and any other pricing data from sources deemed to be reliable. Similar to position and performance bond, settlement customer funds are always segregated from their clearing firm's settlement house funds.

Asset Accounts: Collateral supplied by the clearing firm to the clearing house is held in the asset account. Clearing firms can access their asset accounts through a clearing application, where they are able to review assets on deposit and authorize deposits and withdrawals.

MARKET PARTICIPANTS



Futures market participants fall into two general categories: Hedgers and Speculators.^{xvii}

HEDGER

Hedgers are primary participants in agricultural derivative and futures markets. The word hedge means protection. The dictionary states that to hedge is “to try to avoid or lessen a loss by making counterbalancing investments ...” In the context of futures trading, that is precisely what a hedge is: a counterbalancing transaction involving a position in the futures market that is opposite one’s current position in the cash market.

A hedger is any individual or firm that buys or sells the actual physical commodity, and who wants to remove or reduce the risk of unforeseen price movements in the future by using a technique that shifts price risk to others.

Many hedgers are producers, wholesalers, end users, manufacturers or retailer, and they are affected by changes in commodity prices, exchange rates, and interest rates. Since the physical cash market price and futures market price of a commodity tend to move up and down together, any loss or gain in the cash market will be roughly offset or counterbalanced in the futures market.^{xviii}

Market Participants

- **“Long” Hedgers:** Concerned about rising commodity prices

An example of this is a grain grower who is growing corn in July and wants to establish a price for corn they will receive at harvest time in the fall could do so by hedging – by selling a corn futures contract, and, then later when he sells his physical corn in to the local cash market and simultaneously buying back his futures contract.

- **“Short” Hedgers:** Concerned about falling commodity prices
An example of this is an importer who produces chickens, and who wants to establish in July the cost of corn needed to procure chicken feed in December can do so by hedging – by using the futures market in July to buy a futures contract and later offsetting it by selling a contract before the delivery date.

- **Merchandisers:** They both buy and sell commodities. Their risk is different than the directional risk of a traditional buying and selling hedger. Their risk is in their “margin”, or difference between the purchase and selling prices that determines their profitability.

When it comes to hedging, there are a variety of market participants who

buy and sell physical commodities, and whom may benefit from the added price protection offered by futures and options contracts.

- **Farmers, Livestock Producers** – who need protection against declining prices for crops or livestock, or against rising prices of purchased inputs such as feed.
- **Merchandisers, Elevators & Warehouse Operators** – who need protection against lower prices between the time they purchase or contract to purchase grain from farmers and the time it is sold.
- **Food Processors, Feed Manufacturers, End Users** – who need protection against increasing raw material costs or against decreasing inventory values.
- **Exporters** – who need protection against higher prices for grain contracted for future delivery but not yet purchased
- **Importers** – who want to take advantage of lower prices for grain contracted for future delivery but not yet received

The hedger may be someone who wants to lock in the price the hedger will get at some future date for a product growing in the hedger's fields or stored in the warehouse, or the hedger may be someone who wants to lock in the price the hedger will have to pay at some future date for a commodity that will be used in the hedger's business.

*Market
Participants*

SPECULATOR

Speculators are primary participants in a futures market. A speculator is any individual or firm that accepts risk in order to make a profit. Speculators can achieve these profits by buying low and selling high. But in the case of the futures market, they could just as easily sell first and later buy at a lower price.^{xix}

Speculators aiming to profit in the futures market come in a variety of types. Speculators can be individual traders, proprietary trading firms, portfolio managers, hedge funds or market makers.

In contrast to buyers and sellers who are commercial hedgers and have a vested interest in the underlying physical asset, speculators bring an appetite for risk to the market. In doing so, they can provide significant market liquidity.

An important role of the speculator is to bring significant capital flows into the market with the hopes of achieving profits through the successful

anticipation of price movements. These capital flows are an important conduit that bring investment into the agricultural commodity sectors.

It is important to note that speculators are unlikely to be inclined to “take” or “make” delivery of the actual physical commodity as they are not using the futures market in connection with the commercial use of the product like a hedger.

Individual Traders: For individuals trading their own funds, electronic trading has helped to level the playing field by improving access to price and trade information. The speed and ease of trade execution, combined with the application of modern risk management, gives the individual trader access to markets and strategies that were once reserved for institutions.^{xx}

Proprietary Trading Firms: Proprietary trading firms, sometimes known as prop shops, profit as a direct result of their traders’ activity in the marketplace. These firms supply their traders with the education and capital required to execute a large number of trades per day. By using the capital resources of the prop shop, traders gain access to more capital than they would if they were trading on their own account. They also may have access to the same type of research and strategies developed by larger institutions.^{xxi}

*Market
Participants*

Portfolio or Investment Managers: A portfolio or investment manager is responsible for investing or hedging the assets of a mutual fund, exchange-traded fund or closed-end fund. The portfolio manager implements the fund’s investment strategy and manages the day-to-day trading. Futures markets are often used to increase or decrease the overall market exposure of a portfolio without disrupting the delicate balance of investments that may have taken a significant effort to build.^{xxii}

Hedge Funds: A hedge fund is a managed portfolio of investments that uses advanced investment strategies to maximize returns, either in an absolute sense or relative to a specified market benchmark.^{xxiii}

The name hedge fund is mostly historical, as the first hedge funds tried to hedge against the risk of a bear market by shorting the market. Today, hedge funds use hundreds of different strategies in an effort to maximize returns.

The diverse and highly liquid futures marketplace offer hedge funds the ability to execute large transactions and either increase or decrease the market exposure of their portfolio.

Investor: Investors can be considered to be a subset of Hedge Funds, but

differing in their strategic objective from participation in the market. Investors in the futures market are those that view the futures market as an alternative to the cash market (i.e. the underlying market).

An important role of the Investor is to direct capital into those areas and commodities that require financial investment.

For example, an investor may wish to earn the All Share Index (ALSI) and, instead of buying the shares in the proportions that make up the index, can achieve this by buying the appropriate number of ALSI futures contracts. They may do this for the sake of convenience, to avoid transactions costs (depending on the fair value price) or she may view the underlying market as lacking in liquidity.

An investor may also use long-term instruments and short futures contracts to invest short-term, or use short-term financial instruments and long futures contracts to invest long term.

Market Makers: Market makers are trading firms that have contractually agreed to provide liquidity to the markets, continually providing both bids and offers, usually in exchange for a reduction in trading fees.^{xxiv}

Market makers are important to the trading ecosystem as they help facilitate the movement of large transactions without effecting a substantial change in price. Market makers often profit from capturing the spread, the small difference between the bid and offer prices over a large number of transactions, or by trading related futures markets that they view as being priced to provide opportunity.

Conclusion: Providing liquidity is a crucial market function that enables individuals to efficiently enter and exit the market. It is the diversity of market participants that create efficient and liquid markets allowing all players to benefit.

WHO CAN BROKER EXCHANGE TRADED DERIVATIVES AND FUTURES?

In the United States other firms and individuals who are often referred to as commodity brokers include:

Floor Broker/Trader: an individual who trades commodity contracts on the floor of a commodities exchange. When executing trades on behalf of a client in exchange for a commission he is acting in the role of a broker. When trading on behalf of his own account, or for the account of his

employer, he is acting in the role of a trader.

Historically, a floor trading was conducted in the pits of a commodity exchange via open outcry. A “floor broker” is different from a "floor trader" he or she also works on the floor of the exchange, makes trades as a principal for his or her own account.

Futures Commission Merchant (FCM): a firm or individual that solicits or accepts orders for commodity contracts traded on an exchange and holds client funds to margin, similar to a securities broker-dealer. Most individual traders do not work directly with a FCM, but rather through an IB or CTA.

Loosely speaking, an FCM is a commodity brokerage firm which is in the business of buying and selling futures either for its own account and/or for others, and which is a member of a futures exchange.

Introducing Broker (IB): a firm or individual that solicits or accepts orders for commodity contracts traded on an exchange. IBs do not actually hold customer funds to margin. Client funds to margin are held by a FCM associated with the IB.

Commodity Trading Advisor (CTA): a firm or individual that issue analyses or reports concerning commodities, including the advisability of trading in commodity futures or options, in exchange for payment. They may advise commodity pools and offer managed futures accounts. Like an IB, a CTA does not hold customer funds to margin; they are held at a FCM. CTAs exercise discretion over their clients' accounts, meaning that they have power of attorney to trade the clients account on his behalf according to the client's trading objectives. A CTA is generally the commodity equivalent to a financial advisor or mutual fund manager.

Commodity Pool Operator (CPO): a firm or individual that operates a commodity pool(s) and are advised by a CTA. They are similar to investment trusts that solicit or accept funds, securities or property for the purpose of trading commodity futures contracts or commodity options. A commodity pool is essentially the commodity equivalent to a mutual fund.

Registered Commodity Representative (RCR)/Associated Person (AP): an employee, partner or officer of a FCM, IB, CTA, or CPO, duly registered and licensed to conduct the activities of a FCM, IB, CTA, or CPO. This is the commodity equivalent to a registered representative.

FUTURES ACCOUNTS AND TRADING PROCEDURES

Before you will be able to place your first trade, you need to open an account with a registered futures broker. This broker will maintain your account and guarantee your trades.

In the futures business, brokerage firms are known as either a futures commission merchant (FCM), or an introducing broker (IB). Many securities brokers are also registered to deal in futures.

Working with a knowledgeable and trusted broker with a quality firm will play an important role in your long-term trading success. Contact several brokers until you find the right combination of cost and service.

Be sure to check the background of any potential broker or firm with the National Futures Association (NFA). The NFA directly supervises the activities of all futures brokers and provides background information on all of its members. The NFA provides the complete registration history, as well as complaints, fines and suspensions for all registered brokers and firms.

All members of the NFA must observe high levels of conduct that extend beyond the legal requirements. For more information, visit nfa.futures.org.

Individuals and firms entering the futures markets to hedge their risks on grain imported from the United States, or for any other reason, need to fully understand the processes, procedures, financial requirement and related risks.

FUTURES ORDER TYPES

When a trader wants to buy or sell derivatives, futures, or options; an trading order is given to an introducing broker who handles the trader's account.

Futures orders are submitted through an introducing broker. Orders to buy or sell can be submitted with specific conditions and can take various forms depending on the needs of the individual. These conditions allow traders to create orders that meet the criteria they set for the trade, and to define how, and at what, price the orders will be filled. These differing conditions are referred to as order types, the most common of which are: 1) market orders, 2) limit orders, and 3) stop orders.

Futures Order Types

The following describes the common types of orders that are used in the execution of futures trades:

Market Order: The most common order that a futures buyer or seller uses is the market order. In a market order, the customer states the number of contracts of a given delivery month the customer wishes to buy or sell and the customer does not specify the price. The customer wants the trade made immediately at the best available price. An order may specify "buy 10 July corn futures contracts at the market." This directs the trading representative on the futures market floor to buy 10

July corn contracts at the lowest price being offered at the time that the order enters the trading pit. "Sell five December corn futures at the market" is a directive to sell five December corn futures at the highest bid available at the time the order is entered into the trading pit.

Limit Order: A limit order has a price limit at which it must be executed. When a customer gives the customer's broker a limit order, the customer sets the maximum price that the customer is willing to pay when purchasing, or a minimum price that the customer is willing to accept when selling. "Buy 20 December corn contracts at \$2.50" means to purchase at \$2.50 or lower. The advantage of a limit order is that the customer knows the worst price the customer will receive if the customer's order is executed. The disadvantage of a limit order is that the customer's order might not be filled.

Stop Order: A stop order is really a delayed market order which cannot be activated for trading until some specified development occurs. Stop orders are usually used to liquidate previously entered transactions. For example, "buy 10 December corn contracts at \$3.00 stop" means to buy at any price (a market order) AFTER another trade occurs at \$3.00 or higher. Buy-stop orders are always pegged to prices above the current market. "Sell 10 corn contracts at \$2.80 stop" means to sell at any price (a market order) but not UNTIL another trade occurs at \$2.80 or lower. Sell-stop orders are always below the market.

Futures Order Types

A stop order is activated, triggered or elected once the indicated price is reached. Stop orders can also be activated even if there is no actual trade at the stop price. A buy-stop order is triggered by a bid at the stop order price - a sell-stop order by an offer at the stop order price. Stop orders are also called "contingent orders" because they depend on the occurrence of a specified price change.

Stop orders also can be used to establish positions or enter the market. Stop orders are often used as defensive devices to protect profits and restrict losses.

Time Limits on Orders

In addition to price levels, orders placed through your broker have a time limit that they are active.

Typically, futures orders are submitted as day orders. This means that the order is only active until the end of that day's trading session, if the order does not get filled.

Traders can also place orders that are valid until cancelled by the trader. These orders are typically called "Good Till Cancel" (GTC) orders and will remain active until the trader cancels the order or the order is filled.

Traders can also exit multi-contract positions at different prices. Traders can exit part of their position at one price and the remainder of their position at a different price.

HOW TO READ COMMODITY FUTURES QUOTES

Commodities trading on organized futures exchanges has a long history dating back to the early 1800's. Back then market information, including price, bids, offered, etc., were sent by telegraph, ticker tapes, wire, telex, and other early forms of communication which were slow and expensive. Back then, fees for such early forms of communications were charged by the letter. As such, the industry created a set of abbreviated short form codes for trading terms, commodities, dates, etc... Many for these are still commonly used today when listing futures contract details.

The following is a list letter codes frequently used in the commodities trade and related futures contracts.

CME Group Trade Agricultural Futures:

<u>Contract/Symbol</u>	<u>Contract</u>	<u>Size</u>	<u>Months</u>
Corn/C	5,000	Bushels	H,K,N,U,Z Oat
Futures/O	5,000	Bushels	H,K,N,U,Z
Soybean/S	5,000	Bushels	F,H,K,N,Q,U,X
Soybean Oil/BO	60,000	Pounds	F,H,K,N,Q,U,V,Z
Soybean Meal/SM	100	Tons	F,H,K,N,Q,U,V,Z
CBOT Wheat/W	5,000	Bushels	H,K,N,U,Z
KC Wheat/KW	5,000	Bushels	H,K,N,U,Z

(1 pound = .4534 kilograms)

Often these codes consists of one to two letters to indicate a specific commodity contract, followed by a letter to indicate the delivery month, and finally a number to indicate the year of the contract.

Futures or Options Delivery Months:

<u>CurrentYear</u>	<u>Month</u>
F	JANUARY
G	FEBRUARY
H	MARCH
J	APRIL
K	MAY
M	JUNE
N	JULY
Q	AUGUST
U	SEPTEMBER
V	OCTOBER
X	NOVEMBER
Z	DECEMBER

Options on the futures traded at all of the exchanges are listed using the same symbols and month codes, along with specific codes representing the strike price and whether it is a call or a put.

DAILY PRICE MOVEMENT LIMITS

There are several measures in place to ensure that our markets continue to work in an efficient and orderly manner during volatile market conditions. The establishment of price movement limits specific to each product, the exchange can help restrict a market from moving too far or too fast in a specific period of time.

A price movement limit is the maximum price range, up or down, permitted for a futures contract to move in each trading session. These limits are set to help maintain the ability of the markets to provide effective price discovery and risk-transfer functions. These limits can be changed when the exchange determine that the changes are needed.

When markets hit the price movement limit, different actions occur depending on the product being traded. Markets may temporarily halt until price limits can be expanded, remain in a limit condition or stop trading for the day, based on regulatory rules.

How are price limits calculated?

For the CME exchanges, twice a year, and prior to the resetting of price limits, daily futures settlement prices for each product are collected and averaged over a 45-day period. The average of these prices is multiplied by a specific percentage to get the effective price limit for the next six months.

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There are different percentages applied in this calculation depending on the product. For example, Corn is multiplied by 7% while Lumber is multiplied by 5%. These percentages were established by looking at historical daily percentage price changes by product to capture, on average, daily price movements 99% of the time. Secondly, some of the contracts round their price limits, while others may not.^{xxvi}

Are all contract months subject to price limits?

In grain and oilseed contracts, price limits are removed on the business day prior to first notice day of an expiring contract month. This results in the nearby “spot” month contracts having not price movement limits when they are in the delivery period. This allows efficient convergence of the spot physical cash markets and the futures contract.^{xxvii}

What are expanded price limits?

Generally, expanded limits for grain and oilseed contracts are triggered when two or more futures contract months within the first five to eight (depending on the contract) listed non-spot contracts settle at limit.

Expanded price limits are approximately 50% higher than daily price limits and remain in place until no futures contracts settle at limit.

The triggering of expanded limits in either Chicago Wheat futures or KC HRW Wheat futures triggers expanded limits in the other. Similarly, the triggering of expanded limits in one Soybean Complex (Soybean, Soybean Meal, and Soybean Oil) futures triggers expanded limits in the others.^{xxviii}

It is important to know what these limits are on any trading session.

REGULATION AND OVERSIGHT

All U.S. exchanges are regulated under a system that provides several layers of protection for persons who use the markets. The integrity of trade on the exchanges is supported by the clearing corporations that

stand behind all transactions. The exchanges are also constantly monitoring their own activity through self-regulation. Market firms, their performance and employees are all monitored by the commodity futures exchange, and also by an industry group, the National Futures Association.

Another layer of protection is provided under U.S. law by a regulatory agency of the U.S. government, the Commodity Futures Trading Commission (CFTC). All exchanges have written rules regarding conduct of members, membership, trading practices, position limits and price movements. These rules vary among exchanges and are also developing constantly as innovation continues in the marketplace. Those who wish to trade on any exchange should consult that exchange's constitution and rules for specific details.

For further information on the futures markets, contact:

National Futures Association

NFA Offices

Chicago

300 S. Riverside Plaza, #1800

Chicago, IL 60606-6615

Phone: 800-621-3570

Phone: 312-781-1300

Fax: 312-781-1467

New York

One New York Plaza, #4300

New York, NY 10004

Phone: 212-608-8660

Fax: 212-964-3913

Website: www.nfa.futures.org

The **National Futures Association (NFA)**, founded in 1982, is the self-regulatory organization for the U.S. derivatives industry, including on-exchange traded futures, retail off-exchange foreign currency and OTC derivatives. NFA is headquartered in Chicago and maintains an office in New York City.

Commodities Futures Trading Commission (CFTC)

Three Lafayette Centre

1155 21st Street, NW

Washington, D.C. 20581 U.S.A.

Phone: (202) 418-5000

FAX: (202) 418-5521

Website: <https://www.cftc.gov/About/index.htm>

The **Commodity Futures Trading Commission (CFTC)** is an independent agency of the US government created in 1974, that regulates the U.S. derivatives markets, which includes futures, swaps, and certain kinds of options.

CFTC committees currently include:

- Agricultural Advisory Committee.
- Energy and Environmental Markets Advisory Committee.
- Global Markets Advisory Committee.
- Market Risk Advisory Committee.
- Technology Advisory Committee.
- CFTC-SEC Joint Advisory Committee (Inactive)

The CFTC's mission is to foster open, competitive, and financially sound markets and to protect market users and the public from fraud, manipulation, abusive practices and systemic risk related to derivatives that are subject to the Commodity Exchange Act.

U.S. Securities and Exchange Commission

100 F St., NE

Washington, DC 20549 USA

Phone: 1-202-551-6551

Website: <https://www.sec.gov/about.shtml>

The **U.S. Securities and Exchange Commission (SEC)** oversees securities exchanges, securities brokers and dealers, investment advisors, and mutual funds in an effort to promote fair dealing, the disclosure of important market information, and to prevent fraud.

The SEC is an independent agency of the United States federal government, created the 6th of June 1934 in the aftermath of the Wall Street Crash of 1929. The primary purpose of the SEC is to enforce the law against market manipulation.

Federal Trade Commission

Headquarters

600 Pennsylvania Avenue, NW

Washington, DC 20580 USA

Telephone: (202) 326-2222

Constitution Center

Federal Trade Commission

400 7th St., SW
Washington, DC 20024 USA
Telephone: (202) 326-2222
Website: <https://www.ftc.gov/about-ftc>

The **Federal Trade Commission (FTC)** is an independent agency of the United States government, created in 1914, whose principal mission is the enforcement of civil U.S. antitrust law and the promotion of consumer protection. The FTC shares jurisdiction over federal civil antitrust enforcement with the Department of Justice Antitrust Division.

The Federal Trade Commission works to promote competition, and protect and educate consumers.

DISCLAIMER

This chapter is meant to be a general introduction to derivative markets, including futures, options, OTC's and swaps. It is by no means intended to be comprehensive or exhaustive in its content on the subject. The information and data contained herein have been obtained from sources believed to be reliable, but does not warrant their accuracy or completeness.

This material and information is intended for educational use and professional development. It is not intended, nor does it necessarily represent enforceable standards, industry consensus, mandatory requirements, nor all possible solutions or ideas.

Opinions contained herein reflect the judgment of the writer as of the date written, are based on certain assumptions, only some of which are noted herein, as different assumptions could yield substantially different results, and are subject to change without notice. Neither the information nor the recommendations and opinions expressed herein constitutes an offer to sell or buy any security, futures or option contract, or other instrument. Readers should therefore consult their own advisors regarding the market, tax, accounting, and legal implications of the recommended strategies before transactions are affected.

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Philip Shull
Senior Diplomat (Ret)
U.S. Department of Agriculture

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Market Analysis

MARKET ANALYSIS

There are two common methods of analyzing commodity market conditions:

- **Fundamental Analysis** - A method of accessing the intrinsic value of a commodity using analysis of supply and demand information in an effort to anticipate future price movements or direction.
- **Technical Analysis** - The study of charts and, more specifically, price movement to forecast commodity prices anticipating future price movement using historical prices, trading volume, open interest and other trading data to study price patterns.

A business whose activities are impacted by changes in supply chain activities and commodity prices should understand both methods.

FUNDAMENTAL ANALYSIS

Fundamental analysis is a method of seeking answers to questions about what is happening in commodity markets and accessing the intrinsic value of a commodity using analysis of supply and demand information in an effort to anticipate future price

movements or direction.

Fundamental analysis is really a study of basic, underlying factors which will affect the supply and demand of a commodity. Since in the short run both supply and demand for agricultural commodities are relatively inelastic, prices for commodities can be volatile. If an analyst can project probable future shifts in supply and/or demand and compare them with historical moves, the analyst can begin to successfully project future prices and price trends.

In an effort to more clearly quantify supply and demand, a fundamental analyst will look at a wide range of factors that may influence a price outlook. Some of these include weather conditions, planted and harvested areas, yield estimates, inventories, user demand, supply of related or substitutable commodities, transportation costs and capacities, in concert with a wide range of other micro and macro-economic conditions. Other factors which may be included are a wide range of geopolitical and economic developments, such as government policies and support programs, interest and currency exchange rates, and the world political situation and its potential impact on trade decisions.

The foundation of fundamental analysis is raw data collected from a number of local, national and international sources, including news, market reports, and historical data from private and public sources. This data forms the basis for econometric models to evaluate the objective state of the supply and demand of a commodity.

The Purpose of a Commodity Balance Sheet

The underlying tool for fundamental analysis is the commodity Balance Sheet. The goal of a commodity Balance Sheet is to quantify the supply and demand within a geographical area in an effort to forecast the surplus or deficit of a commodity in an effort to determine a price relationship to bring the situation into balance.

A typical Balance Sheet for grains and other agricultural commodities is set out as follow:

<u>Commodity Balance Sheet</u>
<u>Supply</u>
Beginning Stocks
Production
▪ Area Harvested
▪ Yield
Total Supply
<u>Demand</u>
FSI Total
▪ Food (Milling)
▪ Seed
▪ Industrial Use (Milling, Crush, Energy)
Feed
Residual
Total Consumption
<u>Trade</u>
Imports (Will make a positive contribution to Supply)
Exports (Will make a positive contribution to Demand)
Net Balance in Trade (+/-)
<u>Ending Stocks</u>
% Stocks/Use or Days of Use

In other words we are attempting to define expected Ending Stocks that will result from excess supply, or “short fall” as a result of a deficit. From the results implications can be determines for:

- inter-commodity or quality spread (Typical) price relationships,
- inter-regional (Distal / Spatial) price relationships,
- Related Basis values,
- underlying Future prices

Some weaknesses cited by traders and economists in the use of fundamental analysis are as follows:

- Drawing hard fast trading rules from the analysis and forgetting the imperfect nature of underlying information.
- Using outdated information or using information not available to the rest of the market which, therefore, has no immediate impact.
- Ignoring seasonal considerations.
- Forgetting that commodity markets can exceed costs of production or go significantly below the cost of production for extended periods of time.
- Ignoring the state of the futures markets or the fundamental impact of money flow.
- Allowing expected conclusions to lead to the evidence, i.e., confusing or misdirecting the analysis with market beliefs.
- Viewing fundamentals in a vacuum, without regard to technical analysis or risk management.

By definition, it is the study of all factors affecting the forces of supply and demand on a commodity.

In review, fundamental analysis is an effective tool in forecasting price relationships over distance, time and related quality and commodities, as well as seasonal trade flows. In addition it can assist in the effective management risks in commodities trading.

TECHNICAL ANALYSIS

The study of charts and, more specifically, price movement to forecast commodity prices anticipating future price movement using historical prices, trading volume, open interest and other trading data to study price patterns.

It is an approach to forecasting commodity prices which examines patterns of price change, rates of change and changes in volume of trading and open interest, without regard to underlying fundamental factors. Many academic experts have questioned the value of technical analysis. However, since the charts of past price movements used by technical analysts also are used by most traders to predict price movements in futures markets, any risk manager in the commodity markets must be prepared to understand both technical and fundamental analysis. Such an understanding is needed to give the trader a full appreciation of all forces shaping the decisions of major participants in the futures markets.

As commodities are an integral part of the U.S. economy, and because they frequently demonstrate volatile price movements, they can attract speculative interest from fund managers, commodity pool operators, and commodity trading advisors, into the markets that did not exist just 30 years ago. These important market participants have added increased importance to the area of technical analysis and its interpretation of directional price decisions as they can significantly impact money flows into and out of the markets with the directional movement of price.

As such, technical analysis is an effective tool when used with fundamental analysis to manage feed grains risk along with other commodity price risk.

Following are several examples of basic technical analysis. Some are chart patterns, while others include measurements of directional trends allowing traders to visualize changes in market behavior.

In addition to methods of technical analysis, traders also need to be well-versed in risk management and trading psychology. Certain strategies have stood the test of time and remain popular tools for trend traders who are interested in analyzing certain market indicators.

MARKET INDICATORS

Trends: A common saying heard in many trading circles is; “The trend is your friend.” Trend traders attempt to isolate and extract profit from price trends over time. The method of trend trading attempts to capture profits through the analysis of a commodity price’s directional momentum.ⁱ There can be multiple ways to achieve this outcome.

Trendlines or a moving average can be an “indicator” and help establish a trend’s direction and/or a directional indicator. Indicators can simplify price information, in addition to providing trend trade signals and providing warnings of pending reversals.

Moving Averages: A “Moving Average” is a technical analysis tool that smooths out price data by creating a constantly updated average price. On a price chart, a moving average creates a single, flat line that effectively eliminates any variations due to random price fluctuations.ⁱⁱ

The average is taken over a specific period of time, i.e., 10 days, 20 minutes, 30 weeks, or any time period the trader chooses. For long-term trend followers, the 200-day, 100-day, and 50-day simple moving average are popular choices.

If the moving average line is angled up, an uptrend is underway. However, moving averages don’t make predictions about the future value of a stock; they simply reveal what the price is doing, on average, over a period of time.

There are several ways to utilize the moving average. The first is to look at the angle of the moving average. If it is mostly moving horizontally for an extended amount of time, then the price isn’t trending, it is ranging.

A trading range occurs when a security trades between consistent high and low prices for a period of time.

“Crossovers” are another way to utilize moving averages. By plotting a 200-day and 50-day moving average on your chart, a

buy signal occurs when the 50-day crosses above the 200-day. A sell signal occurs when the 50-day drops below the 200-day. ⁱⁱⁱ

When the price crosses above a moving average, it can also be used as a buy signal, and when the price crosses below a moving average, it can be used as a sell signal. The time frames can be altered to suit your individual trading timeframe.

Moving averages can also provide support or resistance to the price.

However, since the price is more volatile than the moving average, this method is prone to more false signals.

Moving Average Convergence Divergence (MACD): The “Moving Average Convergence Divergence” (MACD) is a kind of oscillating indicator. An oscillating indicator is a technical analysis indicator that varies over time within a band (above and below a centerline; the MACD fluctuates above and below zero). The MACD is both a trend-following and momentum indicator. ^{iv}

One basic MACD strategy is to look at which side of zero the MACD lines are on in the histogram below the chart. If the MACD lines are above zero for a sustained period of time, the stock is likely trending upwards. Conversely, if the MACD lines are below zero for a sustained period of time, the trend is likely down. Using this strategy, potential buy signals occur when the MACD moves above zero, and potential sell signals when it crosses below zero.

Signal line crossovers can also provide additional buy and sell signals. A MACD has two lines; a fast line and a slow line. A buy signal occurs when the fast line crosses through and above the slow line. A sell signal occurs when the fast line crosses through and below the slow line.

Relative Strength Index (RSI): The “Relative Strength Index” (RSI) is another oscillating indicator but its movement is contained between zero and 100 so it provides different information than the MACD. ^v

One way to interpret the RSI is:

- by viewing the price as "**overbought**" — and due for a correction when the indicator in the histogram is above 70,
- and by viewing the price as "**oversold**" — and due for a bounce when the indicator is below 30.3.

In a strong uptrend, the price will often reach 70 and beyond for sustained periods of time. For downtrends, the price can stay at 30 or below for a long time. While general overbought and oversold levels can be accurate occasionally, they may not provide the timeliest signals for trend traders.

An alternative is to buy close to oversold conditions when the trend is up and place a short trade near an overbought condition in a downtrend.

For example, suppose the long-term trend of a stock is up. A buy signal occurs when the RSI moves below 50 and then back above it. Essentially, this means a pullback in price has occurred. As such, the trader "buys" once the pullback appears to have ended (according to the RSI) and the trend is resuming. The 50-levels are used because the RSI doesn't typically reach 30 in an uptrend unless a potential reversal is underway. A short-trade signal occurs when the trend is down and the RSI moves above 50 and then back below it.

On-Balance Volume (OBV): Volume itself is a valuable indicator, and on-balance volume (OBV) takes a significant amount of volume information and compiles it into a single one-line indicator.

The BOV indicator measures cumulative buying and selling pressure by adding the volume on "up" days and subtracting volume on "down" days. Ideally, the volume should confirm trends. A rising price should be accompanied by a rising OBV; a falling price should be accompanied by a falling OBV.^{vi}

If OBV is rising and the price isn't, it's likely that the price will follow the OBV in the future and start rising. If the price is rising and OBV is flat-lining or falling, the price may be near a top. If

the price is falling and OBV is flat-lining or rising, the price could be nearing a bottom.

Head and Shoulders Formation: A “Head and Shoulders” pattern is a chart formation that appears as a baseline with three peaks, where the outside two are close in height and the middle is highest. In technical analysis, a head and shoulders pattern describes a specific chart formation that predicts a bullish-to-bearish trend reversal.^{vii}



A head and shoulders pattern is believed to be one of the most reliable trend reversal patterns. It is one of several top patterns that signal, with varying degrees of accuracy, that an upward trend is nearing its end.

Inverted Head and Shoulders Formation: The opposite of a head and shoulders chart is the “Inverse Head and Shoulders”; also called a “Head and Shoulders Bottom.” It is an inverted pattern with the head and shoulders top used to predict reversals in downtrends.^{viii} This pattern is identified when the price action meets the following characteristics:

- the price falls to a trough and then rises;
- the price falls below the former trough and then rises again;
- finally, the price falls again but not as far as the second trough.

Once the final trough is made, the price heads upward, toward the resistance found near the top of the previous troughs.

Market indicators can be used across a range of time frames, and

for the most part, contain variables that can be adjusted to suit each commodity or trader's specific preferences. As such, traders can combine indicator strategies, or develop their own guidelines, so that entry and exit criteria are clearly established for trading strategies.

It is important to note that learning to develop and trade on technical analysis can be a tricky process.

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Philip Shull
Senior Diplomat (Ret)
U.S. Department of Agriculture

ⁱ Investopedia “Trend Trading: The 4 Most Common Indicators” Michelle, Cory (24th August 28, 2021) <https://www.investopedia.com/articles/active-trading/041814/four-most-commonlyused-indicators-trend-trading.asp> Sighted 20th February 2022

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Price Risk Management and Hedging in U.S. Grains Markets

Market participants across the supply chain involved in buying and selling of grains and their related products are quite aware of the risks they face from a potential price change.

Businesses involved in the production of finished products regularly face commodity price risks on input costs and other manufacturing and distribution risks including power, fuel, interest rates, and foreign currency exposures. Grain processors, feed manufacturers, food companies and importers who are concerned about the impact that a price increase could have on their business are constantly seeking ways to mitigate this risk and protect their bottom line.

While inefficient fixed-price supplier contracts can be used to “hedge” some of these risks, business managers are increasingly looking for more flexible financial hedges to manage these risks.

This chapter is designed to introduce the basic methods to utilize futures in basic hedging strategies for grains and oilseeds.

HEDGING THE PRICE RISK OF GRAIN

Hedging is the management of the price risks naturally inherent in the buying and selling of commodities. In hedging, price risk is transferred from those seeking to reduce it to others willing to assume it in hopes of making a profit.

Grain hedgers include those who need protection again declining prices, such as farmers, merchandisers and grain elevators; as well as those looking for protection against rising prices, such as food processors, feed manufacturers and importers.

“Hedging reduces risk and increases the certainty of outcome.”

Hedging does not prevent all negative events from happening. However, if an event with adverse price impacts does happen, and the firm's position is properly hedged, the impact of the event is reduced.

In practice, hedging occurs across a range of businesses activities and is performed by portfolio managers, individual investors, and corporations use techniques to reduce exposure to various risks.

For example, if you buy homeowner's insurance, you are hedging yourself against fires, break-ins, or other unforeseen disasters. Or, if purchase your inputs of corn and soybean meal at the same time you sell finished feed, you are hedging yourself against supplies of feed inputs and changes in prices.

In commodity and financial markets, hedging is not as simple as paying an insurance company a fee every year for coverage. Hedging against adverse movements in prices, "price risk", means strategically using financial instruments and market strategies to offset the risk of any adverse price movements.

*Hedging
Price Risk*

Hedging: Removing Price Risk



One of the primary functions of the agricultural derivatives, futures and options markets, is hedging. Hedging is essentially taking a position in the futures or options market that will offset (or is opposite) your current position in the physical cash market. Since the cash and futures prices tend to move up and down together, any gains or losses in the cash market will be counterbalanced with gains or losses in the futures market.

Technically, to hedge requires an offsetting trade with negative, or opposite, correlation. The closer the correlation, the better or more efficient the hedge.

A reduction in risk, results in an increased certainty in outcome. It is designed to protect the anticipated profit margin and reduce a potential loss; and not maximize a potential gain. As such, it will also mean a reduction in “potential” profits.

If the investment that is being hedged makes money, you have also usually reduced further potential profit. However, if the investment loses money, and the hedge was successful, the business will have protected its profit margin, and reduced its loss.

Hedging techniques used for agricultural commodities and currencies generally involve the use of financial instruments known as derivatives. Two of the most commonly used derivatives are futures and options. With derivatives, a range of strategies can be constructed where a loss in one investment is offset by a gain in a derivative. Similarly, as this is a hedge, a gain in the investment will be offset by a loss in the derivative. This achieves the desired result of certainty of outcome.

Hedging Price Risk

It should be kept in mind that every hedging strategy has a cost associated with it. Before it is decided to engage in a particular hedging strategy, it should be asked if the potential benefits outweigh the expense. Remember, the goal of hedging is to reduce risk and increase the certainty of outcome, and to protect the operating margin. The cost of the hedge, whether it is the cost of brokerage, financing a margin, or the cost of an option, cannot be avoided.

While comparison of hedging to insurance is frequently employed, insurance is far more prescriptive and precise. With insurance, the business is completely compensated for the loss (usually less a defined deductible). Hedging commodities, on the other hand, isn't a perfect science, and in some respects considered an art. If the relationship between the physical commodity and the underlying derivative is not fully understood, things can easily go wrong.

Although risk managers are always aiming for the perfect hedge, this situation can be very difficult to achieve in practice. In addition, the removal of all risks, also remove all further profit opportunity. Through the process of strategic risk management certain risks will want to be removed, while other risks may want to be retained. The more in depth and technical discussion on risk management will be left for another time.

WHY LEARN ABOUT HEDGING ...?

As there are a wide variety of derivatives, futures and options contracts available in the market, a market participant can hedge price risk against

nearly anything, including commodities, interest rates, or currencies, etc.

However, a good number of market participants may never directly trade a derivative, futures or options contract. Many grain growers and end users can successfully manage (i.e., hedge) their price risk through the use of a variety of physical cash contracts offered by the buyer or the supplier.

Even if an importer or end users never directly engages in directly trading of derivatives, they should have and understand how these common risk management processes work and can impact the market.

Many suppliers and post-farm gate supply chain participants will hedge in some form. They will use a combination of physical cash contracts, along with derivatives, the offer hybrid cash contracts, including Basis Contracts, Minimum Price Contracts, and Maximum Price Contracts, as well as others. Having a basic understanding of hedging can help you comprehend and analyze these useful marketing and procurement tools.

WHO IS A HEDGER?

A hedger is an individual who wants to remove or reduce the risk of unforeseen price movements in the future by using a technique that shifts price risk to others.

Hedging is used in agricultural commodity markets by people who want to remove or reduce the risk of unforeseen price movements in the physical commodity in the future. This is done by shifting the price risk to speculators, or other market participants, who are willing to take on a risk in hopes of making a profit.

In this sense a hedger is typically a producer, processor, marketer, supplier, seller or buyer of a physical commodity that also trades in related derivative markets and futures exchanges to offset price risk.

The hedger may be someone who wants to lock in the price they will receive at for growing crop, storing grain in a warehouse, or who wants to lock in a price they will have to pay for a commodity at some time in the future that will be used in the hedger's business.

The classic example of a hedger is a farmer who is seasonally growing corn, and who wants to, at the time of planting, establish the price he will receive at harvest. They can accomplish this selling an appropriate corn futures contract (December) at the time of planting. Later, at some future point in time before the physical corn is harvested and delivered to the local country

elevator, physical corn will be sold, and the offsetting futures sale of corn will be bought back.

Similarly, a cattle feeder who in April wants to establish in the cost of corn needed to feed cattle for 90 days from October through December can do so by hedging, i.e., buying a December futures contract. Later, at some future point in time before the cattle arrive to the feedlot, physical corn will be purchased, and the offsetting futures purchase of corn will be sold.

In these examples the hedger seeks to reduce price risk in his business activities in order to concentrate on creating profits from core business activities, such as growing, producing, transporting, storing, handling, exporting, importing, manufacturing, milling, processing, feeding or merchandising grain.

WHAT IS A COMMERCIAL HEDGER?

Who is a Hedger?

A commercial hedger is a company, firm or individual who take positions (long or short) on derivative or futures markets in order to secure the price for the commodities they will need for their business purposes at a later date.

A primary example of a commercial hedger is a country elevator, warehouse operator, export or importer. Most participants throughout the United States post farm gate supply chain operate in the manner.

Commercial hedgers have a position in the physical commodity and uses derivatives markets to reduce, i.e., hedge, their price risk exposure to either the items they produce, or the inputs needed for those commodities.

WHAT IS LIFTING A HEDGE?

“Lifting a Hedge” is to concurrently close out of an existing hedge position in a related derivative of futures market as the corresponding physical in the physical market is secured.

Simply put, if a “hedged position” is being maintained; **When physical cash grain is bought, corresponding futures are sold, and, when physical cash grain is sold, corresponding futures are bought.**

In the case of a first stage processor who is protecting the processing margin, such as a feed manufacturer, the grain equivalent of the feed sold, would be the physical grain component to be hedged.

One method of accomplishing this process without the risk of “slippage” in

Who is a Hedger?

the transaction is the use of an exchange of futures for physical (EFP). An EFP is a private agreement between two parties to trade a futures position for the basket of underlying actuals. An exchange of futures for physicals can be used to open a futures position, close a futures position, or switch a futures position for the underlying asset. When two parties have agreed to an EFP they must register the transaction with the relevant exchange. Exchange of futures for physical can also be referred to as an exchange of futures for product, or an exchange of futures for cash (as in cash commodity).

The question may arise as to why not just let these transactions go through the market...? The answer is, simply, for the sake of efficiency. Large transactions can impact a market as they are executed. At times large trades may sometimes be broken up into a series of smaller transactions over time to reduce the impact of slippage. By executing the order by an EFP and outside the market pricing mechanism allows large, offsetting transactions to take place at a determined price. An EFP may also be used when the market depth is not sufficient to absorb a large transaction. This is to the advantage of both the buyer and the seller.

BASICS OF HEDGING AND BASIS

Hedging is based on the principle that physical cash prices and futures market prices are correlated and will tend to move up and down together. This movement may not be identical, but the correlation is close enough that it is possible to reduce the overall price risk by taking an opposite position in the futures market as to that held in the physical cash market.

The gain or loss in one market will be offset by an equal, but opposite position in the other. In this manner, the hedger is able to increase the certainty of outcome for a desired price outcome for a physical cash market transaction that may not actually occur until sometime in the future. The following are some simple illustrations of hedging:

Business A, who wants protection itself against the possibility of being hurt by a rise in prices before purchasing the actual goods in the cash market, will buy a futures contract. Thus, Business A takes what is called a long position in the futures market to counter the risk of what is called short position in the cash market (meaning the business does not yet have the physical goods needed at some time in the future).

Business B, who wants protection against the possibility of being hurt by a drop in prices, will sell a futures contract. Thus, Business B takes a short position in the futures market to counter the risk of a long position (meaning

Business B already owns or is perhaps growing the commodity which will be sold later) in the cash market.

In each of these cases, the business has reduced or largely eliminated risk because the cash and futures markets are usually influenced by the same basic factors.

In the first example, Business A who bought a corn futures contract at \$6.50 when the cash price for delivery in the same month was \$6.60 might find later that cash prices had risen to \$6.85, and the grain would cost 25 cents more than expected. But the future contract price might well have risen from the original \$6.50 to \$6.75, so the business's 25 cent profit on the offsetting sale of the future contract would offset the 25 cent loss in the cash market, and the price change risk would have been fully covered.

In the second example, Business B, who was hurt by a 25 cent drop in the cash market, could offset it by an equal profit if the futures market declined 25 cents after the producer had sold a futures contract.

The simplified hedging examples above are only a first step for effective grain market risk management. Commercial producers and consumers are also dealing with the quality, location, and time value of grain that creates the concept called "basis."

BASIS: THE LINK BETWEEN CASH AND FUTURES PRICES

Basics of Hedging and Basis

As a buyer or seller of grain you know the physical cash price for grain in your local area will differ from the price quoted in the reference futures market. Simply explained:

$$\text{Basis} = \text{Cash} - \text{Futures}$$

$$\mathbf{\$0.10 = \$6.60 - \$6.50}$$

$$\mathbf{\text{Basis} = 10 \text{ Cents Over December Futures}}$$

Basis simply is the difference at any given point in time between the cash price for a commodity delivered at a particular place and time and the referenced futures price for any given contract month of the same commodity.

For anyone buying and selling grain there are three factors that ultimately determine the final price of the commodity: 1.) the futures price, 2.) the local basis value, and 3.) the applicable foreign exchange rate.

In simplest terms, the futures price is the current market assessment of world

fundamentals of supply and demand, and a benchmark value from which to value a commodity.

Basis is the relationship between the local physical cash price and the underlying futures price. The price difference between the cash and futures may be small or it may be large, and the two prices will not always vary by exactly the same amount. This price difference represents variables as type, class, quality, location, transportation and freight cost, storage and handling, as well as local supply and demand factors.

Foreign exchange, if applicable, take into account the relationship between differing underlying currencies that may be involved in a transaction.

For example, if a merchant finds on July 1st that the merchant can buy corn in the cash market for \$6.60 per bushel for November delivery while the December futures contract is selling at the same time for \$6.50, the basis that July day would be plus 10 cents, or "10 over the December corn futures" for November delivery.

When the cash price is below the futures price, the basis is said to be negative (or "under"); when above the futures price, the basis is said to be positive (or "over"). Again, basis is simply quoting the relationship of the local cash price to the futures price.

Basics of Hedging and Basis

For example; when the basis changes from 40 cents under (a cash price 40 cents less than the futures price) to a basis of 30 cents under (a cash price 30 cents less than the futures price) indicates a strengthening basis, even though the basis is still negative.

On the other hand, a basis change from 30 cents over (a cash price 30 cents more than the futures price) to a basis of 25 cents over (a cash price 25 cents more than the futures price) indicates a weakening basis, even though *the basis is still positive.

(Within the grain industry a basis of 15 cents over or 15 cents under a given futures contract is usually referred to as "15 over" or "15 under." The word "cents" is dropped. If the basis is 0 cents or equal to the given futures contract it is referred to as "option price".)

Like the futures price, the basis is determined by the market. When evaluating the current basis value, we consider its potential to "strengthen" or "weaken"; i.e., the more positive (or less negative) the basis becomes, the "stronger" it becomes. In contrast, the more negative (or less positive) the basis becomes, the "weaker" it is.



Source: CME Group - Self-Study Guide to Hedging with Grain and Oilseed Futures and Options 2019¹

Basics of Hedging and Basis

Basis is important to the hedger because the hedger is trying to establish or maintain the cash price by using the futures price. Therefore, the predictability of the difference between the cash and futures markets, the basis, is very important to the hedger.

The basis is also important to the commodity speculator trying to profit by anticipating movements in futures prices which must eventually bear resemblance to cash prices. By knowing the basis, the speculator can relate derivative or futures prices to the underlying physical cash prices.

The price discovery aspect of a derivative market – acting as a clearing place for all market information and providing a real market value for the goods traded – relies on two key elements of the cash and basis equations.

The first element is the need for the cash price at a designated delivery point for a futures market and the price of an expiring futures contract to be reasonably close, differing approximately by the amount of the delivery costs associated with transferring ownership.

The second element is the need for a close correlation between market prices at designated futures market delivery points and prices at other places within the marketplace. Without this correlation, it would be difficult to effectively hedge commodities sold at non-designated delivery points.

BASIS – THE WHAT, WHERE AND WHEN OF PRICE

Basis represents the “physical” attributes of cash grain; imply put the

physical attributes of **What, Where** and **When**. These individual factors that define “Basis” account for the difference between the physical cash price and the futures price of grain at any given point in time.

- **WHAT** – the “*Typical*” or “Type or Class” and/or “Quality” dimension of Price.

Type and Class factors, relate to the relative value of a commodity when comparing it to other types or class which may be suited for a substitutable end use.

In the matter of “type”; corn vs grain sorghum, which may both be used as a feed stuff or in the production of ethanol.

In the matter of “class”; Hard Red Winter (HRW) Wheat vs Soft Red Winter (SRW) Wheat, which may both be used as in milling flour, but with HRW Wheat 12.5% protein, which is preferred for bread, while SRW Wheat 10.0% protein is which is preferred for cakes.

Quality factors, also include differences between the quality grade, bulk density, moisture, foreign material, protein content, etc., of the physical grain and the quality levels specified in a futures contract.

- **WHERE** – the “*Spatial*” or “Location” dimension of Price.

Spatial factors relate to where the commodity is physically located, or the point from which it may be shipped or intended for delivery.

The value of the commodity is influenced by costs of transporting the commodity from its existing location or designated pricing point in the contract or relativity to a futures market.

Basics of Hedging and Basis

- **WHEN** – the “*Temporal*” or “Time” dimension of Price.

Time factors can include the cost of storing grain from one point in time to another.

As grain production is seasonal, with local harvest supplies occurring in a short four-to-six-week period, while consumption by the end users usually occurring 52 weeks throughout the marketing year. As such, inventories accumulated at harvest must be stored and carried forward.

In addition, inter-seasonal differences in the values of grain are noted. Seasonal differences between “old crop” and “new crop” values are driven by seasonal changes in local and macro supply and demand relationships.

An understanding and analysis of the dynamics of “Basis” can be used to provide insight into the correlation, as well as differences, between the physical cash prices and related futures markets.

Because the production and consumption of grain is characterized by seasonal production and continuous use, the market must perform its economic function of storing grain, limiting production, and increasing demand in times of surplus, while encouraging movement, increasing production and rationing demand in times of shortage.

While organized futures markets exercise these economic functions within the confines of standardized contracts and the underlying delivery markets applicable to the contract, it is the function of local basis values to exercise these functions in other more removed markets relative to an underlying futures price.

Basis is the key to understanding cash commodities trading and the key element to understanding the link between the actual physical commodities and the futures, options and derivative markets that seek to express the price of the underlying commodities.

*Basics of
Hedging
and Basis*

HEDGING EXAMPLES

EXAMPLE 1: A PRODUCER'S SHORT HEDGE

A producer plans to sell 50,000 bushels (approximately 1,270 mts) of corn at harvest time in October. On July 1st, the cash price is \$6.00 per bushel and the December futures are \$6.25/bu.

(Note - this is a basis of 25 cents under the December futures contract)

Strategic Considerations –

- Flat price opinion is “bearish” (likely to move lower);
- Basis is relatively inexpensive or “cheap”;
- The producer may not want to commit to a physical sale of corn due to perceived production risks.

The producer hedges his cash selling price by selling 100 December future contracts, thereby establishing a short hedge.

When harvest arrives, the producer finds the cash price has declined to \$5.50/bu and the December futures price has dropped to \$5.75/bu.

(Note - the basis of 25 cents under the December futures contract)

The producer is ready to initiate two final steps of the hedge:

- The producer will sell the producer's physical grain into the cash market at his local cash price; and,
- The producer will close out the producer's hedge by purchasing (buying back) 100 futures contracts to offset the producer's earlier sale of futures.

The net result is the producer has secured the net of \$6.00/bu that was available in July but has not made either a profit or a loss on the hedging operation itself.

Here is how it worked: The producer lost 50 cents per bushel in the cash market when the producer made the producer's actual sale at \$5.50/bu instead of the \$6.00/bu that was available to the producer for October or November delivery back in July. However, that loss was offset by the profit of 50 cents per bushel on the producer's futures transaction as the producer closed out the producer's \$6.25/bu futures sale with an offsetting \$5.75/bu purchase.

The example is summarized in this chart:

Time	Cash	Futures
July 1	Cash price \$6.00/bu for Oct. or Nov.	\$6.25/bu farmer sells 50,000 bushels Dec corn
Time	Delivery	Futures Contracts
Harvest (Oct-Nov)	Cash price \$5.50/bu	\$5.75/bu farmer buys 50,000 bushels Dec corn
	Loss: -\$.50/bu	Gain: + \$.50/bu

The result of the above “short hedge” example can also be evaluated by another method: an analysis of changes in the basis.

The basis on July 1st was -25 cents, meaning the cash price of \$6.00/bu was 25 cents below the \$6.25/bu future, which is referred to as 25 under December. When the hedge is completed at harvest, the basis is still 25 under because the cash price of \$5.50/bu is 25 cents below the future price of \$5.75/bu. Since there is no net change in the basis, there is no gain or loss on the hedge.

This process is not completely risk-free. If the basis in the example had changed while the hedge was in effect, there would have been a net gain or loss on the hedge transaction.

In the above example, the producer used a short hedge by selling futures.

Any short hedge will show a trading profit if the basis strengthens. If the basis moves from 25 under to only 15 under, such a change means that it has strengthened by 10 cents and the hedger reaps a 10 cent profit. Similarly, the basis could weaken and cause a loss on the hedge transaction.

LONG HEDEGER AND BASIS

BUY FUTURES / LEAVE CASH “UNPRICED” = SHORT THE BASIS

Hedging with futures can offer the opportunity to establish an approximate price months in advance of the actual sale or purchase and protect the hedger from unfavorable price changes. This is possible because cash and futures prices tend to move in the same direction and by similar amounts, so losses in one market can be offset with gains in the other.

It must be kept in mind that; “**hedging manages risk by increasing the certainty of outcome.**” Although the hedger is unable to benefit from favorable price changes, they are reducing price risk and protected from unfavorable market moves.

EXAMPLE 2: AN IMPORTER LONG HEDGE

Strategic Considerations –

- Flat price opinion is “bullish” (likely to move higher);
- Basis is relatively expensive.

	Cash Market	Futures Market	Basis
March		Buy July Corn Futures at \$6.50/bu	
June	Purchase physical cash corn at \$9.15/bu for June Shipment	Sell July Corn Futures at \$7.50/bu	The resulting basis value is +\$1.65N
Net	\$9.15/bu - 1.00/bu \$8.15/bu	\$7.50/bu - 6.50 \$1.00/bu	+\$1.65N
Net	\$8.15/bu	\$6.50	+\$1.65N

For example, suppose it is March and an importer wants to price corn for June shipment as they believe that prices between March and June are likely

to move higher. At this same point in time, CME July corn futures price are trading at \$6.50 per bushel. However, the importer wants to leave the basis “unpriced” is not concerned about physical “security of supply” and believes the basis will weaken; (and therefore waits to make a cash purchase). To manage the expected price risk, they buy CME July corn futures at \$6.50 per bushel. In doing so the importer has established a futures price for the June corn, but has left the basis component of the final cash value “unpriced”

At some point before July the importer makes the cash purchase at \$9.15/bu. Simultaneously, they sell CME July corn futures at \$7.50 per bushel. In doing so the importer has established a cash basis of +\$1.65N (July futures price).

Procurement Results – Initially, CME July corn was purchased at \$6.50/bu. Later, physical cash corn was purchased at \$9.15/bu, while simultaneously CME July corn was sold at \$7.50/bu, lifting the initial “long hedge” and establishing a basis of +\$1.65N. This results in the net costs of corn of \$8.15/bu.

Accounting Results – In the accounting ledgers; the cost of corn inventory will be at a cost \$9.15/bu (debit) as per the physical cash purchase for corn, while the futures account will show a \$1.00/bu gain (credit) from the sale and subsequent purchase of CME July corn futures. This results in the net costs of corn of \$8.15/bu.

How might a change in basis values affect the performance of a long hedge?

Basis is important to the hedger because it affects the final outcome of a hedge. Long hedgers benefit from a weakening basis, just the opposite of a short hedger.

Basis risk is considerably less than price risk, but basis behavior can have a significant impact on the performance of a hedge. A stronger-than-expected basis will benefit a short hedger, while a weaker-than-expected basis works to the advantage of a long hedger. It is important to consider when hedging is basis history and market expectations.

As a long hedger, if you like the current futures price and expect the basis to weaken, you should consider hedging a portion of your commodity purchase. On the other hand, if you expect the basis to strengthen and like today’s prices, you might consider buying or pricing your commodity now.

In the above example, if the basis values in March for June shipment of CIF corn was weaker, say at +\$150N than the final basis value established in June of +\$1.65N, it would have been advantageous to purchase the cash grain in

March. Had the basis been established in March, the net cash price would have been (\$6.50 futures + \$1.50 basis) \$8.00/bu.

Similarly, if the basis values for June shipment of CIF corn had strengthened to higher levels, say at +\$180N, the net cash price would have been (\$6.50 futures + \$1.80 basis) \$8.30/bu.

It should be kept in mind that basis values are:

1. less volatile than futures and flat price,
2. are more predictable,
3. make up a smaller component portion of the cash price than futures.

EXAMPLE 3: AN END USER LONG HEDGE, SHORT THE BASIS

Strategic Considerations –

- Flat price opinion is “bullish” (likely to move higher), or physical sales of the end product (feed) are being committed to;
- Basis is relatively expensive.

In March, an end user of corn plans to lock in a price for a forward sale of 50,000 bushels (approximately 1,270 mts) chicken feed. In order to protect against a future price increase on corn the end will need later in July and August.

On March 1st, the cash price corn delivered to his mill in July is \$8.00 per bushel and the July futures are \$6.25/bu.
(Note - this is a basis of \$1.75 over the December futures contract)

The end user hedges his cash price by buying 100 July futures contracts, thereby establishing a long hedge.

In June, the end user finds the cash price has increased \$9.25/bu and the July futures price has rallied to \$7.75/bu.
(Note - the basis of \$1.50 over the December futures contract)

The end user is now ready to purchase physical corn and to initiate two final steps of the hedge:

- The end user will buy physical grain into the physical cash market at his local cash price of \$9.25/bu; and,
- The end user will simultaneously close out the producer's hedge by purchasing (buying back) 100 futures contracts at \$7.75/bu to offset the producer's earlier sale of futures.

The net result is the end user has secured physical cash grain at the net value of \$7.75/bu for delivery in July.

Here is how it worked: The end user lost 1.25 cents per bushel in the cash market when the end user made the actual purchase at \$9.25/bu in June, instead of the \$8.00 that was available to the end user back in March. However, that loss was offset by the profit of \$1.50 cents per bushel on the end user's futures transaction as the end user closed out the \$6.25 futures purchase with an offsetting \$7.75 purchase.

The example is summarized in this chart:

	Cash Market	Futures Market	Basis
March	Cash corn at \$8.00/bu for June Shipment	Buy July Corn Futures at \$6.25/bu	+\$1.75N <i>(implied)</i>
June	Purchase physical cash corn at \$9.25/bu for June Shipment	Sell July Corn Futures at \$7.75/bu	The resulting basis value is +\$1.50N
Net	\$9.25/bu - 1.50/bu \$7.75/bu	\$7.75/bu - <u>\$6.25</u> \$1.50/bu	+\$0.25N <i>(implied savings)</i>
Net	\$7.75/bu	\$6.25	+\$1.50N

The result of the above “long hedge” example can also be evaluated by another method: an analysis of changes in the basis.

The basis on March 1st was \$1.75 over, meaning the cash price of \$8.00/bu was 175 cents above the \$6.25/bu futures which is referred to as \$1.75 over July. When the hedge is completed at the time of securing the physical cash grain in June, the basis had declined to \$1.50 over as the cash price of \$9.25/bu was 150 cents over the future price of \$7.75/bu.

Since there was a decline in the basis value of 25 cents per bushel, there was a resulting basis gain on the hedge.

This process is not completely risk-free. If the basis in the example had increased while the hedge was in effect, there would have been a net basis loss on the hedge transaction.

In the above example, the end user used a long hedge by buying futures. The long hedge strategy showed an additional trading profit as the basis weakened from 175 over, to 150 overs.

However, if the basis moved higher, from 175 over to 185 over, such a change means that it has strengthened by 10 cents, and the hedger would realize a 10 cent basis loss.

Procurement Results – Initially, CME July corn was purchased at \$6.25/bu. Later, physical cash corn was purchased at \$9.25/bu, while simultaneously CME July corn was sold at \$7.75/bu, lifting the initial “long hedge” and establishing a basis of +\$1.50N. This results in the net costs of corn of \$7.75/bu.

Accounting Results – In the accounting ledgers; the cost of corn inventory will be at a cost \$9.25/bu (debit) as per the physical cash purchase for corn, while the futures account will show a \$1.50/bu gain (credit) from the sale and subsequent purchase of CME July corn futures. This results in the net costs of corn of \$7.75/bu.

EXAMPLE 4: AN END USER IMPORTER SHORT HEDGE, LONG THE BASIS

BUY CASH / SELL FUTURES = LONG THE BASIS

Strategic Considerations –

- Flat price opinion is “bearish” (likely to move lower), or there are no commitment to physical sales of the end product.
- Basis is relatively cheap

For example, suppose it is March and an importer purchases corn for June shipment CIF the desired port. At this same point in time, CME July corn futures price are trading at \$7.50 per bushel. While the importer want to establish the physical “security of supply” (and therefore makes the cash purchase at \$9.15/bu) they believe that prices between March and June are likely to move lower. To “unprice” the physical purchase of cash grain, they sell CME July corn futures at \$6.50 per bushel. In doing so the importer has established a cash basis of +\$1.65N (July futures price).

	Cash Market	Futures Market	Basis
March	Purchase physical cash corn at \$9.15/bu for June Shipment	Sell July Corn Futures at \$7.50/bu	The resulting basis value is +\$1.65N
June		Buy July Corn Futures at	

		\$6.50/bu	
Results	Cost of physical cash corn = \$9.15/bu	Net gain / loss from futures position = \$1.00/bu	Basis value = +\$1.65N
Net	\$9.15/bu - 1.00/bu \$8.15/bu	\$6.50/bu	+\$1.65N
Net	\$8.15/bu	\$6.50	+\$1.65N

At some point before July the importer wishes to establish the final net cost of the physical cash corn purchase. The market has moved favorably and CME July corn futures are purchased at \$6.50 per bushel.

Procurement Results – Physical cash corn was purchased at \$9.15/bu, while simultaneously CME July corn was sold at \$7.50/bu, “unpricing” the corn and establishing a basis of +\$1.65N. Later, CME July corn was purchased at \$6.50/bu, pricing the cash corn that had an established basis of +\$1.65N. This results in the net costs of corn of \$8.15/bu.

Accounting Results – In the accounting ledgers; the cost of corn inventory will be at a cost \$9.15/bu (debit) as per the physical cash purchase for corn, while the futures account will show a \$1.00/bu gain (credit) from the sale and subsequent purchase of CME July corn futures. This results in the net costs of corn of \$8.15/bu.

How might a change in basis values affect the performance of a short hedge?

Basis is important to the hedger because it affects the final outcome of a hedge. Short hedgers benefit from a strengthening basis, just the opposite of a long hedger.

In the above example, if the basis values for June shipment of CIF corn had strengthened to weaken to lower levels, say at +\$150N, the net cash price would have been (\$6.50 futures + \$1.50 basis) \$8.00/bu.

EXAMPLE 5: A FOREIGN EXCHANGE HEDGE

Foreign exchange risk can be as important as the underlying commodity hedge. An importer who has foreign exchange risks may also use the exchange traded futures, the OTC swap market, or foreign exchange contracts with a merchant bank to reduce foreign exchange risks. The related transactions, accounting and reporting follows much the same as the

commodity hedge.

For example, a Japanese grain firm plans to buy one billion Japanese yen worth of grain from the United States in three months, but the firm anticipates that the U.S. dollar will strengthen during the coming three months. The yen is currently selling for .9500 and the three-month futures are priced at .9501. The Japanese grain firm properly hedges against a possible strengthening of the dollar by selling three-month futures and then offsets (closes the hedge) when the yen cash or spot market is at .9360 and the yen futures are selling at .9350.

What is the resulting profit or loss? (A futures quote in yen assumes an extra two zeroes: a quote of .9355 really means .009355 yen per dollar.)

	Cash(spot)	Futures
Firm owns Yen	.9500	.9501
Firm sells Yen	.9360	.9350

The Japanese grain firm loses .0140 on the cash transaction but gains .0151 on the futures. The net gain or basis difference results in a .000011 profit or \$11,000. The use of futures to lock in currency risk avoided a potentially volatile move of .0140 or \$140,000.

HISTORICAL BASIS

By hedging with futures, buyers and sellers are eliminating a large portion of overall price risk, and more specifically the futures component of price risk. However, they may be left assuming basis risk. While basis risk is relatively less risky than either cash market prices or futures market prices. It still has a component of residual price risk.

As we have seen, exposure to basis risk is connected to the physical purchase or sale of grain. As such, buyers and sellers of commodities can be proactive managing their basis risk. A good place to begin is an evaluation of the local historical basis.

Importance of Historical Basis

Since agricultural basis tends to follow historical and seasonal patterns, it makes sense to keep good historical basis records of your local markets. A good place to start is to obtain a local history of “flat” price. With a little research, a price history can be constructed for past years. From here it is easy to set the data up in a spreadsheet to do the necessary calculation to determine the basis. From this data set it is an easy process to obtain corresponding historical price history for a related futures contract; (including a historical foreign exchange rate, if applicable).

Exporters, Importers, end users and other merchandisers that purchase ingredients from distant suppliers may find it useful to track and calculate the basis from liquid and transparent secondary markets closer to the source of the supply.

Bushels/Tonne		39.35714						
Date	Cash Price / mt	Fx	Cash in US\$/bu	Futures	Month	Basis		Market Factors
05-Jan-22	AUD 400.00	0.7490	\$7.61	\$7.00	H (March)	0.61	H	
12-Jan-22	AUD 406.00	0.7510	\$7.75	\$7.20	H (March)	0.55	H	Fund Buying
19-Jan-22	AUD 395.00	0.7495	\$7.52	\$6.90	H (March)	0.62	H	Bearish USDA Report
26-Jan-22	AUD 405.00	0.7500	\$7.72	\$7.15	H (March)	0.57	H	Technical Buying
02-Feb-22	AUD 409.00	0.7520	\$7.81	\$7.25	H (March)	0.56	H	
09-Feb-22	AUD 415.00	0.7515	\$7.92	\$7.40	H (March)	0.52	H	Export Sales
16-Feb-22	AUD 412.00	0.7520	\$7.87	\$7.30	H (March)	0.57	H	Farmer Selling
23-Feb-22	AUD 418.00	0.7515	\$7.98	\$7.45	H (March)	0.53	H	
02-Mar-22	AUD 420.00	0.7525	\$8.03	\$7.50	K(May)	0.53	K	Dry U.S. Forecast
-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	

**Importance
of Historical
Basis**

The table above is a sample of a basis record. Although there are numerous ways to set this up, the content should include: date, cash market price, foreign exchange rate, derived cash price in US Dollars per bushel, futures market price (specify contract month), calculated basis and underlying futures month, and market factors for that date. Once in a spreadsheet, this information can be easily put into a chart format and analyzed further.

The most common type of basis record will track the current cash market price to the nearby futures contract month price. It is a good practice to switch the nearby contract month to the next futures contract month prior to entering the delivery month.

It is common to track basis either daily or weekly. If you choose to keep track of basis on a weekly schedule, be consistent with the day of the week you follow. If weekly, avoid tracking prices and basis on the first or last day of the week, i.e. Mondays or Fridays.

Formatting basis information from multiple years on a chart will identify seasonal and historical patterns. In addition to determining a seasonal period average, data will also help to determine the historical basis range, along with historical highs and lows for any given time period. Notes made on the influencing market factors will help to explain these highs and lows.

Basis tables can help to compare the current basis level with historic values. They can also assist in forecasting expected basis levels in the future, assisting in developing merchandising strategies for purchases and sales. It can help determine which suppliers are historically more competitive, as well as if a supplier’s current offer is historically stronger or weaker than expected.

This historical perspective, used in conjunction with an understanding of Delivery Value Equivalents (DVE's), and current fundamental market information will greatly assist in developing more effective merchandising strategies.

Merchandisers and basis traders make a profit by actively managing their basis positions. They keep a watchful eye out for unusual basis patterns and values that present opportunities to improve their margins or avoid losses, while maintaining their market bids and offers at competitive levels.

HEDGING AND THE FORWARD MARKET STRUCTURE

The shape of the forward curve is important to both commodity hedgers and speculators. Both care about whether commodity markets are in a “**carry**” or an “**inverse**”. As such, it needs to be kept in mind that certain market environments are more conducive to hedging strategies than others.

Hedging strategies are best incorporated into merchandising decisions when “time” is available. This is when the forward price structure is showing a “carry”; i.e., the forward or future value of a commodity is higher than its spot or nearby price. This reflects, in part, the costs associated with physically holding the underlying assets into sometime in the future. In this type of an environment, time is working for the merchandiser allowing a window of opportunity to improve a position in the market.

In markets with a “carry” structure, hedging strategies can work very well and offer significant merchandising opportunities and improved returns.

However, in an “inverted” market environment, where prices in the spot or nearby month are at higher than values in the more distant months; time is working against the merchandiser and does not allow a window of opportunity to improve a position in the market. In these types of environments hedging opportunities become increasingly limited as merchandising decisions move more to a “back-to-back” approach.

TRADING OTHER SPREAD RELATIONSHIPS

A “**spread**” trade is a strategic approach a trader can use to seek out profit. These strategies can be executed through the use of derivatives or futures, as well as in liquid physical cash markets, or a combination of both.

The goal of “**spread**” strategy is to profit from the change in the price relationship between two differing positions. A trader or merchandiser may seek to execute a spread in the market when they feel there's a potential to gain from a beneficial change in a price relationship. These relationships can be defined as:

- **What** - “kind or type or quality” (Typical),
- **When** - “time” (Temporal)
- **Where** - “location” (Spatial)

A significant benefit of active “spread” trading in a market assures that price relationships across commodity type, quality, time and location are kept in balance.

A spread requires simultaneous establishment of two positions. The two positions are traded simultaneously as a unit, with each side considered to be a leg of the unit trade.

Being aware of these price changes and their causes is a key element to risk management in commodity markets. These same strategic considerations are contemplated when making merchandising decision for physical cash grain, as well as when determining hedge placements of futures and derivatives. In fact, the majority of futures and derivative transactions traded within CME Group markets are a result of spread relationships.

INTER-COMMODITY SPREADS:

WHAT “KIND, TYPE, CLASS OR QUALITY” OF COMMODITY (TYPICAL)

An “inter-commodity” spread is trade that attempts to take advantage of the value differential between two or more related commodities, such as crude oil vs heating oil, or corn vs soybeans. To be successful requires a knowledge of the underlying dynamics between the various commodities or two different classes or quality of the same commodity. They will typically have a definable relationship, i.e. they are economic substitutes, (corn vs wheat) or compete for the same production capacity (corn vs soybeans).

An inter-commodity spread is a strategy established by simultaneously entering a long and short position between two different, but related commodities with the same contract month.

For example, a trader who is more bullish on the corn market than the soybean market would buy corn futures and simultaneously sell soybean futures in corresponding months. The trader profits if the price of corn appreciates over the price of soybean. A strategy such as this is quite

common as corn and soybeans compete for planted acres each spring.

These price relationships are also important in physical cash markets as substitutable commodities compete for demand, such as into the feed ration and feed ingredients. Grain sorghum is often priced below corn values. If the corn-sorghum price gap widens because of an increase in corn prices or a decline in sorghum prices, a trader will anticipate that feeders may increase their usage of the relatively lower valued grain sorghum. This is likely to decrease the usage of the relatively expensive corn as grain sorghum prices in greater demand.

Inter-Commodity Spreads

With this knowledge, a trader can go long on wheat and short on corn when the spread is widening. Alternatively, the trader may go long on corn and short on wheat when the spread is narrowing.

If a trader can correctly predict changing relationship between various commodities, i.e., whether the value relationship will widen or narrow, the trader will realize a profit.

In this instance, the trader is not concerned with the actual price of each commodity. They are interested in the direction and difference in the price.

For the merchandiser and hedger, understanding these relationships can be an import strategic component of hedge placement.

INTRA-COMMODITY OR CALENDAR SPREADS:

WHEN "TIME" (TEMPORAL)

A calendar spread is a strategy established by simultaneously entering into a long and short position on the same underlying commodity, but with different delivery periods.

A "**Bull Spread**" is when one buys the nearby contract and sells the deferred. For instance, a trader could buy a March wheat futures contract and sell a September wheat futures contract.

Intra-Commodity Spreads

A "**Bear Spread**" is when one sells the nearby contract and buys the deferred. For instance, a trader could sell a March wheat futures contract and buy a September wheat futures contract.

Calendar Spreads are used throughout the agribusiness community for a number of reasons, but primarily to manage price risks over time.

INTER-MARKET SPREADS:

WHERE - "LOCATION" (SPATIAL)

Inter- Market Spreads

An Inter-Market spread is a strategy established by simultaneously entering into a long and short position between the same or similar commodities in two differing locations, and generally involve two differing exchanges.

This based on the fact that some commodities are traded on more than one market with differing underlying locations. Prices for a commodity between two market locations will vary due changes in local supply and demand relationships, as well as the differences in transportation costs.

A trader will make an inter-market spread when the trader believes that the price differences between two markets when a change in the relationship is anticipated or looks abnormal. For example, if the price of corn on the U.S. Chicago CBOT is underpriced when compared to the price of corn on the Chinese Dalian DCE, when considering the logistical and quality differences, a trader will buy the CBOT corn and sell DCE corn. The trader will profit if the market moves to the anticipated price relationship.

PROCESSING SPREADS

This type of spread relationship takes into account an implied processing margin in a particular market sector.

SOYBEANS - An common example of this is the soybean crushing margin or “**crush**”. Soybean crushers process soybeans into meal and oil products. The value of these three components are reflected in their relative values in CBOT futures contracts.

A trader may establish a “**Board Crush**” by buying a given contract month of soybeans and simultaneous selling a corresponding volume of soybean meal and soybean oil in the same month.

A “**Reverse Board Crush**” can also be establish by selling a given contract month of soybeans and simultaneous buying a corresponding volume of soybean meal and soybean oil in the same month.

The soybean crush spread is often used by soybean crushers to hedge the physical purchase price of corn and the physical sales prices of soybean meal and soybean oil. It also offers many opportunities for speculators, as the spread relationship between soybeans, soybean meal and soybean oil vary over time.

CORN - A similar approach can be taken by the ethanol industry. The term “**Corn Crush or Grind**” refers both to a physical process as well as a value

Processing Spreads

calculation. The physical corn grind is the process of converting corn into the byproducts of ethanol and distillers' dried grains (DDGs).

The corn grind spread is a dollar value quoted as the difference between the combined sales values of the products (ethanol and DDGs) versus the cost of corn. This value is traded in the cash or futures market based on expectations of future price movement of corn versus ethanol and DDGs. The relationship between prices in the cash market is commonly referred to as the Gross Production Margin (GPM). The value traded in the futures market is an inter-commodity spread transaction in which corn futures are bought (or sold) and ethanol and DDGs are sold (or bought).

The corn grind spread is often used by ethanol producers to hedge the purchase price of corn and the sales prices of ethanol and DDGs. It also offers many opportunities for speculators, as the spread relationship between the corn, ethanol, and DDGS varies over time.

DIRECTIONAL TRADING

Generally, trading directional price movements is viewed as crossing into the realm of speculation. Trying to predict directional price movement are more difficult and requires a differing approach to market analysis. Directional trading also carries a significantly greater risk profile. These issues need to be considered when developing trading and merchandising strategies.

It is important to understand that when trading spread relationships, direction price movements are of minimal concern, as the offsetting bought vs sold positions should offset this risk.

FUTURES MARGINS ON SPREAD TRADING

A futures spread effectively provides a hedge against systematic risk, allowing exchanges to reduce the margins for spread trading. If an external market event occurs, such as a surprise interest rate movement or terrorist attack, both the long and short positions of a spread, in theory, will offset each other.

Due to a lower risk profile and volatility of spread relationships, margining requirements for spread trading on established futures exchanges are generally lower than margining requirements for hedging or speculative accounts.

For example for comparison:

- Speculative: Initial Margin is \$1,800 Maintenance \$1,600 +/-

- Hedge: Initial Margin is \$1,600 Maintenance \$1,600 +/-
- Spread: Initial Margin is \$ 800 Maintenance \$ 500 +/-

SUMMARY

Price Risk is an intrinsic, yet a precarious element of commodity markets. Regardless of what kind of market participant one aims to be, having a basic knowledge and understanding of hedging strategies will lead to greater awareness of market dynamics and how various participants work to protect themselves against adverse price moves.

Whether or not it is decided to commercially expand the more intricate use of derivatives, futures or options; learning about how hedging works will help advance greater understanding of the markets, and related price signals, which will always help securing improved success in procurement and purchasing activities.

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Philip Shull
Senior Diplomat (Ret)
U.S. Department of Agriculture

ⁱ CME Group "Self-Study Guide to Hedging with Grain and Oilseed Futures and Options ". (2019)
Chapter 2 page 11. https://www.cmegroup.com/trading/agricultural/files/pm255_self-study-guide_hedging_en_2019.pdf Sighted 30th March 2022

How to Become “Import Ready”

Whether to become an importer is one of the most consequential decisions a company can make. This chapter lays out critical characteristics and capabilities of most successful grain traders and makes recommendations that will help make your company “import ready.”

The following is intended to also assist you in a strategic manner, and to take a company’s business activities to the next level of success. A key step will be to create a written strategic plan addressing issues such as growth, expertise, growth, and performance.

While undertaking these efforts does not guarantee import success, experience has shown that their absence greatly increases the chance of failure.

CHARATERISTICS OF A SUCCESSFUL IMPORTER

Companies that regularly procure, purchase or import agricultural commodities from international markets possess certain qualities. An important part of this are the drafting of strategic plans and policies that coordinate and govern their business activities.

The following is a short list of some of the qualities of an “Import-Ready” company:

- A written strategic plan for your company. States why direct importing is the best way to achieve your goals
- Identify the new knowledge, skills, and abilities needed for importing, the cost of acquiring and maintaining those skills, and commitment from ownership/senior management to make those investments.

- ✓ Understand the added demands international business activities can place on key resources, including; procurement and purchasing, contracting, accounting, banking, finance, risk management, and strategic decision making across all levels of business activities.
- ✓ Realistic expectations regarding return on investment from international and importing activities.
- ✓ Flexibility to adjust procurement inputs and service requirements and prices and markets change.
- ✓ A willingness to work with not only internationally based commercial companies and suppliers, but with government export promotion agencies.

ASSESSING YOUR COMPANY'S IMPORTING READINESS

Answering the following questions about importing and international procurement will help to clarify the firm's commercial objectives and assist in determining the company's export readiness:

- ✓ *What does your company want to achieve or gain from importing agricultural products?*
- ✓ *Is importing consistent with the company's strategic goals and objective?*
- ✓ *At what point in the supply chain is it most advantageous for the company to engage the market in its procurement and purchasing activities; i.e. FOB, C&F, CIF, etc...?*
- ✓ *What demands will procuring and purchasing agricultural inputs from international markets place on your company's key resources, management and personnel, production capacity, and financing; and, how will these demands be met?*
- ✓ *Are the expected additional benefits worth the additional costs, or would company resources be better deployed elsewhere; i.e., what are the opportunity costs of becoming import ready?*

Establishing Long-Term Objectives: Engaging in international trade requires a company to set long term goals and develop broader market awareness. Building an informed, robust import strategy will

focus attention where it should be- on expanding your business over the long term and not to just on one-off short-term returns.

Increased Competitiveness: By expanding the company's procurement and purchasing activities into international markets, the company will can gain insights into market dynamics and differing ways of doing business.

The additional exposure to diverse business expertise and unique technology is likely improve the efficiency of the current business activities, as well as the quality of the final product being produced.

This process may also reveal a company's constraints and weaknesses that may also be addressed at this time.

- Opportunity to improve the return on investment. Your company should seek multiple benefits from importing, such as expanded customer networks, the ability to leverage seasonal and quality opportunities offered through multiple suppliers, as well as exposure to new ideas and technology.
- Increased capabilities with the opportunity to develop better products and services, acquire better leadership abilities, and collaborate better with suppliers and customers.

Organizational factors include:

- **Management Commitment** – Total backing from management is the number one determining factor of export success.
- **Incorporation into Company Structure** – It is import to understand that an Importing Plan is a subordinate component of a company's procurement and purchasing plan and strategy.

Similarly, both importing activities, as well and procurement and purchasing activities will be governed by an overarching company Risk Management Policy. A Risk Management Policy establishes:

- Operational Structure – The division of responsibilities between Front Office, Logistics, Back Office, Middle Office and Management.
- Activity Authorization – which delegates the scope of activities and authorizations individuals and delegated positions retain.

- Risk Management Policy considerations – Establishes Position and Risk Limits, within which a company’s business activities must be maintained.
- ✓ **Funding and Financial Support** – Management must be willing to allocate sufficient time, enough resources, and an adequate budget for export activities.
- ✓ **Human Resources** – Broadening staff expertise and commitment, as well as securing human resources with international experience or having staff learn about your target market’s language and culture will help you better engage the procurement of agricultural inputs from the international marketplace.
- ✓ **Goals and Objectives** – Clearly defining the company’s goals and objectives will help in consider whether the expected benefits of importing outweigh the costs.

DEVELOPING AN IMPORTING PLAN

The purpose of an Importing Plan is to:

- ✓ Accumulate facts, assess constraints, and review company goals and objectives.
- ✓ Determine how importing activities will be an integral component of procurement and purchasing.
- ✓ Create an action list that takes all noted elements into account.

A key benefit of this planning process will be to develop a broad consensus among company owners and key management of the company’s strategic goals, objectives, capabilities, and constraints.

In addition, because they will ultimately be responsible for its successful implementation and execution, the personnel involved in the procurement, purchasing, and importing logistical process should come to a consensus on all aspects of the plan. However, in the early stages of planning it may be just a few select people within the organization.

The plan should include specific objectives, sets forth timeline and schedule for implementation, and note key milestones along the way so that a degree of success can be measured.

Through this initial planning stage these 12 questions should be asked:

1. Which products or material input will be selected to be part of the Import, Procurement and Purchasing Plan?
2. Is an import or export license or other statutory requirements needed?
3. Which countries of origin should be targeted for sourcing?
4. What are supplier profiles, both locally and internationally in each country or origin; along with the marketing and supply chain channels that will be utilized by each supplier?
5. What special challenges or limitations that may arise for each supplier and/or country of origin: (for example, available volumes, product quality differences, competitive environment, cultural differences, domicile risks, and import and/or export controls).
6. What strategic business practices will be used to address these issues; i.e. domicile risk, terms of trade, point of transaction - FOB, C&F, CIF, etc...?
7. At what point in the supply chain is the company going to engage the market: (for example, FOB, C&F, CIF, etc...)?
8. How will the price of your product requirements be determined?
9. What specific operational steps must be taken to implement the plan and when will they be taken by...?
10. What will be the time frame for implementing each element or step of the plan?
11. What personnel and company resources will be required and dedicated to importing, procurement and purchasing: (for example, Front Office, Logistics, Back Office, Accounting and Administration, Management...)?

12. What will be the additional cost in time and money for each element?
13. What will be the additional expected revenue generated for each element?
14. What will be the expected net benefit to the company and how will results be evaluated and used to modify the business activities and plan going forward?

Objectives in the plan should be measurable and comparable with the actual results achieved on a periodic basis in order to measure progress along the established timeline and the success of differing strategies.

Keep in mind the plan is there to serve the company. Management should not hesitate to modify the plan and make it more specific as new information and experience are gained.

It is strongly suggested the initial effort in developing an importing plan should be kept simple. It need be only a few pages to start. The process of creating a simple plan will generate additional questions or define areas of additional information that may be needed. In addition, important market data and planning elements may not yet be readily available.

As the initial planning effort gradually generates more information and insight, the exercise itself, and the experience gained through the process, will provide strategic insight into the company's competitive position in the market. Over time the plan will evolve and become more and detailed as you gain experience. The importing plan and the strategic procurement and purchasing plan will become increasingly integrated.

BENEFITS OF AN IMPORTING PLAN

From the beginning, the import, procurement and purchasing plan should be drafted and viewed as a flexible management tool. Importing should be a component of your Procurement and Purchasing Strategy, and also comply with the company's Risk Management Policy.

The plan should not be a static document, but dynamic, evolving with the growth in the company's activities and the dynamics of the

underlying market. Without a coordinated plan, the business may overlook significant opportunities that can add to the bottom line and improve the internal rate of return.

A detailed more plan is recommended for companies that intend to import directly, meaning to purchase directly from a supplier domiciled in another country. If the company chooses to procure and purchase imported products indirectly, a much simpler plan is likely to be required.

In addition, reactive importing and procurement may too quickly see purchasing opportunities from international suppliers abandoned too soon, concluding that it's not worth the extra effort.

Doing the hard initial work and strategically deciding how to develop and grow the business increases the likelihood of using resources wisely, selecting the best alternative to remain competitive and to continue to grow the business.

There are a number of benefits that can be achieved from the development of a coordinated importing plan.

- A written plan will assist in identifying strengths and weaknesses more clearly, and that will need to be addresses to achieve success.
- A written plan communicates the company's agreed strategic goals and objectives, as well as the steps that are to be taken, throughout the company's key personnel. It also helps to assure that key details are less likely to be overlooked or forgotten.
- A written importing plan will communicate how these activities will complement the company's procurement and purchasing strategies.
- A written plan is likely to be required when seeking additional financing or investment needed to facilitate an active procurement and merchandising program.
- A written plan assigns operational responsibilities to key members of the management team and keep everyone on track, providing ways that results and success will be measured.
- A written plan allows for the articulation of initial assumptions about the business and the existing market environment. This will inevitably lead to additional new insights and better future planning and results.

- A written plan will provide a clear understanding of specific steps to be taken and help assure management's long-term commitment to the new strategic direction
- A written plan will assist in keeping the focus of business activities in line with the strategic priorities of the business leadership.

SENIOR MANAGEMENT ISSUES TO BE CONSIDERED

The following is a list of suggested issues that need to be considered by senior management when addressing importing, procurement and purchasing activities of a company. Each point and its impact on the business should be considered in depth.

It is imperative to note here that changes to a company's business activities from importing activities are likely to have a significant on the business's risk profile. As such, it is strongly suggested that a thorough review of the company's Risk Management Policy, along with established risk limits and credit limits reviewed.

Management Goals and Objectives

When initially considering or reviewing a plan it is important to clearly define what the overriding company's goals and objects are that will be driving these related business activities.

- What are the business reasons for pursuing supplies imported from international markets?

Are these solid business objectives, such as: reducing costs and/or securing supplies of required inputs, increasing production capacity, developing a broader and more stable customer base; or, are they and excuse for frivolous activities, (for example, the owner wants an excuse to travel)?

- How committed is top management to a coordinated effort in importing, procurement and purchasing activities?

Is importing view as a "quick fix" to rising input costs, or is it to be a long-term change in core business activities?

- What are management's expectations?

How quickly does management expect importing activities to become self-sustaining, or generate a reasonable rate of return?

Are these activities to be set up as an integrated business activity or separate business unit? And, if so, what is management's expectation on the level of return on investment?

Experience

Within a company's most valued assets of human resource there will exist a reservoir of experience and organizational memory. This will be an important resource to call upon when developing any plan. This process also helps to develop ownership of the strategic decisions the company is making by key management and staff.

If internal resources appear to be insufficient to meet the task, do not hesitate to engage external parties or consultants to who have greater depth of understanding of the issues the company are about to address.

- Is the trend for the business's sale and inquiries for finished product up or down?

Is there an opportunity to grow the company's total volume of business?

- Who are my competitors and what are they doing?

Are any of my competitors currently procuring inputs, commodities or products internationally?

If so, what inputs, commodities or products?

- Which inputs, commodities or products are most likely to be imported, or be part of the business's comprehensive procurement and purchasing strategy?
- With what countries of origin has product been received from or has business already been conducted?

From what countries have inquiries already been made or received?

- ∗ What general and specific lessons have been learned from past attempts or experiences of importing, as well as with procurement and purchasing?

Management and Personnel

When strategically considering the implementation of the plan it will be important to match human resources and their capabilities to the expected future needs that will be required.

- ∗ What in-house international expertise does the company have (for example, international procurement and trade experience, as well as language capabilities)?
- ∗ What organizational structure is required to ensure that importing, procurement and purchasing activities adequately supported?
- ∗ Who will be responsible for the company's importing, procurement and purchasing activities and staff?
How much senior of management's time should be allocated to this activity?
- ∗ What measures and key performance indicators are to be used to measure the outcomes and performance of importing, procurement and purchasing activities?

Production Capacity

When strategically considering the implementation of the plan it will be important to match the company's current and expected future capacities to assets and resources that are to be put into place.

- ∗ Which inputs, commodities or products are most likely to be imported, or be part of the business's comprehensive procurement and purchasing plan?
- ∗ How are the company's current operating capacity likely to be impacted by these changes?
- ∗ How will the change in approach impact the costs, available supply and quality of commodities and inputs?
- ∗ How will the change in approach impact the company's sales volumes and revenues?

- What are the likely impacts on the fluctuations in the annual workload and labor requirements?
- What minimum quantity order required for each commodity or input product?
- How are these changes likely to impact the company's broader supply chain concerns?

Financial Capacity

When considering the implementation of the plan and its related activities it will be all important consider the additional cash flow and financial requirements that will be required. Frequently it will be limits to financial capacity that will limit importing and related business activities that will be required.

- What amount of additional operating capital, both short term and long term, will be required to successfully engage in the volume of envisioned activities?
- Are there any anticipated start-up cost; and, how are these initial costs and expenses of export efforts to be allocated?
- What level of existing operating costs can be supported by these additional business activities?
- Does the company or any of its anticipated business activities qualify for export financing from government or commercial sources?
- Are there any other new development plans in the works might are likely to compete with funding for these activities?

SAMPLE ELEMANTS AND OUTLINE: IMPORTING PLAN

The following is a suggested outline for drafting Importing, Procurement and Purchasing Plan. Changes should be made as required to best suit the company's situation and business environment.

1 Introduction: Why this company should directly engage in coordinated importing, procurement and purchasing activities

2 Commitment Statement

3 Situation or Background Analysis

- Commodities and Input Products to be Included
 - Product License (if needed)
 - Product Export / Import Control Compliance
 - Product Classification(s)
 - Products That Qualify Under FTAs
- Operational Requirements
- Personnel and Expertise Requirements
- Current resources Inside the company
- Resources Outside the Company
- Industry Structure, Competition, and Demand

4 Marketing Component

- Identifying, Evaluating, and Selecting Markets
- Product Selection and Pricing
- Supply Chain and Distribution Methods
- Transactional Terms and Conditions
- Sales Goals (Profit and Loss Forecasts)
- Pricing Including Consideration of Duties, Taxes, Freight Costs, and Logistics

5 Tactics and Actions

- Primary Target Commodities, Products and Countries
- Secondary Target Commodities, Products and Countries
- Indirect Marketing Efforts
- Monthly / Quarterly Benchmarks, Measures and Accomplishments

6 Internal Organization and Procedures

- Management

- ✓ Front Office
- ✓ Logistics and Operations
- ✓ Back Office
- ✓ Accounting and Finance
- ✓ Risk Management Policies

7 Projected Budget

- ✓ Additional Human Resources
- ✓ Other Anticipated Expenses
 - Marketing Materials
 - Travel and Trade Visits
 - IT and Website Enhancements
 - Other Costs
- ✓ Pro-forma Financial Statements
 - Projected Cash Flow
 - Projected Income State
 - Projected Balance Sheet Impacts

8 Implementation Schedule

- ✓ Initial Implementation Timeline
- ✓ Action Dates and Follow-up Dates
- ✓ Periodic Operational and Management Review
(Measuring Results against the Plan)

9 Addendum: Supporting Background Information

- ✓ Basic Market Statistics
(Historical and Projected)
- ✓ Background Facts
- ✓ Competitive Environment

Chapter Author: Guy H. Allen
Senior Economist – International Grains Program
Kansas State University

Chapter Reviewer: Philip Shull
Senior Diplomat (Ret)
U.S. Department of Agriculture

Resources

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GROWER ORGANIZATIONS

U.S. Grains Council

20 F Street NW, Suite 900,
Washington, D.C. 20001 U.S.A.
Phone: (202) 789-0789
Fax: (202) 898-0522
Email: grains@grains.org
Website: www.grains.org

The USGC is a private, non-profit organization with the goal of developing and expanding export markets for U.S. produced feed grains and their co-products through an international network of offices. All of these offices can assist importers with the search for a U.S. supplier.

The Council was founded in 1960 to develop and promote exports of U.S. feed grains and their co-products. It is one of the few organizations whose membership is truly representative of both producers and agribusiness interests. They have successfully coordinated and unified the efforts of both groups into a policy promoting the global expansion for the utilization of feed grains and their co-products. This manual is part of that effort.

The Council can be called on by any importer or potential importer for assistance in either developing the technology to process feed grains for industrial uses or in providing information on those products themselves. The Council will direct inquiries to one of their many internal experts on trade and utilization or to one of the 100-plus firms and organizations comprising its membership. The Council also maintains offices in 10 different countries plus consultants in many more to help importers with their feed grains needs.

USGC membership is comprised of over 140 organizations, including state checkoff boards, agribusinesses, and producer groups, who together form a unique partnership with the goal of building global markets for U.S. grains. Many of these members can be supplier of grain and can assist you in procurement and purchasing. For more information about USGC members, and contact details, see the membership directory at:

https://grains.org/membership/member-directory/#member_area_of_business=95

National Corn Growers Association

St. Louis Office
632 Cepi Drive
Chesterfield, MO 63005 U.S.A.
Phone: (636) 733-9004
Fax: (636) 733-9005

Washington D.C. Office
20 F Street NW, Suite 900,
Washington, D.C. 20001 U.S.A.
Phone: (202) 628-7001
Fax: (202) 628-1933

Email: corninfo@ncga.com

Website: www.ncga.com

Founded in 1957, the National Corn Growers Association (NCGA) has nearly 29,000 corn producer members in 47 states. The Association's mission is to enhance corn profitability and utilization while improving the quality of life in a changing world. Among the Association's many programs to further this mission is a strong commitment to developing new markets for corn.

In this role, the NCGA has funded many innovative research projects probing the technological frontier for new industrial feed grains uses. They have, for instance, helped focus the search for new products on ethanol and biodegradable plastics. They continue supporting efforts to make these processes more efficient and competitive with petroleum feedstock and are promoting the development of starch-based substitutes for road salt and window washer fluid.

The Association has a unique network of relationships focusing on the development of new industrial uses, as well as a number of experienced professionals working on their market potential. These professionals can direct inquiries to researchers supported by or familiar with the Association efforts in this area. They can also help direct importers with specific inquiries to refiners or manufacturers in the United States who might hold patents that could be licensed for overseas use by an interested importer.

National Grain Sorghum Producers

4201 N. Interstate 27
Lubbock, TX 79403 U.S.A.
Phone: (806) 749-3478
Fax: (806) 749-9002
Email: info@sorghumgrowers.com
Website: www.sorghumgrowers.com

This Association represents sorghum grain producers across the United States. They promote alternative uses for sorghum, which include limited use as a feedstock for ethanol production. They do significant work on production efficiencies, including testing on feed efficiencies related to the presence or absence of tannin.

The Association is a resource for potential importers who wish to use grain sorghum as an industrial feedstock and for help in inquiries dealing with the production of ethanol from sorghum.

National Barley Growers Association

600 Pennsylvania Ave. SE
Washington, D.C. 20003 USA
Phone: (202) 548-0734
Fax: (202) 969-7036
Website: www.national-barley.com

The National Barley Growers Association (NBGA) is a national barley advocacy organization. NBGA has been actively working to promote U.S. sourced barley since 1989.

This Association represents barley grain producers across the United States. They promote alternative uses for barley and do significant work on production efficiencies.

The Association is a resource for potential importers who wish to use grain barley as an industrial feedstock.

TRADE ORGANIZATIONS

Corn Refiners Association, Inc.

1701 Pennsylvania Avenue, NW, Suite 400

Washington, DC 20006 U.S.A.

Phone: (202) 331-1634

Fax: (202) 331-2054

Website: www.corn.org

The Corn Refiners Association (CRA) is the national trade association representing a full 100% of the corn refining industry of the United States.

CRA and its predecessors have served this important segment of American agribusiness since 1913. Corn refiners manufacture sweeteners, starch, advanced bioproducts, corn oil, and feed products from corn components such as starch, oil, protein, and fiber.

Based in Washington, D.C., CRA is the proactive, nimble, highly effective, member-driven trade association representing corn wet millers. It advocates for science-based public policy and economically- sound decisions at the state, federal, and global levels.

CRA approaches every new challenge with its members and their customers in mind, working to foster technological innovation, expand commercial opportunities, advance free trade, build the bioeconomy, and feed a hungry world.

The CRA is unabashed in its support of innovative feed grains utilization, particularly corn. It is the principal source of information on new products from wet milling feedstock and their current use by different industries.

Importers needing statistical information on the U.S. corn wet milling industry should think of the CRA as their first resource. The CRA can also help direct specific inquiries to their refiner members.

Federation of Oils, Seeds and Fats Associations Ltd (FOSFA)

4 – 6 Throgmorton Avenue

London EC2N 2DL

Phone: +44 207 374 2346

Fax: +44 207 374 8574

Email: contact@fosfa.org

Website: www.fosfa.org/

The Federation of Oils, Seeds and Fats Associations Ltd (FOSFA) is a professional international contract issuing and arbitral body concerned exclusively with the world trade in oilseeds, oils and fats with 1,180 members in 87 countries. These members include producers and processors, shippers and dealers, traders, brokers and agents, superintendents, analysts, shipowners, ship brokers, tank storage companies, arbitrators, consultants, lawyers, insurers and others, providing services to traders. For further details about membership, click [here](#).

FOSFA has an extensive range of standard forms of contracts covering goods shipped either CIF, C&F or FOB, for soybeans, sunflowerseeds, rapeseed, and others, vegetable and marine oils and fats, refined oils and fats, from all origins worldwide, for different methods of transportation and different terms of trade. Internationally, 85% of the global trade in oils and fats is traded under FOSFA contracts. For details of the Federation's contracts, click [here](#).

The Federation's contracts incorporate a dispute procedure involving arbitration by experienced individuals from within the trade.

Grain and Feed Trade Association

9 Lincoln's Inn Fields

London, WC2A 3BP

Phone: +44 20 7814 9666

Fax: +44 20 7814 8383

Email: post@gafta.com

Website: www.gafta.com

The Grain and Feed Trade Association (GAFTA) is an international, London headquartered trade association consisting of traders, brokers, superintendents, analysts, fumigators, arbitrators and other professionals in the international grain trade.

GAFTA is headquartered in Holborn, London and currently operates four more offices in Beijing, Geneva, Kyiv and Singapore.

GAFTA can trace its origins back to 1878, when the London Corn Trade Association (LCTA) was established by members of the corn trade to protect their interests. The LCTA sought to achieve this through the adoption of standard forms of contract, drawn up by the association, with any disputes arising out of these contracts being settled by arbitration rather than legislation. Disputes were referred to London and conducted under English Law.

In 1906, a group of traders broke away from the LCTA and formed a new more specialised association, the London Cattle Food Trade Association (LCFTA), for those trading in vegetable proteins used as animal feeding stuffs. In 1965, the LCFTA dropped 'London' from its title, reflecting growing internationalisation. In 1969, merger talks commenced between the LCTA and CFTA. The outcome of these talks was the formation of a new joint association, the Grain and Feed Trade Association in 1971.

National Futures Association

NFA Offices

Chicago

300 S. Riverside Plaza, #1800
Chicago, IL 60606-6615
Phone: 800-621-3570
Phone: 312-781-1300
Fax: 312-781-1467

New York

One New York Plaza, #4300
New York, NY 10004
Phone: 212-608-8660
Fax: 212-964-3913
Website: www.nfa.futures.org

The **National Futures Association (NFA)**, founded in 1982, is the self-regulatory organization for the U.S. derivatives industry, including on-exchange traded futures, retail off-exchange foreign currency and OTC derivatives. NFA is headquartered in Chicago and maintains an office in New York City.

National Grain and Feed Association

1400 Crystal Drive, Suite 260

Arlington, VA 22202 USA

Phone: 202-892-0873

Fax:

Email:

Website: <https://imis.ngfa.org/>

The National Grain and Feed Association, founded in 1896, is a broad-based, non-profit trade association that represents and provides services for grain, feed and related commercial businesses. Its activities focus on enhancing the growth and economic performance of U.S. agriculture.

The National Grain and Feed Association, founded in 1896, is a broad-based, non-profit trade association that represents and provides services for grain, feed and related commercial businesses. Its activities focus on enhancing the growth and economic performance of U.S. agriculture.

Affiliated with the NGFA are approximately 30 state and regional associations, whose members include more than 10,000 grain and feed companies nationwide.

North American Export Grain Association

1400 Crystal Drive, Suite 260

Arlington, VA 22202 USA

Phone: 202-682-4030

Fax: 202-682-4033

Email: info@naega.org

Website: www.naega.org/

The North American Export Grain Association is a not-for-profit industry trade association promoting policies, rules and commercial practices that support efficient international trade in grains, oilseeds and their derived products.

NAEGA members are exporters of and serve the vast majority of all U.S. grain and oilseeds in international markets.

Established in 1912, NAEGA's members include private and publicly owned companies and farmer-owned cooperatives who export agricultural production to customers around the world. Our work benefits consumers, farmers and people working the trade.

NAEGA's mission is to promote and sustain the development of commercial export. Through a reliance on member action and support, NAEGA acts throughout the world to promote policies, rules and commercial practices that support international trade in grains, oilseeds, and their derived products. Providing for competitive, informed, robust, responsive, responsible, reliable, resilient, safe, and secure supply chains for agricultural commodities and food products is the core value of NAEGA.

North American Millers Association

1400 Crystal Drive, Suite 650

Arlington VA 22202 USA

Phone: (202) 484-2200

Fax: (202) 488-7416

Email: generalinfo@namamillers.org

Website: www.namamillers.org

The North American Millers' Association represents millers of wheat, corn, oats, and rye in the U.S. and Canada. Our members take raw grain and transform it into flour and other products that are used to make such favorite foods as bread, cereals, pasta, cookies, cakes, and snack foods. We're proud to be the indispensable link between raw grain and healthy and delicious products that have sustained and enriched people's lives for centuries.

NAMA's 37 members have 149 locations across 31 states. Utilizing the technical expertise of our members and staff, we represent the milling industry before the White House, federal agencies, and Congress.

Renewable Fuels Association

RFA Headquarters
16024 Manchester Road, Suite 101
Ellisville, MO 63011 USA
Phone: (636) 594-2284
Fax: (202) 289-7519

Washington D.C.
425 3rd St SW. Suite 1150
Washington, DC 20001 U.S.A.
Phone: (202) 289-3835
Fax: (202) 289-7519

Email: info@ethanolrfa.org
Website: www.ethanolrfa.org

RFA are the leading trade association for America’s ethanol industry, working to drive expanded demand for American-made renewable fuels and bio-products worldwide.

As the authoritative voice of the U.S. ethanol industry, RFA helps America become cleaner, safer, and more energy independent. Since 1981, the RFA has been helping Americans have more affordable, efficient, and environmentally friendly fuel for their cars, trucks, boats, motorcycles and engines of all kinds.

The RFA represents the ethanol industry promoting policies, regulations, and research and development initiatives that will lead to the increased production and use of ethanol fuel.

EDUCATIONAL INSTITUTIONS

International Grains Program (IGP) – Kansas State University

1980 Kimball Avenue

Manhattan, KS 66502 USA

Phone: (785) 532-4070

Email: igp@k-state.edu

Website: www.grains.k-state.edu/igp/

The IGP Institute at Kansas State University has established a worldwide reputation as a center of excellence for international programs related to flour milling and grain processing, feed manufacturing and grain management, grain marketing and risk management focused on corn, grain sorghum, soybeans and wheat.

The mission of the IGP Institute is to provide technical, research-based training benefiting industry professionals globally and enhancing the market preference for U.S. grains and oilseeds. To meet this mission, course offerings are led by KSU faculty and industry professionals in the areas of flour milling and grain processing, grain marketing and risk management, and feed manufacturing and grain management. Along with on-campus trainings, our faculty lead customized on- location workshops as well as distance education courses.

For more than 45 years, the IGP Institute has served Kansas and U.S. commodity organizations through its global education center housed in the Grain Science Complex on the campus of Kansas State University. This complex is home to the International Grains Program Conference Center, Hal Ross Flour Mill, O.H. Kruse Feed Technology Innovation Center and the Bio-processing and Industrial Value Added Program.

U.S. GOVERNMENT AGENCIES

U.S. Commodity Futures Trading Commission (CFTC)

1155 21st Street, NW
Washington, DC 20250 U.S.A.
Phone: (866) 366 2382
Website: www.cftc.gov

The Commodity Futures Trading Commission (CFTC) is an independent agency of the US government created in 1974, that regulates the U.S. derivatives markets, which includes futures, swaps, and certain kinds of options.

The CFTC oversees the derivatives markets by encouraging their competitiveness and efficiency, ensuring their integrity, protecting market participants against manipulation, abusive trading practices, fraud, and ensuring the financial integrity of the clearing process.

The CFTC generally does not directly regulate the safety and soundness of individual firms, with the exception of newly regulated swap dealers and major swap participants, for whom it sets capital standards pursuant to Dodd-Frank. Through oversight, the CFTC enables the derivatives markets to serve the function of price discovery and offsetting price risk.

The CFTC's mandate was renewed and expanded in December 2000 when Congress passed the Commodity Futures Modernization Act of 2000, which instructed the Securities and Exchange Commission (SEC) and the CFTC to develop a joint regulatory regime for single-stock futures, the products of which began trading in November 2002.

In 2010, the Dodd–Frank Wall Street Reform and Consumer Protection Act expanded the CFTC's regulatory authority into the swaps markets. The swaps markets currently have a notional value of more than \$400 trillion. As of 2014 the CFTC oversees 'designated contract markets' (DCMs) or exchanges, swap execution facilities (SEFs), derivatives clearing organizations, swap data repositories (SDRs), swap dealers, futures commission merchants, commodity pool operators and other intermediaries. The CFTC coordinates its work with foreign regulators, such as its UK counterpart, the Financial Conduct Authority, which supervises the London Metal Exchange.

U.S. Federal Trade Commission

Headquarters
600 Pennsylvania Avenue, NW
Washington, DC 20580 USA
Telephone: (202) 326-2222

Constitution Center
Federal Trade Commission
400 7th St., SW
Washington, DC 20024 USA
Telephone: (202) 326-2222
Website: <https://www.ftc.gov/about-ftc>

The **Federal Trade Commission (FTC)** is an independent agency of the United States government, created in 1914, whose principal mission is the enforcement of civil U.S. antitrust law and the promotion of consumer protection. The FTC shares jurisdiction over federal civil antitrust enforcement with the Department of Justice Antitrust Division.

The Federal Trade Commission works to promote competition, and protect and educate consumers.

U.S. Department of Agriculture (USDA)

1301 Independence Ave., SW
Washington, DC 20250 U.S.A.
Phone: (202) 720-2791
Email: askusda@usda.gov
Website: www.usda.gov

The United States Department of Agriculture (USDA), also known as the Agriculture Department, is the federal executive department responsible for developing and executing federal laws related to farming, forestry, rural economic development, and food. It aims to meet the needs of commercial farming and livestock food production, promotes agricultural trade and production, works to assure food safety, protects natural resources, fosters rural communities and works to end hunger in the United States and internationally.

Within this agency, the three main offices to contact for further information.

- USDA – Agricultural Marketing Service (USDA AMS)
- USDA – Foreign Agricultural Service (USDA FAS)
- National Center of Agricultural Utilization Research, ARS

U.S. Department of Agriculture – Agricultural Marketing Service

1301 Independence Ave., SW
Washington, DC 20250 U.S.A.
Phone: (202) 720-8998
Email: pa@usda.gov
Website: www.ams.usda.gov

The USDA Agricultural Marketing Service (USDA AMS) The Agricultural Marketing Service (AMS) administers programs that create domestic and international marketing opportunities for U.S. producers of food, fiber, and specialty crops. AMS also provides the agriculture industry with valuable services to ensure the quality and availability of wholesome food for consumers across the country.

The AMS was established in 1939 when Secretary of Agriculture Henry Wallace consolidated a number of bureaus and programs to create a single agency to carry out a sweeping mission. The new Agricultural Marketing Service was charged with facilitating the efficient, fair marketing of U.S. agricultural products, including food, fiber, and specialty crops.

In 2017, Agriculture Secretary Sonny Perdue announced the realignment of a number of offices within the U.S. Department of Agriculture (USDA). The Grain Inspection, Packers, and Stockyards Administration (GIPSA) and several program areas from the Farm Service Agency (FSA) joined the Agricultural Marketing Service (AMS) to help us better meet the needs of farmers, ranchers, and producers, while providing improved customer service and maximize efficiency.

Among other things, these programs provide testing, standardization, grading and market news services for those commodities, and oversee marketing agreements and orders, administer research and promotion programs, and purchase commodities for federal food programs.

U.S. Department of Agriculture – Foreign Agricultural Service

1400 Independence Ave., SW
Washington, DC 20250 U.S.A.

Phone: (202) 720-2791

Email: askusda@usda.gov

Website: www.fas.usda.gov/contact/key-contactsusda.gov

The USDA Foreign Agricultural Service (USDA FAS) links U.S. agriculture to the world to enhance export opportunities and global food security.

FAS is the foreign affairs agency with primary responsibility for the USDA overseas programs, market development, international trade agreements and negotiations, and the collection of statistics and market information. It also administers the USDA's export credit guarantee and food aid programs and helps increase income and food availability in developing nations by mobilizing expertise for agriculturally led economic growth.

FAS expands and maintains access to foreign markets for U.S. agricultural products by removing trade barriers and enforcing U.S. rights under existing trade agreements. FAS works with foreign governments, international organizations, and the Office of the U.S. Trade Representative to establish international standards and rules to improve accountability and predictability for agricultural trade.

FAS partners with more than 70 cooperator groups representing a cross-section of the U.S. food and agricultural industry and manages a toolkit of trade promotion programs to help U.S. exporters develop and maintain markets for hundreds of products. FAS also supports U.S. agricultural exporters through export credit guarantee programs and other types of assistance.

FAS's network of global contacts and long-standing relationships with international groups contribute to the agency's unique market intelligence capacity. FAS analysts provide objective intelligence on foreign market conditions, prepare production forecasts, assess export opportunities, and track changes in policies affecting U.S. agricultural exports and imports.

FAS has a global network of nearly 100 offices covering approximately 180 countries. These offices are staffed by agricultural attachés and locally hired agricultural experts who are the eyes, ears, and voice for U.S. agriculture around the world. FAS staff identify problems, provide practical solutions, and work to advance opportunities for U.S. agriculture and support U.S. foreign policy around the globe.

U.S. Security and Exchange Commission (SEC)

100 F St., NE
Washington, DC 20250 U.S.A.
Phone: (202) 551-6551
Website: www.sec.gov

The U.S. Securities and Exchange Commission (SEC) is an independent agency of the United States federal government, created in the aftermath of the Wall Street Crash of 1929.

The primary purpose of the SEC is to enforce the law against market manipulation. The SEC has a three-part mission: to protect investors; maintain fair, orderly, and efficient markets; and facilitate capital formation.

In addition to the Securities Exchange Act of 1934, which created it, the SEC enforces the Securities Act of 1933, the Trust Indenture Act of 1939, the Investment Company Act of 1940, the Investment Advisers Act of 1940, the Sarbanes–Oxley Act of 2002, and other statutes. The SEC was created by Section 4 of the Securities Exchange Act of 1934 (now codified as 15 U.S.C. § 78d and commonly referred to as the Exchange Act or the 1934 Act).

National Center of Agricultural Utilization Research, ARS

1815 North University Street
Peoria, IL 61604 U.S.A.
Phone: (309) 685-4011
Fax: (309) 681-6686
Email: askusda@usda.gov
Website: www.ars.usda.gov/midwest-area/peoria-il/national-center-for-agricultural-utilization-research/

The National Center for Agricultural Utilization Research (NCAUR) (sometimes still called the Northern Lab; known locally as the Ag Lab) is a United States Department of Agriculture laboratory center in Peoria, Illinois. The Center researches new industrial and food uses for agricultural commodities, develops new technology to improve environmental quality, and provides technical support to federal regulatory and action agencies.

The ARS is responsible for agricultural research. The ARS operates numerous laboratories across the country. They are deeply involved in research on a broad spectrum of agricultural questions, including all those raised in the debate over new industrial uses for feed grains.

For example, this is the government service responsible for most of the latest developments into starch research. They have made exciting strides in areas of biopolymers and encapsulation. The “super absorbents” that have had such commercial success are a product of these government laboratories.

They are an excellent source for new product avenues, quick and eager to share their ideas. Importers interested in exploring industrial feed grains use should include the ARS on their fact-finding tour.

National Institute of Health - Office of Technology Transfer

9000 Rockville Pike

Bethesda, MD 20892 USA

Phone: (301) 496-7057

Fax: (301) 402-0220

Email: nihott@od.nih.gov

Website: <http://ott.od.nih.gov/>

The NIH Office of Technology Transfer (OTT) plays a strategic role by supporting the patenting and licensing efforts of our NIH ICs. OTT protects, monitors, markets and manages the wide range of NIH discoveries, inventions, and other intellectual property as mandated by the Federal Technology Transfer Act and related legislation.

One method the U.S. government uses to share the fruits of its research labors is through the Office of Technology Transfer (OTT). Part of the National Patent Program, and a Division of the ARS of the U.S. Department of Agriculture, this office speeds products or processes developed by government scientists into commercial application.

A unique blend of taxpayer-funded support and entrepreneurial incentives, the program rewards individual scientists who work on government projects a share in any patents and licensing revenue that results from commercial application.

It was this office that licensed the super absorbent biopolymers that rank as one of the great successes of feed grains over the competitive

petroleum feedstock. The U.S. government holds hundreds of other patents, many of them related to starch research from the National Center of Agricultural Utilization Research in Peoria, Ill.

These patents include new approaches to absorbents, many different encapsulation biopolymers, a variety of films (for example, shrink-wrap biodegradable mulch) and new processes to ferment ethanol from cornstarch.

The Federal Technology Act of 1986 empowered the government, in this case, ARS, to enter into contracts and agreements with both the ARS and individual scientists called Cooperative Research and Development Agreements, or CRADA's.

CRADA's give the cooperator who has entered into an agreement with ARS the right of first refusal to any commercial license opportunities that might arise from the agreed-to project. Under CRADA's, the cooperator may or may not provide funds depending upon the relevance of the proposal to the agency's mission. Information on CRADA's and how they function can be obtained through the Office of Technology Transfer, or OTT.

For help in identifying an opportunity to work with the ARS in CRADA's, inquiries should be directed to ARS Utilization in Peoria, Ill., or their Washington headquarters.

OTT also offers a number of services designed to showcase the government's inventory of agricultural patents. These include:

- TEKTRAN – an electronic system that gives the subscriber direct access to information on new research results and inventions that are available for commercial licensing.
- Agricultural Inventions Catalog – a comprehensive list of the patents held by government jointly with ARS research scientists. The catalog is updated periodically and can be obtained through the OTT.

In addition, detailed help in obtaining licenses for U.S. government-held patents is available through the OTT. They have published several how-to aids that walk the potential licensee through the steps needed to bring the product or process patented to the marketplace.

Office of Energy Efficiency & Renewable Energy (EERE)

1000 Independence Avenue, SW

Washington, DC 20585 U.S.A.

Phone: (877) 337-3463

Website: <https://www.energy.gov/eere/about-office-energy-efficiency-and-renewable-energy>

As part of its work to support energy efficiency and renewable energy research, the EERE collaborates with private organizations, researchers, and other nations. Most of EERE's new investments directly support deployments or demonstrations of technologies that show viable pathways for achieving EERE's five programmatic priorities:

- ✓ Decarbonizing the electricity sector.
- ✓ Decarbonizing transportation across all modes: air, sea, rail, and road.
- ✓ Decarbonizing the industrial sector.
- ✓ Reducing the carbon footprint of buildings.
- ✓ Decarbonizing the agriculture sector, specifically focused on the nexus between energy and water.

**U.S. Patent and Trademark Office (USPTO) -
General Information Services Division**

Crystal Plaza 3, Room 2CO2

Washington, DC 20231 U.S.A.

Phone: (800) 786-9199

Fax: (703) 305-7786

Email: usptoinfo@uspto.gov

Website: www.uspto.gov

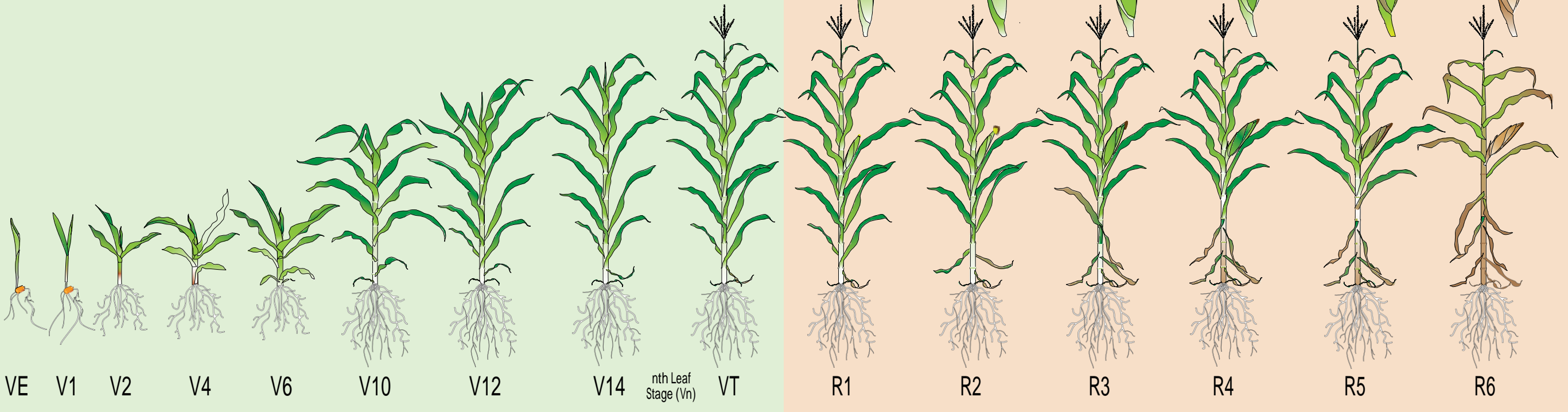
USPTO Patent Depository Library

Phone: (703) 308-3924

The United States Patent and Trademark Office is an agency in the U.S. Department of Commerce that issues patents to inventors and businesses for their inventions, and trademark registration for product and intellectual property identification.

Both of these agencies can be used as resources to research the patent history of agriculture inventions in the United States. They can provide detailed descriptions of the products and processes protected by U.S. and international patent law and identify the patent holder if an importer is interested in licensing that technology.

Corn Growth and Development



Vegetative

Reproductive

Corn Development Stages

Vegetative

Vegetative

Reproductive

Reproductive

VE – Emergence

Emergence occurs when the first leaves, called the spike or the coleoptile, appear above the soil surface. The seed absorbs water (about 30% of its weight) and oxygen for germination. The radicle root quickly emerges near the tip of the kernel, depending on soil moisture and temperature conditions. The coleoptile emerges from the embryo side of the kernel and is pushed to the soil surface by mesocotyl elongation. The mesocotyl encloses the plumule leaves that open as the structure approaches the soil surface.

Management

Ideal soil temperatures (50 to 55 degrees Fahrenheit) and moisture conditions promote rapid emergence (5 to 7 days). Optimum seed placement varies from 1 to 2 inches deep. Appropriate planting depth is critical for optimal emergence. Cold, dry, and deep planting can delay emergence for several days.

V1 – First-Leaf

One leaf with collar visible (structure found at the base of the leaf). The first leaf in corn has a rounded tip. From this point until flowering (R1 stage), leaf stages are defined by the uppermost leaf with visible collars. The growing point is located below the surface until the late V5 stage.

Management

Scout for proper emergence (e.g., 30 plants in 17 1/2 feet for 30-inch row spacing = 30,000 plants per acre), early-season weeds, insects, diseases, and other production issues.

V2 – Second-Leaf

Nodal roots begin to emerge below ground. Seminal roots begin to senesce. Frost is unlikely to damage corn seedling, unless it is extremely cold or the corn was shallowly planted.

V4 – Fourth-Leaf

Nodal roots are dominant, occupying more soil volume than seminal roots. Leaves still developing on apical meristem (primary growth of the plant).

V6 – Sixth-Leaf

Six leaves with collar visible. The first leaf with the rounded tip is senescent; consider this point when counting leaves. The growing point emerges above the soil surface. All plant parts are initiated. Sometime between V6 and V10, the potential number of rows (ear girth) is determined. Potential row number is affected by genetics and environment and is reduced by stress conditions. The plant increases in height due to stalk elongation; nodal roots are established in the lowest, below-ground nodes of the plant.

Management

Scout for weeds, insects, and diseases. Rapid nutrient uptake begins at this stage. Timing nutrient applications to match this uptake enhances the potential for greater nutrient use efficiency, particularly for mobile nutrients such as nitrogen.

V10 – Tenth-Leaf

Brace roots begin to develop in the lower above-ground nodes of the plants. Until this stage, rate of leaf development is approximately 2 to 3 days per leaf.

Management

Nutrient (potassium = K > nitrogen = N > phosphorous = P) and water (0.25 inch per day) demands for the crop are high. Heat, drought, and nutrient deficiencies will affect potential number of kernels and ear size. Scout for root lodging issues and diseases (e.g., common rust, brown spot). Weed control is critical

V14 – Fourteen-Leaf

Rapid growth. This stage occurs approximately two weeks before flowering. Highly sensitive to heat and drought stress. Four to six extra leaves will expand from this stage until VT.

Management

Scout for root lodging issues, greensnap (likely to occur from V10 to VT) and diseases (e.g., common rust, brown spot). Abnormal corn ears can occur and be obvious from this time until flowering.

VT – Tassel

Potential kernels per row is set, final potential grain number (number of ovules), and potential ear size are being determined. Last branch of the tassel is visible at the top of the plant. Silks may or may not have emerged. The plant is almost at its maximum height.

Management

Nutrient (K > N > P) and water (0.30 inch per day) demands for the crop are close to maximum. Heat and drought will affect potential number of kernels. Scout for insects (e.g., corn leaf aphid, western bean cutworm, corn earworm, fall armyworm) and diseases (e.g., gray leaf spot, southern rust, northern leaf blight). Total leaf defoliation severely affects final yields.

R1 – Silking

Flowering begins when a silk is visible outside the husks. The first silks to emerge from the husk leaves are those attached to potential kernels near the base of the ear. Silks remain active until pollinated. Pollen falls from the tassel to the silks, fertilizing the

ovule to produce an embryo. Potential kernel number is determined. Maximum plant height is achieved. Following fertilization, cell division is occurring within the embryo.

Management

Nutrient (N and P accumulation is still progressing, K is almost complete) and

since corn does not tolerate early-season competition for water, nutrients, and radiation well.

R4 – Dough

Starchy material within the kernels has dough-like consistency (approximately 26 to 30 days after R1). Rapid accumulation of starch and nutrients occurs; kernels have 70% moisture and begin to dent on the top. Material squeezed out of the kernel has dough-like consistency.

Management

Stress can produce unfilled or shallow kernels and "chaffy" ears. Impact of frost on grain quality can be severe when it occurs at this stage (25 to 40% yield loss from light to killing frost, respectively).

R5 – Dent

Most of the kernels are dented. Kernel moisture declines to approximately 55% (38 to 42 days after R1) as the starch content increases.

Management

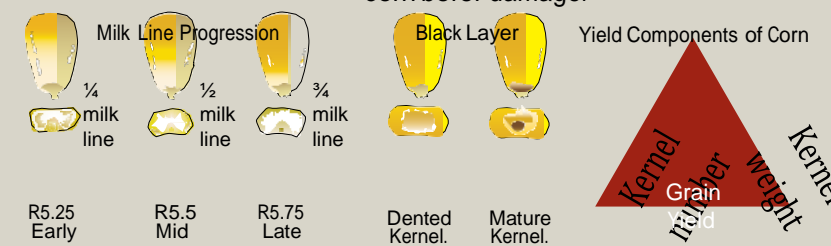
Stress can reduce kernel weight. Silage harvest is approaching (at around 50% kernel milk).

R6 – Maturity

A black layer forms at the base of the kernel, blocking movement of dry matter and nutrients from the plant to the kernel (50 to 60 days after R1). Kernels achieve maximum dry weight (30 to 35% moisture) and are physiologically mature.

Management

Grain is not ready for safe storage. Frost or any biotic or abiotic stress does not impact yields after this development stage. Lodging from disease, insect damage, or hail can result in physical loss of yield. Harvest can proceed, but recommended moisture for long-term storage is 14.5%. Scout fields for ear drop due to things such as European corn borer damage.



Dent	Dent	Dent	Black layer not dev	Black layer formed	Ears per area
Milk line progresses from the top of the kernel (early dent) to the bottom (late dent).			eloped		

water (0.33 inch per day) demands are at the peak. Heat and drought will affect pollination and final grain number. Defoliation by hail or other factors such as insects will produce a large yield loss.

R2 – Blister

Silks darken and begin to dry out (approximately 12 days after R1). Kernels are white and blister-like in shape and contain a clear fluid. Kernels are approximately 85% moisture; embryos develop in each kernel. Cell division is complete. Grain filling commences.

Management

Stress can reduce yield potential by reducing final grain number (abortion).

R3 – Milk

Silks dry out (approximately 20 days after R1). Kernels are yellow, and a milk-like fluid can be squeezed out of the kernels when crushed between fingers. This fluid is the result of the starch accumulation process.

Management

Stress will still cause kernel abortion, initially from the ear tip.



Yield components and critical growth stages for their definition in corn production.

Stage	Yield Components	
	Potential	Actual
VE	Ears/area	—
V6	Kernel rows/ear	*Factory ³
V12	—	Kernel rows/ear
V18	Kernels/row	—
R1 ^{1,2}	Kernel weight Ears/area	Kernel number R1 to R5
R6	—	Kernel weight

¹Potential Kernel Weight = set when cell division takes place in the endosperm, 7 to 10 days after pollination (R1-R2 or the "lag" phase of the sigmoidal kernel growth curve).

²R1 = potential kernel ovules and kernel number, if no stress is affecting pollination and final kernel development.

³Factory = After tassel initiation at V5, all corn plant parts are already developed to support ear and grain development.

Growth stages, moisture content, and total dry matter progression for corn during the reproductive period.¹

R Stage	Moisture %	Dry Matter (% of Total Dry Weight)		Days
5.0	60	45	75	3
5.25 (1/4 milk line)	52	65	120	6
5.5 (1/2 milk line)	40	90	175	10
5.75 (3/4 milk line)	37	97	205	14
6.0 (Physiological maturity)	35	100		

¹Abendroth, L.J., R.W. Elmore, M.J. Boyer, and S. K. Marlay. 2011. *Corn Growth and Development*. PMR 1009. Iowa State Univ. Extension, Ames Iowa.

Ignacio A. Ciampitti, Crop Production and Cropping Systems Specialist,
Department of Agronomy, Kansas State University. ciampitti@ksu.edu,
[TWITTER @KSUCROPS](https://twitter.com/KSUCROPS)

Roger W. Elmore, Cropping Systems Agronomist,
Department of Agronomy and Horticulture, University of Nebraska-Lincoln.
roger.elmore@unl.edu, [TWITTER @RogerElmore](https://twitter.com/RogerElmore)

Joe Lauer, Corn Specialist,
Department of Agronomy, University of Wisconsin.
jglauer@wisc.edu, [TWITTER @WiscCorn](https://twitter.com/WiscCorn)

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Based on information from *How a Corn Plant Develops*, Special Report No. 48, 1986 and
Corn Growth and Development, PMR 1009, 2011. Iowa State University Extension.

Reviewers: J. Coulter, University of Minnesota and D. Fjell, Kansas State University.

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June 2016 | MF3305

Stage 0

Emergence: The plant breaks through the soil surface; early growth usually is slow. The time between planting and emergence depends on soil temperature, residue cover and distribution, soil moisture, planting depth, and seed vigor. Adjust planting time so emergence occurs in favorable conditions.



Stage 1

Three-leaf stage: Three leaves are fully expanded with a visible collar (leaf tissue at the junction of the leaf blade and sheath). The growing point is under the soil surface. This stage occurs 10 to 20 days after emergence, depending on soil temperature and moisture.



Stage 2

Five-leaf stage: Five leaves are fully expanded with a visible collar. The growing point is below the soil surface. The plant begins a rapid growth and nutrient accumulation phase. The root system is expanding rapidly. Minimize weed competition from planting through this growth stage. This stage occurs 20 to 25 days after emergence.



Stage 3

Growing point differentiation: Potential leaf number is defined 30 to 40 days after emergence. Maximum plant growth and nutrient uptake rates are achieved. The growing point is above the surface and changes from producing leaves to forming heads.



Stage 4

Flag leaf visible: Rapid stem elongation and increases in leaf area occur at this stage. The final leaf, the "flag leaf," is visible in the whorl. Potassium uptake is >40%, nitrogen >30%, phosphorus >20%, and total growth is about 20% complete relative to final nutrient content.



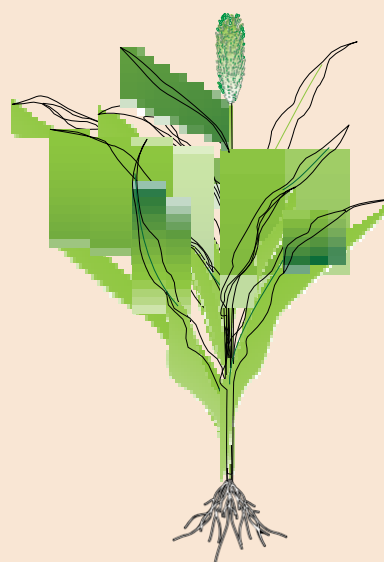
Stage 5

Boot stage: Maximum leaf area has been achieved. Maximum potential head size and seed number has been set. The upper stalk, known as the "peduncle," begins to elongate. Final size of the peduncle varies with the genotype. This stage occurs 50 to 60 days after emergence.



Stage 6

Half-bloom: Full exertion of the head occurs at this stage and 50% of the plants in the field are in some stage of bloom. For an individual plant, this stage is when the flowering reaches 50% of the head. Total growth is 50% complete. Compared to final nutrient content, nutrient accumulation is 60% for phosphorus, 70% for nitrogen, and >80% for potassium.



Stage 7

Soft-dough: Grain formation begins immediately after flowering and the grain fills rapidly (50% of dry weight). The stem loses weight due to a remobilization process (from stem to grain). Grains are the main priority for the plant; thus, without a good balance between leaves (source) and grain (sink), the duration of grain filling can be shortened. A severe stress at this growth stage can produce lighter and chaffy grains.



Stage 8

Hard-dough: Grain reaches 75% of its final dry weight and nutrient uptake is almost complete. Lower leaves lose functionality due to remobilization of nutrients to grains or senescence. A severe stress at this growth stage can still reduce grain weight, but not at the extent possible in the soft-dough stage.

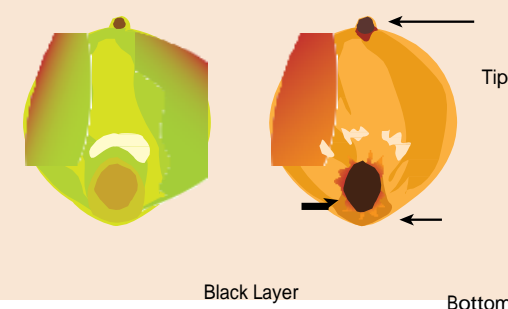


Stage 9

Physiological maturity: Grain achieves its maximum dry weight. Mature grain is identified by looking for the dark spot, the black layer, on the bottom of the kernel. Grain moisture ranges from 25 to 35%. The time to harvest depends on the

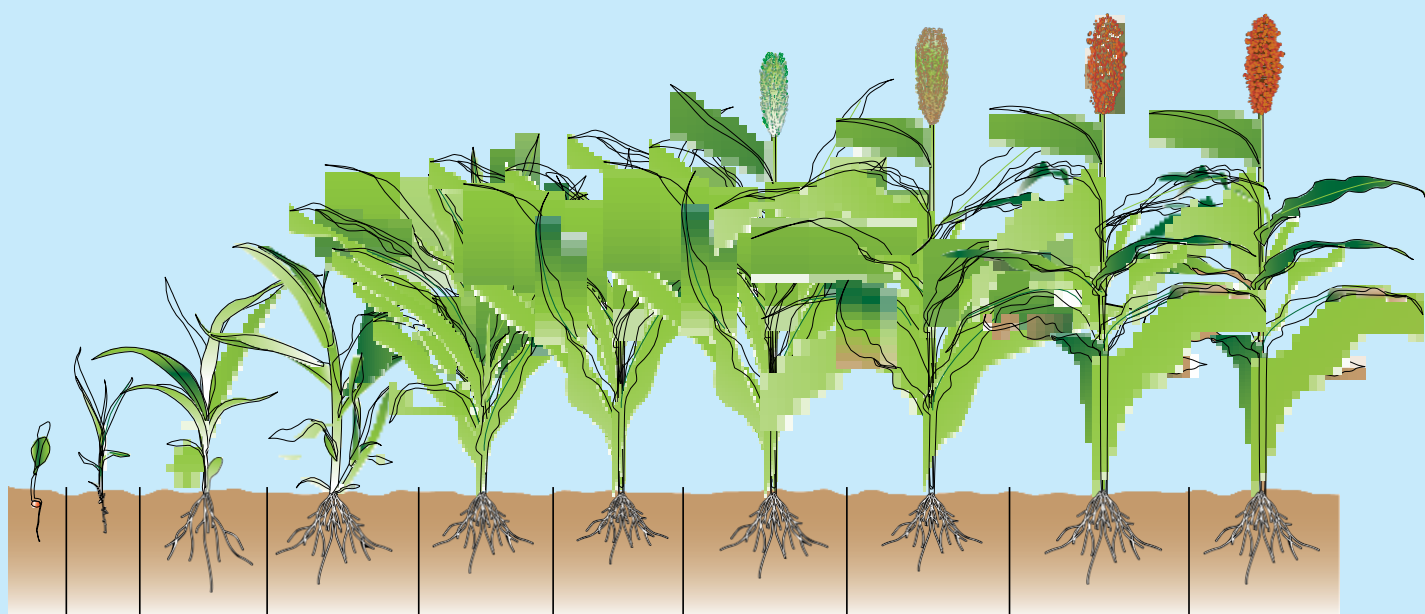


environmental conditions. Artificial drying can be promoted by the use of desiccants without affecting yield when applied after maturity.



Sorghum Growth Stages and Identifying Characteristics

Growth stage	Identifying characteristic
0	Emergence. Coleoptile visible at soil surface.
1	Three-leaf stage. Collar of third leaf visible.
2	Five-leaf stage. Collar of fifth leaf visible.
3	Growing point differentiation. About eight-leaf stage with a visible collar.
4	Flag leaf visible. Final leaf visible in whorl.
5	Boot stage. Head extended into flag leaf sheath.
6	Half-bloom. Half of the plants at some stage of bloom.
7	Soft-dough. Grains are soft with little or no liquid present when squeezed.
8	Hard-dough. Grains are hard when squeezed.
9	Physiological maturity. Black layer on the bottom of kernel.



0 1 2 3 4 5 6 7 8 9



Technical Content and Project Leader: Ignacio A. Ciampitti Crop Production and Cropping
Systems Specialist Department of Agronomy, Kansas State University ciampitti@ksu.edu;
Twitter@KSUCROPS

Reviewers: Curtis R. Thompson, Richard L. Vanderlip, and P.V. Vara Prasad.

Based on information from *How a Sorghum Plant
Develops*, S3, K-State Research and Extension

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Department of Agriculture Cooperating, John D. Floros, Director.

NORTH AMERICAN EXPORT GRAIN ASSOCIATION, INC.

FREE ON BOARD EXPORT CONTRACT U.S.A./CANADA

Use of this contract, in whole or in part, is subject to compliance with its Terms of Use, which are available upon request

Revised as of March 30, 2018

NO.2

Contract No. _____

New York, N.Y. _____ 20 _____

1. **Seller** _____
2. **Buyer** _____
3. **Broker/Agent** _____
4. **Quantity**
in bulk, including dockage, 5% more or less at buyer's option, and at market price (per Clause 10) as follows: If the first delivery under this contract is for a quantity between contract minimum and contract maximum (both inclusive), no further deliveries shall be made. If this contract is to be executed by more than one vessel, the loading tolerance of 5% more or less shall apply on the difference between the mean contract quantity and the quantity that has been delivered on all prior vessels. Any delivery which falls within this difference, plus or minus 5%, shall complete the contract.
5. **Weight** Quantity to be final at port of loading in accordance with customary weight certificates. 1,016 kilograms shall be equal to 2,240 pounds.
6. **Commodity**
in accordance with the official grain standards of the United States or Canada, whichever applicable, in effect on the date of this contract. Delivery of higher (better) grades of grain of the same type and description is permissible.
7. **Quality**
Quality and condition to be final at port of loading in accordance with official inspection certificates and/or other certificates as may be required in this contract.

In case of delivery at St. Lawrence ports, quality and condition to be final in accordance with Lake and/or loading ports official inspection certificates; Lake inspection certificates to be properly identified at ports of loading.

Each party hereby authorizes the other party to request in both parties' names an appeal inspection under the U.S. Grain Standards Act, if applicable, or as may be required in this contract at any time prior to or during the loading of the vessel, and whether or not such request was filed before commencement of loading. The cost of such appeal inspection, unless otherwise stipulated in this contract, shall be borne by the party requesting it.

The commodity is not warranted free from defect, rendering same unmerchantable, which would not be apparent on reasonable examination, any statute or rule of law to the contrary notwithstanding.
8. **Delivery**
Delivery shall be made between _____ and _____, both inclusive (the "delivery period"), at discharge end of loading spout, to buyer's tonnage in readiness to load, in accordance with custom of the port and subject to the elevator tariff to the extent that it does not conflict with the terms of this contract. Incorporation of a loading rate guaranty in this contract shall not entitle seller to delay delivery.

Buyer shall give vessel nominations ("preadvice") in accordance with Clause 15, in time for seller to receive minimum _____ days notice of probable readiness of tonnage and quantities required (the "preadvice period"). Buyer to keep seller informed of changes in expected date of vessel readiness.

Time for the preadvice shall be deemed to commence to count at 1200 noon, local time at place of receipt, on the business day of receipt by seller and shall be counted in consecutive periods of 24 hours.

Seller shall, if applicable, declare port and berth of loading within a reasonable time (but not later than _____ days) after receipt by seller of the preadvice, except that seller shall not be obligated to make such declaration earlier than (a) the 8th day prior to commencement of the delivery period for port declaration and (b) the 5th day prior to commencement of the delivery period for berth declaration.

The vessel shall not be prevented from filing and from taking its place in the vessel line-up at the designated port/berth during the preadvice period or before commencement of the delivery period, notwithstanding which, seller shall not be obliged to effect delivery to the vessel before the expiration of the preadvice period or before commencement of the delivery period. For the purposes of this contract a vessel shall be considered filed when it (a) has tendered valid notice of readiness to load to the charterer or its agent, at the port of loading, (b) has given written advice of such tender to the loading elevator, complete with all customarily required documents, such advice having been presented between the hours of 0900 and 1600 local time on a business day or between the hours of 0900 and 1200 noon on Saturday (provided not a holiday) and (c) is ready to receive grain in the compartments required for loading under this contract.

Buyer shall be allowed to make one substitution of a vessel, provided the substituting vessel is of the same type and approximately the same size and position. If the original or the substituting vessel is unable to lift the commodity by reason of the vessel having sunk or having suffered incapacitating physical damage, an additional substitution shall be made of a vessel of the same type and approximately the same size, and with a position agreeable to buyer and seller. Such agreement shall not be unreasonably withheld. The nomination of the substituting vessel shall be subject to the preadvice requirements of this clause, regardless of any preadvice previously given, unless the estimated time of arrival of the substituting vessel is the same as the estimated time of arrival of the original vessel when nominated. No substitution of vessels other than as provided in this clause shall be made. If this is a "named vessel" contract, no substitution other than after a casualty as described above shall be permitted.

Bills of lading and/or mate's receipts to be considered proof of date of delivery in the absence of evidence to the contrary. Any delivery in part fulfillment of this contract shall be considered as if made under a separate contract.

9. Days

In any month containing an odd number of days, the middle day shall be reckoned as belonging to both halves of the month.

10. Price

per

free on board buyer's tonnage at

If this contract is for a flat price, any variance in quantity from the mean contract quantity shall be settled basis the FOB market value (as defined in paragraph (a) and (b) below).

If the contract price is to be established on an exchange of futures, futures shall be exchanged prior to delivery of the commodity or at least 5 calendar days prior to the last trading day of the applicable futures month, whichever is earlier, to the nearest 5,000 bushels of the mean contract quantity. If deliveries under this contract result in a variance from the mean contract quantity, there shall be another exchange of futures as soon as possible after the last date of loading to bring the resulting amount of futures exchanged to the nearest 5,000 bushels of the quantity delivered. All exchanges of futures shall be made within the range of prices prevailing on the futures market on the date of the exchange. The variance from the mean contract quantity shall be settled basis the market value of the premium (as defined in paragraph (a) and (b) below).

- (a) The FOB (flat price) market value, or the market value of the premium, as the case may be, shall be that prevailing on the close of the appropriate market in the country of origin of the commodity on the last date of loading, if such be a business day, otherwise on the close of such market on the previous business day.
- (b) In the event the parties do not agree on the market value by the time the shipping documents are ready to be transmitted to buyer, seller shall invoice the entire shipment provisionally at contract price. Thereafter, final invoice for the difference between contract price and market value shall be presented as soon as possible and payment shall be made immediately.

11. Payment

*(a) Net cash by irrevocable divisible letters of credit issued or confirmed by a prime U.S. bank in New York (or _____ by mutual agreement), available by sight drafts accompanied by shipping documents per Clause 12 (or warehouse receipts if option (c) of Clause 18 is exercised). Such letters of credit, in a form acceptable to seller, shall be established not later than 5 days prior to the beginning of the delivery period, and shall be valid at least until the 30th day after expiration of the delivery period. Should delivery be delayed beyond the delivery period, buyer, if requested by seller, shall amend letters of credit accordingly and buyer shall increase the amount of the letter of credit to provide for carrying charges, if applicable. All bank charges shall be for buyer's account.

--or--

*(b) Net cash in U.S. Dollars, by telegraphic transfer to the bank designated by seller, against presentation of and in exchange for shipping documents per Clause 12 (or warehouse receipts if option (c) of Clause 18 is exercised). Such presentation shall be made in the city of _____ All bank charges in connection with payment shall be for buyer's account.

--or--

*(c) _____

*Delete paragraphs which are not applicable.

12. Shipping Documents

Payment to be made against bills of lading or mate's receipts (at seller's option), and weight and inspection certificates. However, if practicable, seller shall follow instructions of buyer in establishing bills of lading containing such clauses as buyer's/vessel's agents or owners usually endorse or attach. Buyer shall accept such bills of lading but seller assumes no responsibility for their correctness.

13. Notice of Delivery

Notice of delivery stating vessel's name, dates of bills of lading (or mate's receipts), quantities and qualities loaded (including percentage of dockage if applicable) shall be given or passed on by seller to buyer without undue delay. Notices of delivery shall be subject to correction of any errors.

14. Insurance

Marine and war risk (plus strikes, riots, civil commotions and mine risk) insurance, covering seller's/buyer's interests as they may appear, is to be covered by buyer with first-class approved companies and/or underwriters and to be confirmed by such companies and/or underwriters to seller at least 5 days prior to the expected readiness of the vessel. If this confirmation is not received by seller by such time, seller may place such insurance for buyer's account and at buyer's risk and expense.

15. Communications

All notices under this contract shall be given by letter, if delivered by hand on the day of writing, or by any other method of rapid written communication. Any notice received after 1600 hours (local time at place of receipt) on a business day shall be deemed to have been received on the following business day, except that for notices given and received by parties which are both located in the Continental United States and/or Canada, the reference herein to 1600 hours shall signify 1600 hours New York City time (E.S.T. or E.D.T., as in effect on date of receipt of the notice).

16. Circles

- (a) For the purposes of this clause, a circle shall consist of a series of contracts in which each seller is also a buyer of a commodity of the same description and quality, for delivery at the same ports and with compatible delivery periods.
- (b) If this contract forms part of a circle, each party may agree with the other parties in the circle to forego actual delivery and to participate in a clearing agreement for the settlement of contract price differences. Monies due and owed to parties in the circle shall be payable on the middle day of the contract delivery period.
- (c) If a circle can be shown to exist but no clearing agreement has been reached by the 10th calendar day following the last day of the delivery period, actual delivery shall not be made and payment shall be made by each buyer to its seller of the excess of seller's invoice amount over the lowest invoice amount in the circle. Such payments shall be made promptly after the 10th calendar day following the last day of the delivery period.
- (d) Should any party in a circle fail to make payment on the due date as required under paragraph (b) or (c) above for reasons cited in Clause 23 or for any other reason, payment shall be made between each buyer and its seller of the difference between the seller's invoice amount at contract price and the market value of the commodity on date of insolvency or default, as the case may be. Such payment shall be made latest on the 2nd business day after the due date under paragraph (b) or (c) above. Payments already made under paragraph (b) or (c) above shall be refunded.
- (e) All circle settlements shall be based on the mean contract quantity.

If a circle under paragraph (b), (c) or (d) above exists, Clause 21 shall not apply and Clauses 18 and 20 shall not be invoked. Payments due on a non-business day shall be made not later than the following business day.

All payments made after the delivery period shall include carrying charges from the day following the last day of the delivery period, to the date of payment, at the rates stipulated in this contract. These carrying charges shall be settled individually between each buyer and its seller.

- (f) The parties agree that any dispute arising out of the voluntary clearing agreement entered into in accordance with paragraph (b) above shall be subject to arbitration as to any party thereto. Such arbitration shall be conducted in accordance with the provisions of Clause 30.

**17. U.S./Canadian
Government
Rules and
Regulations**

Buyer and seller agree to comply with the U.S. and/or Canadian regulatory requirements applicable to this contract, including, but not limited to, those governing any export subsidy, destination controls, government financing of agricultural commodities and the monitoring of export purchases and sales. Any losses, fines, penalties, expenses, costs or damages incurred as a result of failure to perform in accordance with this provision shall be borne by the party responsible for such failure.

18. Failure to Take Delivery

If vessel fails to file before the end of the delivery period, buyer shall be in breach of contract and seller shall carry the grain for buyer's account and risk as provided in Clause 19. In the event that buyer has not given vessel nominations conforming to the applicable provisions of Clause 8 by the 15th calendar day following the last day of the delivery period, or if the vessels having been nominated within such time, fail to file by the 35th calendar day following the last day of the delivery period, seller may, in its discretion: (a) continue to carry the commodity for buyer's account and risk, (b) declare buyer in default, or (c) tender to buyer proper warehouse receipts in a quantity equal to the mean quantity open under this contract, in exchange for which buyer shall pay at contract price plus accrued carrying charges, but less out-elevation and outbound weighing and inspection charges. Such tender of warehouse receipts shall be deemed due performance of the contract by seller.

SPECIAL PROVISIONS FOR CONTRACTS PROVIDING FOR DELIVERY AT ST. LAWRENCE, GREAT LAKES OR HUDSON BAY PORTS:

- (1) Seller shall be barred from declaring option (b) above while the navigation in the designated delivery area is officially closed for the ice season, and for 20 days thereafter.
- (2) However, if options (a), (b) and (c) above become available to seller only while the navigation is officially closed, the seller may declare option (b) during the first 10 days it becomes available to him; thereafter, he shall be barred from declaring it, until the 21st day after the official opening of navigation.
- (3) If seller carries the grain into the new season for buyer's account, buyer shall have the right to nominate vessels per Clause 8, regardless of whether vessels were already nominated during the delivery period.

19. Carrying Charges

If the commodity is being carried for buyer's account and risk as provided in Clause 18, it is mutually agreed that carrying charges, consisting of storage, insurance and interest, shall accrue as follows:

- (a) Storage and insurance from the day following the last day of the delivery period up to and including the dates of delivery (or if seller exercises option (b) or (c) of Clause 18, the date applicable thereto), both dates inclusive, at the following rates:

_____ U.S. cents per bushel per day _____

_____ U.S. cents per bushel per day _____

- (b) Interest from the day following the last day of the delivery period up to and including the last day of delivery (or if seller exercises option (b) or (c) of Clause 18, the date applicable thereto), both dates inclusive, at the following rates:

Carrying charges for the delivery completing this contract shall be computed on the mean contract quantity less the amounts previously delivered (if any), irrespective of whether or not buyer has availed himself of the loading tolerance option under Clause 4. It is further expressly agreed that carrying charges as provided herein are to be construed in the nature of liquidated damages and, as such, that no further proof of damages shall be required in substantiation thereof.

20. Strikes or Other Causes Of Delay in Delivery

- (a) This clause shall apply by reason of the causes enumerated in paragraph (b) below:
 - (1) if delivery by seller of the commodity, or any part thereof, is prevented or delayed at the port(s) of delivery and/or elevator(s) of delivery or elsewhere,
 - and/or,
 - (2) if the forwarding of the commodity to such port(s) and/or elevator(s) is prevented;

PROVIDED that seller shall have sent notice to buyer not later than 2 business days after the date of commencement of the causes, or not later than 2 business days after the 1st day of the delivery period, whichever occurs later (except that subsequent sellers shall not be bound by these deadlines, provided they pass along the notice to their buyer, without delay); and PROVIDED further that seller shall, at buyer's request, furnish a certificate of the North American Export Grain Association, Inc., certifying the existence and the duration of the causes. Such certificate shall be final.

- (b) The causes of delay and/or prevention ("causes") referred to in paragraph (a) above shall be:
 - (1) Riots, strikes, lockouts, interruptions in or stoppages of the normal course of labor,
 - (2) Embargoes or exceptional impediments to transportation,
 - (3) Action by Federal, State or local government or authority.
- (c) The obligation of seller to make delivery shall be suspended while the causes are in effect, until the termination of the causes and/or the resumption of work after the termination of the causes, whichever is later. Seller shall not be responsible for further delays after resumption of work (whether such termination or resumption of work occurs prior to, during or after the delivery period) except that, if a vessel nominated under this contract is not loaded in the proper rotation but is bypassed by vessels (other than liners) which had filed after the vessel nominated under this contract, seller shall pay to buyer damages equal to the actual working time lost (weather working days, Saturdays, Sundays and holidays excluded) to buyer's vessel during the loading of the bypassing vessels, at the demurrage rate in the Charter Party for the vessel nominated under this contract.

If the Charter Party of the vessel under this contract does not indicate a demurrage rate, the damages are to be calculated at a reasonable demurrage rate predicated on the then current market, to be agreed upon amicably or to be determined by arbitration.

- (d) (1) If the causes commence before or during the delivery period and terminate during or after delivery period, then the delivery period shall be deemed to be extended by a number of days equivalent to the period starting with the commencement of the causes or the commencement of the delivery period, whichever is later, and ending with the termination of the causes, and/or the resumption of work after the termination of the causes, whichever is later.
- (2) If the causes commence during the additional time afforded to buyer under Clause 18 with respect to vessel nominations and filings, then the right of seller to exercise option (b) or (c) under Clause 18 shall be deemed to be delayed by a number of days equivalent to the period starting with the commencement of the causes and ending with the termination of the causes and/or the resumption of work after the termination of the causes, whichever is later.
- (3) Clause 20 may apply if a vessel has filed during the delivery period and the cause commences after the end of the delivery period.

- (e) Carrying charges, if due under Clauses 18/19, shall begin to accrue on the day following the last day of the delivery period, as extended by paragraph (d)(1) above; however, if this clause becomes operative while carrying charges are already accruing, then such charges shall continue to accrue as they would in the absence of the causes.

- 21. Prohibition** In case of prohibition of export, blockade or hostilities or in case of any executive or legislative act done by or on behalf of the government of the country of origin or of the territory where the ports of loading named herein are situated, restricting export, whether partially or otherwise, any such restriction shall be deemed by both parties to apply to this contract and to the extent of such total or partial restriction to prevent fulfillment and to that extent this contract or any unfulfilled portion thereof shall be cancelled without prejudice to seller's entitlement to carrying charges. Seller shall advise buyer without delay of the reasons therefore, and if required by buyer, seller shall provide certification of the North American Export Grain Association, Inc., as sufficient evidence for cancellation under this clause.
- 22. Default** In case of default by either party, the other party shall be at liberty, after giving notice, to resell or repurchase, as the case may be, without undue delay and the defaulting party shall make good the loss, if any, to the other party but the defaulting party shall not be entitled to any profit. If the non-defaulting party has not repurchased or resold the commodity by the 10th calendar day after the giving of notice of default, the market value on the said 10th day shall be used for settlement purposes. If such 10th day falls on a non-business day, the market value on the previous business day shall govern. In the event of a default by buyer, the sale price under this contract shall automatically be increased by the value of carrying charges calculated up to the date of resale, or the 10th calendar day after the giving of notice of default, whichever is applicable.
- 23. Insolvency** Either party shall, at any time after sending notice, have the right to terminate this contract and to recover the loss (if any) in the event that:
 - (a) the other party suspends payment or commits an act of bankruptcy;
 - or--
 - (b) reasonable grounds for insecurity having arisen with respect to the financial capacity of the other party to perform under this contract, and a written demand for adequate assurance of due performance having been made, such assurance is not received within a period of time not exceeding 5 days.
- 24. Construction** For the purposes of this contract, except as otherwise expressly provided or unless the context otherwise requires, plural terms include the singular.
- 25. Passage of Title** Anything in this contract to the contrary notwithstanding, seller shall retain title to the commodity until seller has been paid in full (per Clause 11), it being understood that risk of loss shall pass to buyer on delivery at discharge end of loading spout (per Clause 8).
- 26. Limitation of Liability** The seller shall not be liable under this contract, except as expressly stated herein, after delivery of the commodity at the discharge end of the loading spout and presentation of the contractually required documentation. The buyer assumes all claims, losses, costs, and damages ("expenses") and risks whatsoever at the discharge end of the loading spout including, but not limited to, compliance with any requirements by customs, quarantine and other authorities except for the U.S. and/or Canadian regulatory requirements applicable to this contract. All such expenses and risks arising from events or actions after the delivery of the commodity at the discharge end of the loading spout shall be the sole responsibility of the buyer, who shall indemnify and hold the seller harmless for all such expenses and risks incurred (including attorney fees).
- 27. International Convention** The following shall not apply to this contract:
 - (a) the Uniform Law on the International Sale of Goods and the Uniform Law on the Formation of Contracts for the International Sale of Goods;
 - (b) the United Nations Convention on Contracts for the International Sale of Goods of 1980; and
 - (c) the United Nations Convention on the Limitation Period in the International Sale of Goods, concluded at New York on 14 June 1974, and the Protocol Amending the Convention on the Limitation Period in the International Sale of Goods, concluded at Vienna on 11 April 1980.
- 28. Governing Law** The parties agree that this contract shall be governed by the laws of the State of New York, notwithstanding any choice of law provision to the contrary.
- 29. Other Conditions**
- 30. Arbitration** Buyer and seller expressly agree that any controversy or claim arising out of, in connection with or relating to this contract, or the interpretation, performance or breach thereof, shall be settled by arbitration in the City of New York before the American Arbitration Association (AAA), or its successors, in accordance with the International Arbitration Rules of the American Arbitration Association, as those Rules may be in effect at the time of such arbitration proceeding, which Rules are hereby deemed incorporated herein and made a part hereof, and under the laws of the State of New York. The number of arbitrators shall be three.

Each party shall designate one arbitrator from the list of Grain Arbitrators maintained and supplied by the North American Export Grain Association, Inc. The two party appointed arbitrators shall select a third panelist from the list of Special Grain Arbitrators or the AAA list of International Arbitrators and this person shall serve as Chairperson of the panel.

AAA shall maintain a list of Special Grain Arbitrators who are included on the North American Export Grain Association, Inc. list of Grain Arbitrators. If the tribunal is not formed by this procedure, the AAA shall appoint the panel in the same manner, two arbitrators from the North American Export Grain Association, Inc. supplied list of Grain Arbitrators and the Chairperson of the panel from the list of Special Grain Arbitrators or the AAA list of International Arbitrators.

The language of the arbitration shall be English. In disputes involving a "string" of contracts, two or more arbitrations may be consolidated before the same tribunal, at the written request of any party. The tribunal in consolidated arbitrations shall be mindful of differences in terms between the various contracts and in the action of the parties, and vary the award from contract to contract, if indicated. The arbitration award shall be final and binding on the parties and judgment upon such arbitration award may be entered in the Supreme Court of the State of New York or any other court having jurisdiction thereof. Buyer and seller hereby recognize and expressly consent to the jurisdiction over each of them of the American Arbitration Association or its successors, and all of the courts of the State of New York. The parties agree that arbitration awards may be released by the AAA to the North American Export Grain Association, Inc., for distribution to the interested public. Buyer and seller agree that this contract shall be deemed to have been made in New York State and be deemed to be performed there, any reference herein or elsewhere to the contrary notwithstanding.

BUYER

SELLER

The waiting time (“waiting time”) at the first berth shall be pro-rated among all the contracts for the commodities to be delivered to the

vessel.

The time spent getting to and used at the first berth ("berth time") shall be pro-rated among the contracts loaded at the first berth.

The waiting time at the second berth shall be pro-rated among all remaining contracts for the commodities yet to be delivered to the vessel.

The berth time at the second berth shall be pro-rated among the contracts loaded at the second berth.

Waiting time and berth time for berths subsequent to the second berth shall be treated in a similar manner as for the second berth.

Waiting time shall cease and berth time begin when pilot is on board and vessel lifts anchor in order to proceed to the loading berth.

Berth time shall cease when loading is completed at that berth and waiting time shall begin when vessel drops anchor in waiting area after having sailed from berth.

If no waiting time is involved between berths, berth time at the next berth shall begin when vessel sails from the previous berth.

If, between the time that the vessel is ordered into a berth and the time of completion of loading at that berth, the vessel is ordered into one or more other berths, subsequently incurred waiting time at this (these) other berth(s) shall not count.

- (c) If the commodities other than those under this contract are delivered at (an)other port(s):

The laytime statement shall be prepared as if the vessel had not called at another port. If the commodities under this contract are loaded at the second or a subsequent port, the words "filing of the vessel in accordance with Clause 8 of the North American Export Grain Association, Inc., FOB Contract No.2 ("NAEGA 2")" in Clause 1(a) above shall be deemed to read "presentation of the vessel's passes". If, however, the first and second or subsequent ports have been nominated by the seller of the grain under this contract, laytime for the second and/or subsequent port(s) shall commence upon vessel's arrival at that or the subsequent port(s); except that, if vessel fails inspection at such port(s), laytime shall cease to count until vessel passes.

7. If vessel fails reinspection at the loading berth, laytime shall cease to count until vessel passes.
8. Any trimming costs as well as overtime costs for performing trimming shall be for buyer's account. Any time used for trimming shall not count as laytime and/or shall be exempt from demurrage, unless loading operations are being carried on simultaneously in other holds.
9. Other Conditions:
10. Buyer and seller expressly agree that any controversy or claim arising out of, in connection with or relating to this contract, or the interpretation, performance or breach thereof, shall be settled by arbitration in the City of New York before the American Arbitration Association (AAA), or its successors, in accordance with the International Arbitration Rules of the American Arbitration Association, as those Rules may be in effect at the time of such arbitration proceeding, which Rules are hereby deemed incorporated herein and made a part hereof, and under the laws of the State of New York. The number of arbitrators shall be three.

Each party shall designate one arbitrator from the list of Grain Arbitrators maintained and supplied by the North American Export Grain Association, Inc. The two party appointed arbitrators shall select a third panelist from the list of Special Grain Arbitrators or the AAA list of International Arbitrators and this person shall serve as Chairperson of the panel.

AAA shall maintain a list of Special Grain Arbitrators who are included on the North American Export Grain Association, Inc. list of Grain Arbitrators. If the tribunal is not formed by this procedure, the AAA shall appoint the panel in the same manner, two arbitrators from the North American Export Grain Association, Inc. supplied list of Grain Arbitrators and the Chairperson of the panel from the list of Special Grain Arbitrators or the AAA list of International Arbitrators.

The language of the arbitration shall be English. In disputes involving a "string" of contracts, two or more arbitrations may be consolidated before the same tribunal, at the written request of any party. The tribunal in consolidated arbitrations shall be mindful of differences in terms between the various contracts and in the action of the parties, and vary the award from contract to contract, if indicated. The arbitration award shall be final and binding on the parties and judgment upon such arbitration award may be entered in the Supreme Court of the State of New York or any other court having jurisdiction thereof. Buyer and seller hereby recognize and expressly consent to the jurisdiction over each of them of the American Arbitration Association or its successors, and all of the courts of the State of New York. The parties agree that arbitration awards may be released by the AAA to the North American Export Grain Association, Inc., for distribution to the interested public. Buyer and seller agree that this contract shall be deemed to have been made in New York State and be deemed to be performed there, any reference herein or elsewhere to the contrary notwithstanding.

BUYER

SELLER

Contract No.27



Copyright
THE GRAIN AND FEED TRADE ASSOCIATION

CONTRACT FOR CANADIAN AND UNITED STATES OF AMERICA GRAIN IN BULK - CARGOES TALE QUALE – CIF/CIFFO/C&F/C&FFO TERMS

** delete/specify as applicable*

Date

1 **SELLERS**.....

2

3 **INTERVENING AS BROKERS**.....

4

5 **BUYERS**.....

6 have this day entered into a contract on the following terms and conditions.

7

8 **1. GOODS**

9 A cargo of

10

11 **2. QUANTITY** 5% more or less.

12 Sellers shall have the option of shipping a further 5% more or less on contract quantity, excess or deficiency
13 over the above 5%, shall be settled at the market price on the date of the last bill of lading, and on the quantity
14 thereof; the value to be fixed by arbitration, unless mutually agreed.

15

16 **3. PRICE AND DESTINATION**

17 At the price (*per tonne of 1,000 kilograms/*per ton of 1016 kilograms or 2240 lbs) gross weight of

18

19 *cost, insurance and freight to

20

21 *cost, insurance and freight free out to

22

23 *cost and freight to

24

25 *cost and freight free out to

26

27 **4. BROKERAGE**.....per tonne, to be paid by Sellers on the mean contract quantity, goods lost

28 or not lost, contract fulfilled or not fulfilled unless such non-fulfilment is due to the cancellation of the
29 contract under the terms of the Prevention of Shipment Clause. Brokerage shall be due on the day shipping
30 documents are exchanged, or if the goods are not appropriated then brokerage shall be due on the 30th
31 consecutive day after the last day for appropriation. Any disputes arising out of this clause shall be referred
32 to arbitration in accordance with the arbitration clause

33

34 **5. QUALITY**

35 ***Warranted to contain** at time and place of discharge.

36

37 ***Official** certificate of inspection, or certification of inspection of at time and place of
38 loading into the ocean carrying vessel, shall be final as to quality.

39 Buyers shall not be entitled to reject a tender of a higher grade of the same colour and description.

40

41 ***Sample**, at time and place of shipment about as per sealed sample marked in possession of
42; the word "about" when referring to quality shall mean the equivalent of 0.50% on contract price.

43 Difference in quality shall not entitle Buyers to reject except under the award of arbitrator(s) or board of
44 appeal, as the case may be, referred to in the Arbitration Rules specified in the Arbitration Clause.

45 **Condition.** Shipment shall be made in good condition. Should the goods arrive out of condition, due regard
46 shall be made for the time of the year in which the shipment took place. The fact of the goods so arriving shall

not necessarily be sufficient proof of an improper shipment.

47
48
49 **6. PERIOD OF SHIPMENT**

50 As per bill(s) of lading dated or to be dated.....
51 The bill(s) of lading to be dated when the goods are actually on board. Date of the bill(s) of lading shall be
52 accepted as proof of date of shipment in the absence of evidence to the contrary. In any month containing an
53 odd number of days, the middle day shall be accepted as being in both halves of the month.

54
55 **7. PORTS OF SHIPMENT**

56 From United States and/or Canadian port(s) including Lake Port(s) and Hudson River not above Albany, but
57 excluding Pacific and Hudson Bay port(s).

58
59 **8. SALES BY NAMED VESSELS**

60 For all sales by named vessel(s), the following shall apply: -

- 61 (a) Position of vessel is mutually agreed between Buyers and Sellers;
62 (b) The word "now" to be inserted before the word "classed" in the Ship's Classification Clause;
63 (c) Appropriation Clause cancelled if sold "shipped".

64
65 **9. SHIP'S CLASSIFICATION**

66 Direct or indirect, by first class mechanically self-propelled vessel(s) suitable for the carriage of the contract
67 goods, classed in accordance with the Institute Classification Clause of the International Underwriting
68 Association in force at the time of shipment.

69
70 **10. NOMINATION OF VESSEL(S) FOR CONTRACTS CONCLUDED ON C & F/C&FFO TERMS**

- 71 (a) At a date agreed between the Parties but in any event prior to the commencement of loading,
72 Sellers shall nominate the intended carrying vessel(s) to Buyers.
73 (b) Sellers are entitled to substitute the nomination(s) provided that the substituting vessel(s) complies
74 with the terms of this clause

75
76 **11. EXTENSION OF SHIPMENT**

77 The contract period for shipment, if such be 31 days or less, shall be extended by an additional period of not
78 more than 8 days, provided that Sellers serve notice claiming extension not later than the next business day
79 following the last day of the originally stipulated period. The notice need not state the number of additional
80 days claimed.

81 Sellers shall make an allowance to Buyers, to be deducted in the invoice from the contract price, based on the
82 number of days by which the originally stipulated period is exceeded, in accordance with the following scale: -

- 83 1 to 4 additional days, 0.50%;
84 5 or 6 additional days, 1%;
85 7 or 8 additional days 1.50% of the gross contract price.

86 If, however, after having served notice to Buyers as above, Sellers fail to make shipment within such 8 days,
87 then the contract shall be deemed to have called for shipment during the originally stipulated period plus 8
88 days, at contract price less 1.50%, and any settlement for default shall be calculated on that basis. If any
89 allowance becomes due under this clause, the contract price shall be deemed to be the original contract price
90 less the allowance and any other contractual differences shall be settled on the basis of such reduced price.

91
92 **12. APPROPRIATION**

- 93 (a) Notice of appropriation shall state the vessel's name, the presumed weight shipped, and the date or the
94 presumed date of the bill of lading.
95 (b) The notice of appropriation shall within 8 consecutive days from the date of the last bill(s) of lading be
96 served by or on behalf of the Shipper direct on his Buyers or on the Selling Agent or Brokers named in the
97 contract. The Non-Business Days Clause shall not apply.
98 (c) Notice of appropriation shall, within the period stated in sub-clause (b) be served by or on behalf of
99 subsequent Sellers on their Buyers or on the Selling Agent or Brokers named in the contract, but if notice of
100 appropriation is received by subsequent Sellers on the last day or after the period stated in sub-clause (b)
101 from the date of the last bill of lading, their notice of appropriation shall be deemed to be in time if served: -
102 (1) On the same calendar day, if received not later than 1600 hours on any business day, or
103 (2) Not later than 1600 hours on the next business day, if received after 1600 hours or on a non-business
104 day.
105 (d) A notice of appropriation served on a Selling Agent or Brokers named in the contract shall be considered
106 an appropriation served on Buyers. A Selling Agent or Brokers receiving a notice of appropriation shall
107 serve like notice of appropriation in accordance with the provisions of this clause. Where the Shipper or

subsequent Sellers serves the notice of appropriation on the Selling Agent, such Selling Agent may serve notice of appropriation either direct to the Buyers or to the Brokers.

(e) The bill of lading date stated in the notice of appropriation shall be for information only and shall not be binding, but in fixing the period laid down by this clause for serving notices of appropriation the actual date of the bill of lading shall prevail.

(f) Every notice of appropriation shall be open to correction of any errors occurring in transmission, provided that the sender is not responsible for such errors, and for any previous error in transmission which has been repeated in good faith.

(g) Should the vessel arrive before receipt of the appropriation and any extra expenses are incurred thereby, such expenses shall be borne by Sellers.

(h) When a valid notice of appropriation has been received by Buyers, it shall not be withdrawn except with their consent.

(i) In the event of less than 95 tonnes being tendered by any one vessel Buyers shall be entitled to refund of any proved extra expenses for sampling, analysis and lighterage incurred thereby at port of discharge.

13. PAYMENT

(a) Payment % of invoice amount by cash in.....in exchange for and on presentation of shipping documents.

(b) Shipping documents – shall consist of - 1. Invoice. 2. Full set(s) of on board Bill(s) of Lading and/or Ship's Delivery Order(s) and/or other Delivery Order(s) in negotiable and transferable form. Such other Delivery Order(s) if required by Buyers, to be countersigned by the Ship owners, their Agents or a recognised bank. 3. For CIF/CIFFO terms Policy (ies) and/or Insurance Certificate(s) and/or Letter(s) of Insurance in the currency of the contract. The Letter(s) of Insurance to be certified by a recognised bank if required by Buyers. 4. Other documents as called for under the contract. Buyers agree to accept documents containing the Chamber of Shipping War Deviation Clause and/or other recognised official War Risk Clause.

(c) In the event of shipping documents not being available when called for by Buyers, or on arrival of the vessel at destination, Sellers shall provide other documents or an indemnity entitling Buyers to obtain delivery of the goods and payment shall be made by Buyers in exchange for same, but such payment shall not prejudice Buyers' rights under the contract when shipping documents are eventually available.

(d) Should Sellers fail to present shipping documents or other documents or an indemnity entitling Buyers to take delivery, Buyers shall take delivery under an indemnity provided by themselves and shall pay for the other documents when presented. Any reasonable extra expenses, including the costs of such indemnity or extra charges incurred by reason of the failure of Sellers to provide such documents, shall be borne by Sellers, but such payment shall not prejudice Buyers' rights under the contract when shipping documents are eventually available.

(e) Should shipping documents be presented with an incomplete set of bill(s) of lading or should other shipping documents be missing, payment shall be made provided that delivery of such missing documents is guaranteed, such guarantee to be countersigned, if required by Buyers, by a recognised bank.

(f) Costs of collection shall be for account of Sellers, but if Buyers demand presentation only through a bank of their choice, in that event any additional collection costs shall be borne by Buyers.

(g) No obvious clerical error in the documents shall entitle Buyers to reject them or delay payment, but Sellers shall be responsible for all loss or expense caused to Buyers by reason of such error and Sellers shall on request furnish an approved guarantee in respect thereto.

(h) **Interest.** If there has been unreasonable delay in any payment, interest appropriate to the currency involved shall be charged. If such charge is not mutually agreed, a dispute shall be deemed to exist which shall be settled by arbitration. Otherwise interest shall be payable only where specifically provided in the terms of the contract or by an award of arbitration. The terms of this clause do not override the parties' contractual obligation under sub-clause (a).

14. DUTIES, TAXES, LEVIES, ETC.

Sellers shall customs clear the goods for export. All export duties, taxes, levies, etc., present or future, in country of origin, shall be for Sellers' account. All import duties, taxes, levies, etc., present or future, in country of destination, shall be for Buyers' account.

15. DISCHARGE

(a) **For CIF/C&F terms,** discharge shall be as fast as the vessel can deliver in accordance with the custom of the port, but in the event of shipment being made under liner bill(s) of lading, discharge shall be as fast as the vessel can deliver in accordance with the terms of the bill(s) of lading. The cost of discharge from hold to ship's rail shall be for Sellers' account, from ship's rail overboard for Buyers' account.

(b) **For C&FFO/CIFFO terms,** the cost of discharge shall be for Buyers' account.

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Discharge shall be at the average rate of tonnes per Weather Working Day, Saturdays, Sundays, Holidays Excepted, Unless Used, (WWD SSEX UU), in which case actual time used to count. Notice of Readiness (NOR) shall be tendered during ordinary office hours on arrival, Whether In Port Or Not, (WIPON), Whether In Berth Or Not, (WIBON), Whether In Free Pratique Or Not, (WIFPON), Whether Customs Cleared Or Not (WCCON) and laytime shall commence at 0800 hours on the next working day. Rate of demurrage/despatch as per Charter Party. In the event of a time charter, the daily hire rate shall be taken as the rate of demurrage, half despatch.

(c) If documents are tendered which do not provide for discharging as above or contain contrary stipulations, Sellers shall be responsible to Buyers for all extra expenses incurred thereby. Discharge by grab(s) shall be permitted unless specifically excluded at time of contract. If shipment is effected by lash barge, then the last day of discharge shall be the day of discharging the last lash barge at the port of destination.

16. WEIGHING

The terms and conditions of GAFTA Weighing Rules No. 123 are deemed to be incorporated into this contract. Unless otherwise agreed, final settlement shall be made on the basis of gross delivered weights at time and place of discharge at Buyers' expense. If the place of destination is outside the port limits, Buyers agree to pay the extra expenses incurred by Sellers or their agents for weighing. No payment shall be made for increase in weight occasioned by water and/or oil during the voyage. If final at time and place of loading, as per GAFTA registered superintendents' certificate at Sellers' choice and expense, (in which case the deficiency clause will not apply).

17. DEFICIENCY

Any deficiency in the bill of lading weight shall be paid for by Sellers and any excess over bill of lading weight shall be paid for by Buyers at contract price.

18. SAMPLING, ANALYSIS AND CERTIFICATES OF ANALYSIS

The terms and conditions of GAFTA Sampling Rules No.124 are deemed to be incorporated into this contract. Samples shall be taken at the time of discharge on or before removal from the ship or quay, unless the parties agree that quality final at loading applies, in which event samples shall be taken at time and place of loading. The parties shall appoint superintendents, for the purposes of supervision and sampling of the goods, from the GAFTA Register of Superintendents. Unless otherwise agreed, analysts shall be appointed from the GAFTA Register of Analysts.

19. FUMIGATION

Where fumigation has been agreed, the terms and conditions of GAFTA Fumigation Rules No. 132 shall be incorporated into this contract.

20. INSURANCE

20.1 For Contracts Concluded on CIF/CIFFO terms Sellers shall provide insurance on terms not less favourable than those set out hereunder, and as set out in detail in GAFTA Insurance Terms No.72 viz.:-

(a) Risks Covered: -

- Cargo Clauses (WA) with average payable, with 3% franchise or better terms - Section 2 of Form 72
- War Clauses (Cargo) - Section 4 of Form 72
- Strikes, Riots and Civil Commotions Clauses (Cargo) - Section 5 of Form 72
- Australian, Canadian, South African and United States of America Acts - Section 6 of Form 72

(b) Insurers - The insurance to be effected with first class underwriters and/or companies who are domiciled or carrying on business in the United Kingdom or who, for the purpose of any legal proceedings, accept a British domicile and provide an address for service of process in London, but for whose solvency Sellers shall not be responsible.

(c) Insurable Value - Insured amount to be for not less than 2% over the invoice amount, including freight when freight is payable on shipment or due in any event, ship and/or cargo lost or not lost, and including the amount of any War Risk premium payable by Buyers.

(d) Freight Contingency - When freight is payable on arrival or on right and true delivery of the goods and the insurance does not include the freight, Sellers shall effect insurance upon similar terms, such insurance to attach only as such freight becomes payable, for the amount of the freight plus 2%, until the termination of the risk as provided in the above mentioned clauses, and shall undertake that their policies are so worded that in the case of a particular or general average claim the Buyers shall be put in the same position as if the C.I.F. value plus 2% were insured from the time of shipment.

230 (e) Certificates/Policies - Sellers shall give all policies and/or certificates and/or letters of insurance provided for
231 in this contract, (duly stamped if applicable) for original and increased value (if any) for the value stipulated
232 in (c) above. In the event of a certificate of insurance being supplied, it is agreed that such certificate shall be
233 exchanged by Sellers for a policy if and when required and such certificate shall state on its face that it is so
234 exchangeable. If required by Buyers, letter(s) of insurance shall be guaranteed by a recognised Bank, or by
235 any other guarantor who is acceptable to Buyers.

236 (f) Total Loss - In the event of total or constructive total loss, or where the amount of the insurance becomes
237 payable in full, the insured amount in excess of 2% over the invoice amount shall be for Sellers' account and
238 the party in possession of the policy (ies) shall collect the amount of insurance and shall thereupon settle with
239 the other party on that basis.

240 (g) Currency of Claims - Claims to be paid in the currency of the contract.

241 (h) War and Strike Risks Premiums - Any premium in excess of 0.50% to be for account of Buyers. The rate of such
242 insurance not to exceed the rate ruling in London at time of shipment or date of vessel's sailing whichever
243 may be adopted by underwriters. Such excess premium shall be claimed from Buyers, wherever possible,
244 with the Provisional Invoice, but in no case later than the date of vessel's arrival, or not later than 7 consecutive
245 days after the rate has been agreed with underwriters, whichever may be the later, otherwise such claim shall
246 be void unless, in the opinion of Arbitrators, the delay is justifiable. Sellers' obligation to provide War Risk
247 Insurance shall be limited to the terms and conditions in force and generally obtainable in London at time of
248 shipment.

249 (i) Where Sellers are responsible for allowances or other payments to Buyers under the contractual terms,
250 (and which risks are also covered by the insurance provided by Sellers), the Buyers, on receipt of settlement,
251 shall immediately return to Sellers the insurance documents originally received from them and shall, if
252 required, subrogate to Sellers all right of claim against the Insurers in respect of such matters.

253 **20.2 For Contracts Concluded on C & F/C&FFO terms** Buyers shall be responsible for obtaining
254 insurance cover as per Clause 20.1 above and shall, if required by Sellers, provide evidence to Sellers
255 prior to the commencement of loading that they have obtained suitable cover. If Buyers refuse or fail
256 to provide evidence Sellers are entitled (but not obliged) to cover insurance on the same terms at the
257 Buyers' expense.

258 21. PREVENTION OF SHIPMENT

259 "Event of Force Majeure" means (a) prohibition of export or other executive or legislative act done by or on
260 behalf of the government of the country of origin or of the territory where the port or ports named herein
261 is/are situate, restricting export, whether partially or otherwise, or (b) blockade, or (c) acts of terrorism, or
262 (d) hostilities, or (e) strike, lockout or combination of workmen, or (f) riot or civil commotion, or (g)
263 breakdown of machinery, or (h) fire, or (i) ice, or (j) Act of God, or (k) unforeseeable and unavoidable
264 impediments to transportation or navigation, or (l) any other event comprehended in the term "force
265 majeure".
266

267 Should Sellers' performance of this contract be prevented, whether partially or otherwise, by an Event of
268 Force Majeure, the performance of this contract shall be suspended for the duration of the Event of Force
269 Majeure, provided that Sellers shall have served a notice on Buyers within 7 consecutive days of the
270 occurrence or not later than 21 consecutive days before commencement of the shipment period, whichever
271 is later, with the reasons therefor.
272

273 If the Event of Force Majeure continues for 21 consecutive days after the end of the shipment period, then
274 Buyers have the option to cancel the unfulfilled part of the contract by serving a notice on Sellers not later
275 than the first business day after expiry of the 21 day period.
276

277 If this option to cancel is not exercised then the contract shall remain in force for an additional period of 14
278 consecutive days, after which, if the Event of Force Majeure has not ceased, any unfulfilled part of the
279 contract shall be automatically cancelled.
280

281 If the Event of Force Majeure ceases before the contract or any unfulfilled part thereof can be cancelled,
282 Sellers shall notify Buyers without delay that the Event of Force Majeure has ceased. Sellers shall be
283 entitled, from the cessation, to as much time as was left for shipment under the contract prior to the
284 occurrence of the Event of Force Majeure. If the time that was left for shipment under the contract is 14
285 days or less, a period of 14 consecutive days shall be allowed.
286

287 The burden of proof lies upon Sellers and the parties shall have no liability to each other for delay and/or
288 non-fulfilment under this clause, provided that Sellers shall have provided to Buyers, if required, satisfactory
289 evidence justifying the delay or non-fulfilment.
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22. CIRCLE

Where Sellers re-purchase from their Buyers or from any subsequent buyer the same goods or part thereof, a circle shall be considered to exist as regards the particular goods so re-purchased, and the provisions of the Default Clause shall not apply. (For the purpose of this clause the same goods shall mean goods of the same description, from the same country of origin, of the same quality, and, where applicable, of the same analysis warranty, for shipment to the same port(s) of destination during the same period of shipment). Different currencies shall not invalidate the circle. Subject to the terms of the Prevention of Shipment Clause in the contract, if a circle is established prior to the goods being appropriated to all parties in the circle, settlement shall be based on the mean contract quantity. However, where a circle is established after the goods have been appropriated to all parties in the circle, settlement shall be based on the appropriated quantity. No circle settlement shall apply where documents have been presented to and paid by one of the parties in the circle. Settlement shall be made between the parties in the circle by payment by all Buyers to their Sellers of the excess of the Sellers' invoice amount over the lowest invoice amount in the circle. Payment shall be due not later than 15 consecutive days after the last day for appropriation, or, should the circle not be ascertained before the expiry of this time, then payment shall be due not later than 15 consecutive days after the circle is ascertained. Where the circle includes contracts expressed in different currencies the lowest invoice amount shall be replaced by the market price on the first day for contractual shipment and invoices shall be settled between each Buyer and his Seller in the circle by payment of the differences between the market price and the relative contract price in currency of the contract. All Sellers and Buyers shall give every assistance to ascertain the circle and when a circle shall have been ascertained in accordance with this clause same shall be binding on all parties to the circle. As between Buyers and Sellers in the circle, the non-presentation of documents by Sellers to their Buyers shall not be considered a breach of contract. Should any party in the circle prior to the due date of payment commit any act comprehended in the Insolvency Clause of his contract, settlement by all parties in the circle shall be calculated at the closing out price as provided for in the Insolvency Clause, which shall be taken as a basis for settlement, instead of the lowest invoice amount in the circle. In this event respective Buyers shall make payment to their Sellers or respective Sellers shall make payment to their Buyers of the difference between the closing out price and the contract price.

23. NOTICES

- (a) All notices required to be served on the parties pursuant to this contract shall be served in legible form by E-mail, or by other mutually recognised electronic method of rapid communication, always subject to the provision that if receipt of any notice is contested, the burden of proof of transmission shall be on the sender who shall, in the case of a dispute, establish, to the satisfaction of the arbitrator(s) or board of appeal appointed pursuant to the Arbitration Clause, that the notice was actually transmitted to the addressee.
- (b) In case of resales/repurchases, all notices shall be served without delay by sellers on their respective buyers or vice versa, and any notice received after 1600 hours on a business day shall be deemed, for the purpose of passing onto their sub buyers and sub sellers, to have been received on the business day following.
- (c) A notice to the Brokers or Agent shall be deemed a notice under this contract.

24. NON-BUSINESS DAYS

Saturdays, Sundays and the officially recognised and/or legal holidays of the respective countries and any days, which GAFTA may declare as non-business days for specific purposes, shall be non-business days. Should the time limit for doing any act or serving any notice expire on a non-business day, the time so limited shall be extended until the first business day thereafter. The period of shipment shall not be affected by this clause.

25. DEFAULT

- In default of fulfilment of contract by either party, the following provisions shall apply: -
- (a) The party other than the defaulter shall, at their discretion have the right, after serving a notice on the defaulter to sell or purchase, as the case may be, against the defaulter, and such sale or purchase shall establish the default price.
 - (b) If either party be dissatisfied with such default price or if the right at (a) above is not exercised and damages cannot be mutually agreed, then the assessment of damages shall be settled by arbitration.
 - (c) The damages payable shall be based on, but not limited to, the difference between the contract price and either the default price established under (a) above or upon the actual or estimated value of the goods, on the

352 date of default, established under (b) above.

353 (d) In no case shall damages include loss of profit on any sub-contracts made by the party defaulted against or
354 others unless the arbitrator(s) or board of appeal, having regard to special circumstances, shall in his/their
355 sole and absolute discretion think fit.

356 (e) Damages, if any, shall be computed on the quantity appropriated if any but, if no such quantity has been
357 appropriated then on the mean contract quantity, and any option available to either party shall be deemed to
358 have been exercised accordingly in favour of the mean contract quantity.

359 (f) Default may be declared by Sellers at any time after expiry of the contract period, and the default date shall
360 then be the first business day after the date of Sellers' advice to their Buyers. If default has not already been
361 declared then (notwithstanding the provisions stated in the Appropriation Clause) if notice of appropriation
362 has not been served by the 10th consecutive day after the last day for appropriation laid down in the contract,
363 the Sellers shall be deemed to be in default, and the default date shall then be the first business day thereafter.

364 **26. INSOLVENCY**

365 26.1 If before the fulfilment of this contract, either party shall:

366 (a) suspend payments;

367 (b) notify any of the creditors that he is unable to meet debts or that he has suspended or that he is about to
368 suspend payments of his debts;

369 (c) convene, call or hold a meeting of creditors;

370 (d) propose either:

371 (i) a voluntary arrangement; or

372 (ii) a restructuring plan under Part 26A Companies Act 2006;

373 (e) be subject to a moratorium pursuant to Part A1 of the Insolvency Act 1986;

374 (f) be subject to either:

375 (i) a notice of intention to appoint an administrator; or

376 (ii) a notice of appointment of an administrator;

377 (g) have an administration order made;

378 (h) be subject to a winding up petition;

379 (i) have a winding up order made;

380 (j) have a receiver or manager appointed;

381 (k) convene, call or hold a meeting to go into liquidation (other than for re-construction or amalgamation);

382 (l) become subject to an interim order under Section 252 of the Insolvency Act 1986; or

383 (m) have a bankruptcy petition presented against him,

384 (any of which acts being hereinafter called an "**Act of Insolvency**")

385 then the party committing such Act of Insolvency shall forthwith serve a notice of the occurrence of such
386 Act of Insolvency on the other party to the contract and upon proof (by either the other party to the
387 contract or the office-holder or other person representing the party committing the Act of Insolvency)
388 that such notice was served within 2 business days of the occurrence of the Act of Insolvency, the contract
389 shall be closed out at the market price ruling on the business day following the serving of the notice.

390 26.2 If such notice has not been served, then the other party, on learning of the occurrence of the Act of
391 Insolvency, shall have the option of declaring the contract closed out at either the market price on the
392 first business day after the date when such party first learnt of the occurrence of the Act of Insolvency or
393 at the market price ruling on the first business day after the date when the Act of Insolvency occurred.

394 26.3 In all cases the other party to the contract shall have the option of ascertaining the settlement price on
395 the closing out of the contract by re-purchase or re-sale, and the difference between the contract price
396 and the re-purchase or re-sale price shall be the amount payable or receivable under this contract.
397

398 **27. DOMICILE**

399 This contract shall be deemed to have been made in England and to be performed in England,
400 notwithstanding any contrary provision, and this contract shall be construed and take effect in accordance
401 with the laws of England. Except for the purpose of enforcing any award made in pursuance of the Arbitration
402 Clause of this contract, the Courts of England shall have exclusive jurisdiction to determine any application
403 for ancillary relief, (save for obtaining security only for the claim or counter-claim)
404 the exercise of the powers of the Court in relation to the arbitration proceedings and any dispute other than
405 a dispute which shall fall within the jurisdiction of arbitrators or board of appeal of the Association pursuant
406 to the Arbitration Clause of this contract. For the purpose of any legal proceedings each party shall be
407 deemed to be ordinarily resident or carrying on business at the offices of The Grain and Feed Trade
408 Association, England, (GAFTA), and any party residing or carrying on business in Scotland shall be held to
409 have prorogated jurisdiction against himself to the English Courts or if in Northern Ireland to have submitted
410 to the jurisdiction and to be bound by the decision of the English Courts. The service of
411

413 proceedings upon any such party by leaving the same at the offices of The Grain and Feed Trade
414 Association, together with the posting of a copy of such proceedings to his address outside England, shall be
415 deemed good service, any rule of law or equity to the contrary notwithstanding.

416 **28. ARBITRATION**

417 (a) Any and all disputes arising out of or under this contract or any claim regarding the interpretation or
418 execution of this contract shall be determined by arbitration in accordance with the GAFTA Arbitration
419 Rules, No 125, in the edition current at the date of this contract; such Rules are incorporated into and form
420 part of this Contract and both parties hereto shall be deemed to be fully cognisant of and to have expressly
421 agreed to the application of such Rules.

422 (b) Neither party hereto, nor any persons claiming under either of them shall bring any action or other
423 legal proceedings against the other in respect of any such dispute, or claim until such dispute or claim shall
424 first have been heard and determined by the arbitrator(s) or a board of appeal, as the case may be, in
425 accordance with the Arbitration Rules and it is expressly agreed and declared that the obtaining of an
426 award from the arbitrator(s) or board of appeal, as the case may be, shall be a condition precedent to the
427 right of either party hereto or of any persons claiming under either of them to bring any action or other
428 legal proceedings against the other of them in respect of any such dispute or claim.

429 (c) Nothing contained under this Arbitration Clause shall prevent the parties from seeking to obtain
430 security in respect of their claim or counterclaim via legal proceedings in any jurisdiction, provided such
431 legal proceedings shall be limited to applying for and/or obtaining security for a claim or counterclaim, it
432 being understood and agreed that the substantive merits of any dispute or claim shall be determined solely
433 by arbitration in accordance with the GAFTA Arbitration Rules, No 125.
434

435 **29. INTERNATIONAL CONVENTIONS**

436 The following shall not apply to this contract: -

437 (a) The Uniform Law on Sales and the Uniform Law on Formation to which effect is given by the Uniform
438 Laws on International Sales Act 1967.

439 (b) The United Nations Convention on Contracts for the International Sale of Goods of 1980.

440 (c) The United Nations Convention on Prescription (Limitation) in the International Sale of Goods of 1974 and
441 the amending Protocol of 1980.

442 (d) Incoterms.

443 (e) Unless the contract contains any statement expressly to the contrary, a person who is not a party to this
444 contract has no right under the Contract (Rights of Third Parties) Act 1999 to enforce any term of it.
445

446 **30. METHODS OF ANALYSIS**

447 Unless otherwise agreed, the terms and conditions of GAFTA Methods of Analysis No. 130 are deemed
448 to be incorporated into this contract.
449

SellersBuyers

Printed in England and issued by

GAFTA
THE GRAIN AND FEED TRADE ASSOCIATION
9 LINCOLN'S INN FIELDS, LONDON WC2A 3BP

Contract No.30



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THE GRAIN AND FEED TRADE ASSOCIATION

CONTRACT FOR CANADIAN AND UNITED STATES OF AMERICA GRAIN IN BULK PARCELS TALE QUALE – CIF/CIFFO/C&F/C&FFO TERMS

** delete/specify as applicable*

Date.....

1 **SELLERS**.....

2

3 **INTERVENING AS BROKERS**.....

4

5 **BUYERS**.....

6 have this day entered into a contract on the following terms and conditions.

7

8 **1. GOODS**.....

9

10 **2. QUANTITY** 2% more or less.

11 Sellers shall have the option of shipping a further 3%, more or less on contract quantity, excess or deficiency
12 over the above 2%, shall be settled at the market price on the date of bill of lading, and on the quantity
13 thereof; the value to be fixed by arbitration, unless mutually agreed. In the event of more than one shipment
14 being made, each shipment shall be considered a separate contract, but the margin on the mean quantity sold
15 shall not be affected thereby.

16

17 **3. PRICE AND DESTINATION**

18 At the price (*per tonne of 1,000 kilograms/*per ton of 1016 kilograms or 2240 lbs) gross weight of

19

20

21

22 *cost, insurance and freight to

23

24 *cost, insurance and freight free out to

25

26 *cost and freight to

27

28 *cost and freight free out to

29

30 **4. BROKERAGE**.....per tonne, to be paid by Sellers on the mean contract quantity, goods lost

31 or not lost, contract fulfilled or not fulfilled unless such non-fulfilment is due to the cancellation of the
32 contract under the terms of the Prevention of Shipment Clause. Brokerage shall be due on the day shipping
33 documents are exchanged, or if the goods are not appropriated then brokerage shall be due on the 30th
34 consecutive day after the last day for appropriation. Any disputes arising out of this clause shall be referred
35 to arbitration in accordance with the arbitration clause.

36

37 **5. QUALITY**

38 * **Warranted to contain**..... at time and place of discharge.

39

40 * **Official**..... certificate of inspection, or certification of inspection of at time and place of
41 loading into the ocean carrying vessel, shall be final as to quality. Buyers shall not be entitled to reject a
42 tender of a higher grade of the same colour and description.

43

44 ***Sample**, at time and place of shipment about as per sealed sample marked in possession of
45

46 Difference in quality shall not entitle Buyers to reject except under the award of arbitrator(s) or board of

47 appeal, as the case may be, referred to in the Arbitration Rules specified in the Arbitration Clause.

48 **Condition.** Shipment shall be made in good condition. Should the goods arrive out of condition, due regard
49 shall be made for the time of the year in which the shipment took place. The fact of the goods so arriving shall
50 not necessarily be sufficient proof of an improper shipment.
51

52 **6. PERIOD OF SHIPMENT**

53 As per bill(s) of lading dated or to be dated
54 The bill(s) of lading to be dated when the goods are actually on board. Date of the bill(s) of lading shall be
55 accepted as proof of date of shipment in the absence of evidence to the contrary. In any month containing an
56 odd number of days, the middle day shall be accepted as being in both halves of the month.
57

58 **7. PORTS OF SHIPMENT**

59 From United States and/or Canadian port(s) including Lake Port(s) and Hudson River not above Albany, but
60 excluding Pacific and Hudson Bay port(s).
61

62 **8. SALES BY NAMED VESSELS**

63 For all sales by named vessels, the following shall apply: -
64 (a) Position of vessel is mutually agreed between Buyers and Sellers;
65 (b) The word "now" to be inserted before the word "classed" in the Ship's Classification Clause;
66 (c) Appropriation Clause cancelled if sold "shipped".
67

68 **9. SHIP'S CLASSIFICATION**

69 Shipment by first class mechanically self-propelled vessel(s) suitable for the carriage of the contract goods,
70 classed in accordance with the Institute Classification Clause of the International Underwriting Association in
71 force at the time of shipment, excluding tankers and vessels which are either classified in Lloyd's Register or
72 described in Lloyd's Shipping Index as "Ore/Oil" vessels
73

74 **10. NOMINATION OF VESSEL(S) FOR CONTRACTS CONCLUDED ON C & F/C&FFO TERMS**

75 (a) At a date agreed between the Parties but in any event prior to the commencement of loading,
76 Sellers shall nominate the intended carrying vessel(s) to Buyers.
77 (b) Sellers are entitled to substitute the nomination(s) provided that the substituting vessel(s)
78 complies with the terms of this clause.
79

80 **11. EXTENSION OF SHIPMENT**

81 The contract period for shipment, if such be 31 days or less, shall be extended by an additional period of not
82 more than 8 days, provided that Sellers serve notice claiming extension not later than the next business day
83 following the last day of the originally stipulated period. The notice need not state the number of additional
84 days claimed.

85 Sellers shall make an allowance to Buyers, to be deducted in the invoice from the contract price, based on the
86 number of days by which the originally stipulated period is exceeded, in accordance with the following scale: -

- 87 1 to 4 additional days, 0.50%;
- 88 5 or 6 additional days, 1%;
- 89 7 or 8 additional days 1.50% of the gross contract price.

90 If, however, after having served notice to Buyers as above, Sellers fail to make shipment within such 8 days,
91 then the contract shall be deemed to have called for shipment during the originally stipulated period plus 8
92 days, at contract price less 1.50%, and any settlement for default shall be calculated on that basis. If any
93 allowance becomes due under this clause, the contract price shall be deemed to be the original contract price
94 less the allowance and any other contractual differences shall be settled on the basis of such reduced price.
95

96 **12. APPROPRIATION**

97 (a) Notice of appropriation shall state the vessel's name, the presumed weight shipped, and the date or the
98 presumed date of the bill of lading.
99 (b) The notice of appropriation shall within 8 consecutive days from the date of the bill(s) of lading be
100 served by or on behalf of the Shipper direct on his Buyers or on the Selling Agent or Brokers named in the
101 contract. The Non-Business Days Clause shall not apply.
102 (c) Notice of appropriation shall, within the period stated in sub-clause (b) be served by or on behalf of
103 subsequent Sellers on their Buyers or on the Selling Agent or Brokers named in the contract, but if notice of
104 appropriation is received by subsequent Sellers on the last day or after the period stated in sub-clause (b)
105 from the date of the bill of lading, their notice of appropriation shall be deemed to be in time if served: -
106 (1) On the same calendar day, if received not later than 1600 hours on any business day, or
107

(2) Not later than 1600 hours on the next business day, if received after 1600 hours or on a non-business day.

(d) A notice of appropriation served on a Selling Agent or Brokers named in the contract shall be considered an appropriation served on Buyers. A Selling Agent or Brokers receiving a notice of appropriation shall serve like notice of appropriation in accordance with the provisions of this clause. Where the Shipper or subsequent Sellers serves the notice of appropriation on the Selling Agent, such Selling Agent may serve notice of appropriation either direct to the Buyers or to the Brokers.

(e) The bill of lading date stated in the notice of appropriation shall be for information only and shall not be binding, but in fixing the period laid down by this clause for serving notices of appropriation the actual date of the bill of lading shall prevail.

(f) Every notice of appropriation shall be open to correction of any errors occurring in transmission, provided that the sender is not responsible for such errors, and for any previous error in transmission which has been repeated in good faith.

(g) Should the vessel arrive before receipt of the appropriation and any extra expenses is incurred thereby, such expenses shall be borne by Sellers.

(h) When a valid notice of appropriation has been received by Buyers, it shall not be withdrawn except with their consent.

(i) In the event of less than 95 tonnes being tendered by any one vessel Buyers shall be entitled to refund of any proved extra expenses for sampling, analysis and lighterage incurred thereby at port of discharge.

13. PAYMENT

(a) **Payment** % of invoice amount by cash in in exchange for and on presentation of shipping documents.

(b) **Shipping documents** – shall consist of - 1. Invoice. 2. Full set(s) of on board Bill(s) of Lading and/or Ship's Delivery Order(s) and/or other Delivery Order(s) in negotiable and transferable form. Such other Delivery Order(s) if required by Buyers, to be countersigned by the Shipowners, their Agents or a recognised bank. 3. For CIF/CIFFO terms Policy (ies) and/or Insurance Certificate(s) and/or Letter(s) of Insurance in the currency of the contract. The Letter(s) of Insurance to be certified by a recognised bank if required by Buyers. 4. Other documents as called for under the contract. Buyers agree to accept documents containing the Chamber of Shipping War Deviation Clause and/or other recognised official War Risk Clause.

(c) In the event of shipping documents not being available when called for by Buyers, or on arrival of the vessel at destination, Sellers shall provide other documents or an indemnity entitling Buyers to obtain delivery of the goods and payment shall be made by Buyers in exchange for same, but such payment shall not prejudice Buyers' rights under the contract when shipping documents are eventually available.

(d) Should Sellers fail to present shipping documents or other documents or an indemnity entitling Buyers to take delivery,

Buyers shall take delivery under an indemnity provided by themselves and shall pay for the other documents when presented. Any reasonable extra expenses, including the costs of such indemnity or extra charges incurred by reason of the failure of Sellers to provide such documents, shall be borne by Sellers, but such payment shall not prejudice Buyers' rights under the contract when shipping documents are eventually available.

(e) Should shipping documents be presented with an incomplete set of bill(s) of lading or should other shipping documents be missing, payment shall be made provided that delivery of such missing documents is guaranteed, such guarantee to be countersigned, if required by Buyers, by a recognised bank.

(f) Costs of collection shall be for account of Sellers, but if Buyers demand presentation only through a bank of their choice, in that event any additional collection costs shall be borne by Buyers.

(g) No obvious clerical error in the documents shall entitle Buyers to reject them or delay payment, but Sellers shall be

responsible for all loss or expense caused to Buyers by reason of such error and Sellers shall on request furnish an approved guarantee in respect thereto.

(h) Interest. If there has been unreasonable delay in any payment, interest appropriate to the currency involved shall be charged. If such charge is not mutually agreed, a dispute shall be deemed to exist which shall be settled by arbitration. Otherwise interest shall be payable only where specifically provided in the terms of the contract or by an award of arbitration. The terms of this clause do not override the parties' contractual obligation under sub-clause (a).

14. DUTIES, TAXES, LEVIES, ETC.

Sellers shall customs clear the goods for export. All export duties, taxes, levies, etc., present or future, in country of origin, shall be for Sellers' account. All import duties, taxes, levies, etc., present or future, in country of destination, shall be for Buyers' account.

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15. DISCHARGE

(a) For CIF/C&F terms, discharge shall be as fast as the vessel can deliver in accordance with the custom of the port, but in the event of shipment being made under liner bill(s) of lading, discharge shall be as fast as the vessel can deliver in accordance with the terms of the bill(s) of lading. The cost of discharge from hold to ship's rail shall be for Sellers' account, from ship's rail overboard for Buyers' account.

(b) For C&FFO/CIFFO terms, the cost of discharge shall be for Buyers' account.

Discharge shall be at the average rate of tonnes per Weather Working Day, Saturdays, Sundays, Holidays Excepted, Unless Used, (WWD SSHEX UU), in which case actual time used to count. Notice of Readiness (NOR) shall be tendered during ordinary office hours on arrival, Whether In Port Or Not, (WIPON), Whether In Berth Or Not, (WIBON), Whether In Free Pratique Or Not, (WIFPON), Whether Customs Cleared Or Not (WCCON) and laytime shall commence at 0800 hours on the next working day. Rate of demurrage/despatch as per Charter Party. In the event of a time charter, the daily hire rate shall be taken as the rate of demurrage, half despatch.

(c) If documents are tendered which do not provide for discharging as above or contain contrary stipulations, Sellers shall be responsible to Buyers for all extra expenses incurred thereby. Discharge by grab(s) shall be permitted unless specifically excluded at time of contract. If shipment is effected by lash barge, then the last day of discharge shall be the day of discharging the last lash barge at the port of destination.

16. SAMPLING, ANALYSIS AND CERTIFICATES OF ANALYSIS

The terms and conditions of GAFTA Sampling Rules No.124 are deemed to be incorporated into this contract. Samples shall be taken at the time of discharge on or before removal from the ship or quay, unless the parties agree that quality final at loading applies, in which event samples shall be taken at time and place or loading. The parties shall appoint superintendents, for the purposes of supervision and sampling of the goods, from the GAFTA Register of Superintendents. Unless otherwise agreed, analysts shall be appointed from the GAFTA Register of Analysts.

17. FUMIGATION

Where fumigation has been agreed, the terms and conditions of GAFTA Fumigation Rules No. 132 shall be incorporated into this contract.

18. WEIGHING

The terms and conditions of GAFTA Weighing Rules No.123 are deemed to be incorporated into this contract. Unless otherwise agreed, final settlement shall be made on the basis of gross delivered weights at time and place of discharge at Buyers' expense. If the place of destination is outside the port limits, Buyers agree to pay the extra expenses incurred by Sellers or their agents for weighing. No payment shall be made for increase in weight occasioned by water and/or oil during the voyage. If final at time and place of loading, as per GAFTA registered superintendents' certificate at Sellers' choice and expense, (in which case the Deficiency Clause will not apply).

19. DEFICIENCY

Any deficiency in the bill of lading weight shall be paid for by Sellers and any excess over bill of lading weight shall be paid for by buyers at contract price, (unless the Pro-rata clause applies).

19. PRO RATA

(a) Should any of the above mentioned quantity form part of a larger quantity of the same or a different period of shipment of bags of the same mark, or of a similar quality, whether in bags or bulk or whether destined to more than one port, no separation or distinction shall be necessary.

(b) All loose collected, damaged goods and sweepings shall be shared by and apportioned pro-rata in kind between the various Receivers thereof at the port of discharge named in the contract, buying under contracts containing this clause. In the event of this not being practicable or any of them receiving more or less than his pro-rata share or apportionment, he shall settle with the other(s) on a pro-rata basis in cash at the market price and each Receiver shall bear his proportion of the depreciation in market value. The pro-rata statement shall be established by the Sellers or their Representatives in conjunction with the Receivers or their Representatives.

(c) The above pro-rata apportionment between Receivers shall have no bearing on the establishment of final invoices with Sellers and for the purpose of these invoices, the total quantity of loose collected, damaged goods and sweepings shall be regarded as delivered to those Receivers who did not receive their full invoiced

230 quantity.

231 (d) In the case of excess or deficiency, the difference between the invoiced and the total delivered quantity
232 shall be settled at the market price by final invoices to be rendered by Receivers, who have received more or
233 less than that paid for, to their immediate Sellers without taking into consideration the above pro-rata
234 apportionment between Receivers.

235 (e) If an excess quantity is delivered to one or more Receiver and a deficient quantity is delivered to one or
236 more Receiver, the excess and deficiency shall be settled between them at the market price. Invoices shall be
237 established with immediate Sellers for any balance resulting from this settlement.

238 (f) All Shippers, Sellers and Buyers of any part of such larger quantity as aforesaid under contracts containing
239 this clause shall be deemed to have entered into mutual agreements with one another to the above effect, and
240 to agree to submit to arbitration all questions and claims between them or any of them in regard to the
241 execution of this clause as aforesaid in accordance with the Arbitration Clause of this contract. Sellers and
242 Buyers shall give all reasonable assistance in execution of this clause. All Sellers shall be responsible for the
243 settlement by the respective Buyers in accordance with this clause within a reasonable time.

244 (g) The market price wherever mentioned in this clause shall be the market price on the last day of discharge
245 of the vessel in the port of destination, such price to be fixed by arbitration unless mutually agreed.

246 (h) In the event of this clause being brought into operation, any allowances payable in respect of condition, or
247 quality, or under any of the other guarantees contained in this contract, shall be based upon the actual weight
248 received by the Buyers and not on the pro-rata weight.

249 (i) In the event of any conflict in terms of apportionment applicable to the port of discharge the methods
250 published by The Grain and Feed Trade Association shall, where applicable, take precedence over sub-clauses
251 (b) to (h) above.

252 (j) In the event that sub-clause (a) applies or that the goods subsequently become co-mingled, and that the
253 goods were shipped by more than one Shipper and destined for one or more ports of discharge then, after the
254 adjustment between Receivers under the terms of this clause, the Shippers shall settle pro-rata between
255 themselves in proportion to their bill of lading quantities. Such settlements shall be made in cash and in the
256 event of two or more discharging ports being involved, then the settlement price shall be the average of the
257 market prices on the last day of discharge in the respective ports.

258 20. INSURANCE

259 **20.1 For Contracts Concluded on CIF/CIFFO terms** Sellers shall provide insurance on terms not less
260 favourable than those set out hereunder, and as set out in detail in GAFTA Insurance Terms No.72
261 viz.:-

262 (a) Risks Covered: -

263 Cargo Clauses (WA) with average payable, with 3% franchise or better terms - Section 2 of Form 72

264 War Clauses (Cargo) - Section 4 of Form 72

265 Strikes, Riots and Civil Commotions Clauses (Cargo) - Section 5 of Form 72

266 Australian, Canadian, South African and United States of America Acts - Section 6 of Form

267 72

268 (b) Insurers - The insurance to be effected with first class underwriters and/or companies who are domiciled
269 or carrying on business in the United Kingdom or who, for the purpose of any legal proceedings, accept a
270 British domicile and provide an address for service of process in London, but for whose solvency Sellers shall
271 not be responsible.

272 (c) Insurable Value - Insured amount to be for not less than 2% over the invoice amount, including freight
273 when freight is payable on shipment or due in any event, ship and/or cargo lost or not lost, and including the
274 amount of any War Risk premium payable by Buyers.

275 (d) Freight Contingency - When freight is payable on arrival or on right and true delivery of the goods and the
276 insurance does not include the freight, Sellers shall effect insurance upon similar terms, such insurance to
277 attach only as such freight becomes payable, for the amount of the freight plus 2%, until the termination of the
278 risk as provided in the above mentioned clauses, and shall undertake that their policies are so worded that in
279 the case of a particular or general average claim the Buyers shall be put in the same position as if the C.I.F.
280 value plus 2% were insured from the time of shipment.

281 (e) Certificates/Policies - Sellers shall give all policies and/or certificates and/or letters of insurance provided
282 for in this contract, (duly stamped if applicable) for original and increased value (if any) for the value stipulated
283 in (c) above. In the event of a certificate of insurance being supplied, it is agreed that such certificate shall be
284 exchanged by Sellers for a policy if and when required and such certificate shall state on its face that it is so
285 exchangeable. If required by Buyers, letter(s) of insurance shall be guaranteed by a recognised bank, or by any
286 other guarantor who is acceptable to Buyers.

287 (f) Total Loss - In the event of total or constructive total loss, or where the amount of the insurance becomes
288 payable in full, the insured amount in excess of 2% over the invoice amount shall be for Sellers' account and
289 the party in possession of the policy (ies) shall collect the amount of insurance and shall thereupon settle with
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the other party on that basis.

(g) Currency of Claims - Claims to be paid in the currency of the contract.

(h) War and Strike Risks Premiums - Any premium in excess of 0.50% to be for account of Buyers. The rate of such insurance not to exceed the rate ruling in London at time of shipment or date of vessel's sailing whichever may be adopted by underwriters. Such excess premium shall be claimed from Buyers, wherever possible, with the Provisional Invoice, but in no case later than the date of vessel's arrival, or not later than 7 consecutive days after the rate has been agreed with underwriters, whichever may be the later, otherwise such claim shall be void unless, in the opinion of Arbitrators, the delay is justifiable. Sellers' obligation to provide War Risk Insurance shall be limited to the terms and conditions in force and generally obtainable in London at time of shipment.

(i) Where Sellers are responsible for allowances or other payments to Buyers under the contractual terms, (and which risks are also covered by the insurance provided by Sellers), the Buyers, on receipt of settlement, shall immediately return to Sellers the insurance documents originally received from them and shall, if required, subrogate to Sellers all right of claim against the Insurers in respect of such matters.

20.2 For Contracts Concluded on C & F/C&FFO terms Buyers shall be responsible for obtaining insurance cover as per Clause 20.1 above and shall, if required by Sellers, provide evidence to Sellers prior to the commencement of loading that they have obtained suitable cover. If Buyers refuse or fail to provide evidence Sellers are entitled (but not obliged) to cover insurance on the same terms at the Buyers' expense

21. PREVENTION OF SHIPMENT

"Event of Force Majeure" means (a) prohibition of export or other executive or legislative act done by or on behalf of the government of the country of origin or of the territory where the port or ports named herein is/are situate, restricting export, whether partially or otherwise, or (b) blockade, or (c) acts of terrorism, or (d) hostilities, or (e) strike, lockout or combination of workmen, or (f) riot or civil commotion, or (g) breakdown of machinery, or (h) fire, or (i) ice, or (j) Act of God, or (k) unforeseeable and unavoidable impediments to transportation or navigation, or (l) any other event comprehended in the term "force majeure".

Should Sellers' performance of this contract be prevented, whether partially or otherwise, by an Event of Force Majeure, the performance of this contract shall be suspended for the duration of the Event of Force Majeure, provided that Sellers shall have served a notice on Buyers within 7 consecutive days of the occurrence or not later than 21 consecutive days before commencement of the shipment period, whichever is later, with the reasons therefor.

If the Event of Force Majeure continues for 21 consecutive days after the end of the shipment period, then Buyers have the option to cancel the unfulfilled part of the contract by serving a notice on Sellers not later than the first business day after expiry of the 21 day period.

If this option to cancel is not exercised then the contract shall remain in force for an additional period of 14 consecutive days, after which, if the Event of Force Majeure has not ceased, any unfulfilled part of the contract shall be automatically cancelled.

If the Event of Force Majeure ceases before the contract or any unfulfilled part thereof can be cancelled, Sellers shall notify Buyers without delay that the Event of Force Majeure has ceased. Sellers shall be entitled, from the cessation, to as much time as was left for shipment under the contract prior to the occurrence of the Event of Force Majeure. If the time that was left for shipment under the contract is 14 days or less, a period of 14 consecutive days shall be allowed.

The burden of proof lies upon Sellers and the parties shall have no liability to each other for delay and/or non-fulfilment under this clause, provided that Sellers shall have provided to Buyers, if required, satisfactory evidence justifying the delay or non-fulfilment.

22. CIRCLE

Where Sellers re-purchase from their Buyers or from any subsequent buyer the same goods or part thereof, a circle shall be considered to exist as regards the particular goods so re-purchased, and the provisions of the Default Clause shall not apply. (For the purpose of this clause the same goods shall mean goods of the same description, from the same country of origin, of the same quality, and, where applicable, of the same analysis warranty, for shipment to the same port(s) of destination during the same period of shipment). Different currencies shall not invalidate the circle. Subject to the terms of the Prevention of Shipment Clause in the contract, if a circle is established prior to the goods being appropriated to all parties in the circle, settlement shall be based on the mean contract quantity.

352 However, where a circle is established after the goods have been appropriated to all parties in the
353 circle, settlement shall be based on the appropriated quantity. No circle settlement shall apply where
354 documents have been presented to and paid by one of the parties in the circle. Settlement shall be
355 made between the parties in the circle by payment by all Buyers to their Sellers of the excess of the
356 Sellers' invoice amount over the lowest invoice amount in the circle. Payment shall be due not later
357 than 15 consecutive days after the last day for appropriation, or, should the circle not be ascertained
358 before the expiry of this time, then payment shall be due not later than 15 consecutive days after the
359 circle is ascertained. Where the circle includes contracts expressed in different currencies the lowest
360 invoice amount shall be replaced by the market price on the first day for contractual shipment and
361 invoices shall be settled between each Buyer and his Seller in the circle by payment of the differences
362 between the market price and the relative contract price in currency of the contract. All Sellers and
363 Buyers shall give every assistance to ascertain the circle and when a circle shall have been
364 ascertained in accordance with this clause same shall be binding on all parties to the circle. As
365 between Buyers and Sellers in the circle, the non-presentation of documents by Sellers to their
366 Buyers shall not be considered a breach of contract. Should any party in the circle prior to the due
367 date of payment commit any act comprehended in the Insolvency Clause of his contract, settlement by
368 all parties in the circle shall be calculated at the closing out price as provided for in the Insolvency
369 Clause, which shall be taken as a basis for settlement, instead of the lowest invoice amount in the
370 circle. In this event respective Buyers shall make payment to their Sellers or respective Sellers shall
371 make payment to their Buyers of the difference between the closing out price and the contract price.

372 **23. NOTICES**

373 (a) All notices required to be served on the parties pursuant to this contract shall be served in legible form by
374 E-mail, or by other mutually recognised electronic method of rapid communication, always subject to the
375 provision that if receipt of any notice is contested, the burden of proof of transmission shall be on the sender
376 who shall, in the case of a dispute, establish, to the satisfaction of the arbitrator(s) or board of appeal
377 appointed pursuant to the Arbitration Clause, that the notice was actually transmitted to the addressee.

378 (b) In case of resales/repurchases, all notices shall be served without delay by sellers on their respective
379 buyers or vice versa, and any notice received after 1600 hours on a business day shall be deemed, for the
380 purpose of passing onto their sub buyers and sub sellers, to have been received on the business day following.

381 (c) A notice to the Brokers or Agent shall be deemed a notice under this contract.
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383 **24. NON-BUSINESS DAYS**

384 Saturdays, Sundays and the officially recognised and/or legal holidays of the respective countries and any
385 days, which GAFTA may declare as non-business days for specific purposes, shall be non-business days. Should
386 the time limit for doing any act or serving any notice expire on a non-business day, the time so limited shall be
387 extended until the first business day thereafter. The period of shipment shall not be affected by this clause.
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389 **25. DEFAULT**

390 In default of fulfilment of contract by either party, the following provisions shall apply:-

391 (a) The party other than the defaulter shall, at their discretion have the right, after serving a notice on the
392 defaulter, to sell or purchase, as the case may be, against the defaulter, and such sale or purchase shall establish
393 the default price.

394 (b) If either party be dissatisfied with such default price or if the right at (a) above is not exercised and
395 damages cannot be mutually agreed, then the assessment of damages shall be settled by arbitration.

396 (c) The damages payable shall be based on, but not limited to, the difference between the contract price and
397 either the default
398 price established under (a) above or upon the actual or estimated value of the goods, on the date of default,
399 established under (b) above.

400 (d) In no case shall damages include loss of profit on any sub-contracts made by the party defaulted against or
401 others unless the arbitrator(s) or board of appeal, having regard to special circumstances, shall in his/their
402 sole and absolute discretion think fit.

403 (e) Damages, if any, shall be computed on the quantity appropriated if any but, if no such quantity has been
404 appropriated then on the mean contract quantity, and any option available to either party shall be deemed to
405 have been exercised accordingly in favour of the mean contract quantity.

406 (f) Default may be declared by Sellers at any time after expiry of the contract period, and the default date shall
407 then be the first business day after the date of Sellers' advice to their Buyers. If default has not already been
408 declared then (notwithstanding the provisions stated in the Appropriation Clause) if notice of appropriation
409 has not been served by the 10th consecutive day after the last day for appropriation laid down in the contract,
410 the Sellers shall be deemed to be in default and the default date shall then be the first business day thereafter.
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26. INSOLVENCY

26.1 If before the fulfilment of this contract, either party shall:

- (a) suspend payments;
- (b) notify any of the creditors that he is unable to meet debts or that he has suspended or that he is about to suspend payments of his debts;
- (c) convene, call or hold a meeting of creditors;
- (d) propose either:
 - (i) a voluntary arrangement; or
 - (ii) a restructuring plan under Part 26A Companies Act 2006;
- (e) be subject to a moratorium pursuant to Part A1 of the Insolvency Act 1986;
- (f) be subject to either:
 - (i) a notice of intention to appoint an administrator; or
 - (ii) a notice of appointment of an administrator;
- (g) have an administration order made;
- (h) be subject to a winding up petition;
- (i) have a winding up order made;
- (j) have a receiver or manager appointed;
- (k) convene, call or hold a meeting to go into liquidation (other than for re-construction or amalgamation);
- (l) become subject to an interim order under Section 252 of the Insolvency Act 1986; or
- (m) have a bankruptcy petition presented against him,

(any of which acts being hereinafter called an “**Act of Insolvency**”) then the party committing such Act of Insolvency shall forthwith serve a notice of the occurrence of such Act of Insolvency on the other party to the contract and upon proof (by either the other party to the contract or the office-holder or other person representing the party committing the Act of Insolvency) that such notice was served within 2 business days of the occurrence of the Act of Insolvency, the contract shall be closed out at the market price ruling on the business day following the serving of the notice.

26.2 If such notice has not been served, then the other party, on learning of the occurrence of the Act of Insolvency, shall have the option of declaring the contract closed out at either the market price on the first business day after the date when such party first learnt of the occurrence of the Act of Insolvency or at the market price ruling on the first business day after the date when the Act of Insolvency occurred.

26.3 In all cases the other party to the contract shall have the option of ascertaining the settlement price on the closing out of the contract by re-purchase or re-sale, and the difference between the contract price and the re-purchase or re-sale price shall be the amount payable or receivable under this contract.

27. DOMICILE

This contract shall be deemed to have been made in England and to be performed in England, notwithstanding any contrary provision, and this contract shall be construed and take effect in accordance with the laws of England. Except for the purpose of enforcing any award made in pursuance of the Arbitration Clause of this contract, the Courts of England shall have exclusive jurisdiction to determine any application for ancillary relief, (save for obtaining security only for the claim or counter-claim), the exercise of the powers of the Court in relation to the arbitration proceedings and any dispute other than a dispute which shall fall within the jurisdiction of arbitrators or board of appeal of the Association pursuant to the Arbitration Clause of this contract. For the purpose of any legal proceedings each party shall be deemed to be ordinarily resident or carrying on business at the offices of The Grain and Feed Trade Association, England, (GAFTA), and any party residing or carrying on business in Scotland shall be held to have prorogated jurisdiction against himself to the English Courts or if in Northern Ireland to have submitted to the jurisdiction and to be bound by the decision of the English Courts. The service of proceedings upon any such party by leaving the same at the offices of The Grain and Feed Trade Association, together with the posting of a copy of such proceedings to his address outside England, shall be deemed good service, any rule of law or equity to the contrary notwithstanding.

28. ARBITRATION

- (a) Any and all disputes arising out of or under this contract or any claim regarding the interpretation or execution of this contract shall be determined by arbitration in accordance with the GAFTA Arbitration Rules, No 125, in the edition current at the date of this contract; such Rules are incorporated into and form part of this Contract and both parties hereto shall be deemed to be fully cognisant of and to have expressly agreed to the application of such Rules.
- (b) Neither party hereto, nor any persons claiming under either of them shall bring any action or other legal

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proceedings against the other in respect of any such dispute, or claim until such dispute or claim shall first have been heard and determined by the arbitrator(s) or a board of appeal, as the case may be, in accordance with the Arbitration Rules and it is expressly agreed and declared that the obtaining of an award from the arbitrator(s) or board of appeal, as the case may be, shall be a condition precedent to the right of either party hereto or of any persons claiming under either of them to bring any action or other legal proceedings against the other of them in respect of any such dispute or claim.

(c) Nothing contained under this Arbitration Clause shall prevent the parties from seeking to obtain security in respect of their claim or counterclaim via legal proceedings in any jurisdiction, provided such legal proceedings shall be limited to applying for and/or obtaining security for a claim or counterclaim, it being understood and agreed that the substantive merits of any dispute or claim shall be determined solely by arbitration in accordance with the GAFTA Arbitration Rules, No 125.

29. INTERNATIONAL CONVENTIONS

The following shall not apply to this contract: -

- (a) The Uniform Law on Sales and the Uniform Law on Formation to which effect is given by the Uniform Laws on International Sales Act 1967.
- (b) the United Nations Convention on Contracts for the International Sale of Goods of 1980.
- (c) The United Nations Convention on Prescription (Limitation) in the International Sale of Goods of 1974 and the amending Protocol of 1980.
- (d) Incoterms.
- (e) Unless the contract contains any statement expressly to the contrary, a person who is not a party to this contract has no right under the Contract (Rights of Third Parties) Act 1999 to enforce any term of it.

30. METHODS OF ANALYSIS

Unless otherwise agreed, the terms and conditions of GAFTA Methods of Analysis No. 130 are deemed to be incorporated into this contract.

SellersBuyers

Printed in England and issued by

GAFTA
THE GRAIN AND FEED TRADE ASSOCIATION
9 LINCOLN'S INN FIELDS, LONDON WC2A 3BP



Effective for Contracts dated from 01st March 2022

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Gafta

**THE GRAIN AND FEED TRADE ASSOCIATION
9 LINCOLN'S INN FIELDS, LONDON WC2A 3BP**

post@gafta.com

www.gafta.com

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ARBITRATION RULES NO. 125

Any dispute arising out of a contract or arbitration agreement, which incorporates or refers to these Rules, shall be referred to arbitration, and arbitrator(s) or board of appeal, as the case may be, will proceed to determine all issues put before them, in accordance with the following provisions: -

1. PRELIMINARY

- 1.1** The provisions of the Arbitration Act 1996, and of any statutory amendment, modification or re-enactment thereof for the time being in force, shall apply to every arbitration and/or appeal under these Rules save insofar as such provisions are expressly modified by, or are inconsistent with, these Rules.
- 1.2** The juridical seat of the arbitration shall be, and is hereby designated pursuant to section 4 of the Arbitration Act 1996 as, England.
- 1.3** Any oral hearing fixed in an arbitration shall take place at a place designated by The Grain and Feed Trade Association (Gafsa), London, or (but without prejudice to Rules 1.1 and 1.2 above), elsewhere if agreed by the parties in writing.

2. PROCEDURE AND TIME LIMITS FOR CLAIMING ARBITRATION

The claimant shall serve on the respondent a notice stating his intention to refer a dispute to arbitration within the following time limits. (The appointment of arbitrators shall be in accordance with Rule 3).

2.1 When Samples are to be Examined by Arbitrators

- (a) In respect of disputes arising out of the "Rye Terms" clause not later than the 10th consecutive day after the date of completion of final discharge. (See Rule 6).
- (b) In other cases where samples are to be examined by the arbitrators, not later than the 21st consecutive day after completion of loading or of delivery or of discharge or of unstuffing of the container, as the case may be.

2.2 Other Disputes

In respect of all other disputes relating to the sale of goods: -

- (a) arising out of CIF, CIFFO, C & F, C&FFO and similar shipment contract terms, not later than one year after (i) the expiry of the contract period of shipment, including extension if any, or (ii) the date of completion of final discharge of the ship at port of destination, whichever period shall last expire,
- (b) arising out of FOB terms, not later than one year after (i) the date of the last bill of lading or (ii) the expiry of the contract period of delivery, including extension if any, whichever period shall first expire,
- (c) on any other terms, not later than one year after the last day of the contractual delivery, collection or arrival period, as the case may be

- 2.3** No award by the tribunal shall be questioned or set aside on appeal or otherwise on the ground that the claim was not made within the time limits stipulated in this Rule if the respondent to the claim did not raise the matter in their submissions, so as to enable the tribunal to consider whether or not to exercise the discretion vested in it by Rule 23.

3. APPOINTMENT OF THE TRIBUNAL

The dispute shall be heard and determined by a tribunal of three arbitrators (appointed in accordance with Rule 3.2) or, if both parties agree, by a sole arbitrator (appointed in accordance with clause 3.1). This Rule is without prejudice to Rule 6, which governs the appointment of the tribunal in relation to disputes arising out of the Rye Terms clause, and Rule 5.3, which governs the appointment of a tribunal for examination of samples.

3.1 Procedure for the Appointment of a Sole Arbitrator

- (a) If he requires the appointment of a sole arbitrator the claimant shall, before expiry of the time limit for claiming arbitration, serve a notice on the respondent seeking his agreement to the appointment of a sole arbitrator by Gafta.
- (b) Not later than the 9th consecutive day after service of the notice referred to in (a) above, the respondent shall either; (i) serve a notice on the claimant stating that he agrees to the appointment of a sole arbitrator by Gafta, or (ii) appoint an arbitrator to a tribunal of three arbitrators and serve on the claimant a notice of the arbitrator so appointed, in which case Rule 3.2(c) shall apply.
- (c) Where the parties have agreed to the appointment of a sole arbitrator, or where the respondent has not responded to the claimant's notice under 3.1(a) above, or where the respondent has not agreed to a sole arbitrator but has not appointed an arbitrator, Gafta shall appoint an arbitrator on receipt of the first statements and evidence submitted in accordance with Rule 4, or, where interlocutory or interim decisions are required of the tribunal, upon the application of either party.

3.2 Procedures for the Appointment of a Tribunal of Three Arbitrators

- (a) The claimant shall before the expiry of the time limit for claiming arbitration appoint an arbitrator and serve a notice on the respondent of the name of the arbitrator so appointed, or apply to Gafta for the appointment of an arbitrator on its behalf and serve a copy of the application on the respondent.
- (b) The respondent shall, not later than the 9th consecutive day after service of the notice of the name of the claimant's arbitrator, appoint a second arbitrator and serve a notice on the claimant of the name of the arbitrator so appointed.
- (c) If the respondent does not agree to the appointment of a sole arbitrator and has instead appointed an arbitrator and given written notice thereof pursuant to Rule 3.1 (b), the claimant shall not later than the 9th consecutive day after service of such notice of appointment, appoint a second arbitrator and serve a notice on the respondent of the name of the arbitrator so appointed.
- (d) Where two arbitrators have been appointed, Gafta shall appoint a third arbitrator on receipt of the first statements and evidence submitted in accordance with Rule 4, or, where interlocutory or interim decisions are required of a tribunal, upon the application of either party. The third arbitrator shall be the chairman of the tribunal so formed and his name shall be notified to the parties by Gafta.

3.3 Procedures for the Appointments of Arbitrators by Gafta.

If either party fails to appoint an arbitrator or to give notice thereof within the above time limits, the

other party may apply to Gafta for the appointment of an arbitrator. Notice of such application must be served on the party who has failed to appoint.

Where the claimant has already sought the respondent's agreement to the appointment of a sole arbitrator pursuant to Rule 3.1, then Gafta will on receipt of the first statements and evidence submitted in accordance with Rule 4, or, where interlocutory or interim decisions are required of the tribunal, upon the application of either party appoint a sole arbitrator. Where either party has already appointed an arbitrator, pursuant to Rule 3.1(b) or Rule 3.2, then Gafta will appoint the second arbitrator of the tribunal.

3.4 Applications to Gafta for the appointment of an arbitrator shall be accompanied by: -

- (a) prima facie evidence that the parties have entered into a contract subject to these Rules,
- (b) copies of the notices (i) claiming arbitration and (ii) stating that an application will be made to Gafta for the appointment of an arbitrator,
- (c) the appropriate fee ruling at the date of application,

3.5 Upon applications being made to Gafta under Rule 3 for the appointment(s) of an arbitrator(s), Gafta will make the appointment(s) and will give notice of the name(s) of the arbitrator(s) appointed to the parties.

3.6 Any party making an application to Gafta for the appointment of an arbitrator, may be required by Gafta to pay a deposit of such sum as it may require on account of any fees and expenses thereafter arising.

3.7 An arbitrator appointed under these Rules shall be a Gafta Qualified Arbitrator and shall not be interested in the transaction nor directly interested as a member of a company or firm named as a party to the arbitration, nor financially retained by any such company or firm, nor a member of nor financially retained by any company or firm financially associated with any party to the arbitration.

3.8 An appointment of an arbitrator shall be valid and effective for all purposes provided that he has signified his acceptance of the appointment to the party appointing him, or to Gafta, as the case may be, at any time prior to the discharge of any arbitral function.

3.9 (a) If an arbitrator dies, refuses to act, resigns, or becomes incapable of acting, and/or refuses to stand down in circumstances where, in Gafta's reasonable opinion, it would be appropriate for him to do so, or if he fails to proceed with the arbitration, or is found to be ineligible, or his authority is revoked by the Gafta pursuant to the Gafta Rules and Regulations and Code of Conduct for Qualified Arbitrators, the party, or Gafta as the case maybe, who originally appointed that arbitrator shall forthwith appoint a substitute and serve notice thereof on the other party.

(b) If a party fails, contrary to (a) above, to appoint a substitute arbitrator and to give notice thereof within 5 consecutive days of learning of the arbitrator's death, refusal to act, resignation, incapacity, failure to proceed, finding of ineligibility or revocation of authority, as the case may be, Gafta shall, upon the application of either party, have the power to appoint a substitute arbitrator.

4. ARBITRATION PROCEDURE

4.1 The claimant shall draw up clear and full submissions of his case, which, together with a copy of the contract and any supporting documents shall be served as set out in Rule 4.4. The claimant shall deposit with Gafta such sum as Gafta considers appropriate on account of the costs, fees and expenses of the arbitration. If the deposit is not received by Gafta by 12 noon on the 60th consecutive day of the date on which it was called for, the application shall be deemed to be waived and barred. Time limits as per Rule 2 to apply.

- 4.2** The respondent shall, on receipt of the claimant's case and documents, draw up a clear and full defence submissions (and counterclaim, if any) which, together with any supporting documents, shall be served as set out in Rule 4.4.
- 4.3** The claimant may submit further written comments and/or documents in reply, such to be served as set out in Rule 4.4.
- 4.4** All submissions and evidence shall be served by sending them to the other party, with copies to Gafta. In the case of a sole arbitrator 2 sets, or in the case of a tribunal of three arbitrators, 4 sets of statements and evidence shall be delivered to Gafta. All submissions and evidence are to be in English or with English translations.
- 4.5** The tribunal may vary or depart from the above procedure in order to give each party a reasonable opportunity of putting his case and dealing with that of his opponent, and shall adopt procedures suitable to the circumstances of the particular case, avoiding unnecessary delay or expense, so as to provide a fair means for the resolution of the matters falling to be determined.
- 4.6** Upon receipt of the deposit as per Rule 4:1 the timetable for the proceedings, including any steps to be taken pursuant to Rule 4 and/or determined by the tribunal will be advised to the parties by Gafta. It shall be the duty of the tribunal to ensure the prompt progress of the arbitration, including the making of orders where appropriate. Any delay in the proceedings may be notified to Gafta.
- 4.7** Nothing in this Rule shall prevent the respondent from delivering his statement and documentary evidence before receiving documents/statements from the claimant.
- 4.8** The tribunal may grant an oral hearing if requested by a party to do so, on such terms and conditions as it deems appropriate, or decide whether in the circumstances of the case it is necessary to convene one. In the event that there is to be an oral hearing, the date, time and place will be arranged by Gafta. The form in which the parties can join an oral hearing is at the tribunal's discretion. In exceptional circumstances where, as a consequence, the majority of the tribunal are unable to travel to the designated place of hearing, the tribunal may, at its absolute discretion and where it believes it appropriate to do so, convene a virtual hearing using such electronic media as it deems fit. The decision of the tribunal shall be final and binding on the parties. The parties may be represented by one of their employees, or by a Gafta Qualified Arbitrator or other representative, but they may not be represented by a solicitor or barrister, or other legally qualified advocate, wholly or principally engaged in private practice, unless legal representation is expressly agreed. The tribunal may call upon either party to deposit with Gafta such sum or sums as the tribunal considers appropriate on account of fees, costs and expenses.
- 4.9** Where no oral hearing is to take place members of a three arbitrator tribunal need not meet in person but may communicate with each other by post, telephone, fax, e-mail or other appropriate means in order to discuss the parties' submissions and to arrive at a decision of the dispute, always without prejudice to the requirement in Rule 9.1 below that the chairman shall sign the award.
- 4.10 Lapse of Claim**
If neither party submits any documentary evidence or submissions as set out in this Rule or as ordered by the tribunal, within 1 year from the date of the notice claiming arbitration, then, the claimant's claim shall be deemed to have lapsed on the expiry of the said period of 1 year unless before that date the claim is renewed:
- (a) by a notice served by either party on the other, such notice to be served during the 30 consecutive days prior to the expiry date, or
 - (b) by the service of documentary evidence or submissions by either party,
- in which case the claim and counterclaim are each renewed for a further year.

The claim may be thus renewed for successive periods of 1 year, but not to exceed more than 6 years from the date of the first notice served in accordance with Rule 2. Wherever a claim is renewed any counterclaim is also deemed to be renewed.

- 4.11** If the arbitration is abandoned, suspended or concluded, by agreement or otherwise, before the final award is made, the parties shall be jointly and severally liable to pay to Gafta the tribunal's and Gafta's costs, fees and expenses.

5. SAMPLES

- 5.1** If either party wish to submit samples for examination by the tribunal, those samples shall be drawn, sealed and despatched to Gafta in accordance with the provisions of the Gafta Sampling Rules No. 124, no later than 21 consecutive days after the date of completion of discharge or of the unstuffing of the container or the date the sample was taken, as the case may be, and shall be held at the disposal of the tribunal.
- 5.2** As soon as possible after receipt (and if necessary prior to the completion of the exchange of submissions and documents pursuant to Rule 4 and/or the order of the tribunal), the samples shall be examined by the tribunal.
- 5.3** Upon the joint application of both parties and at their expense, Gafta may arrange for the examination of the samples to take place at the relevant place agreed by the parties, by the tribunal to be appointed by Gafta. This provision does not over-ride the parties' obligations to take, seal and despatch samples where required by the Gafta Sampling Rules No. 124. The tribunal so appointed shall determine all matters in dispute between the parties.
- 5.4** All samples sent to Gafta for arbitration, testing and/or other purposes shall become and be the absolute property of Gafta.

6. ARBITRATION PROCEDURE FOR CLAIMS ARISING OUT OF THE "RYE TERMS" CLAUSE

- 6.1** When the claimant has served on the respondent notice of its intention to refer the dispute to arbitration in accordance with Rule 2.1(a) he shall send a copy of the notice to Gafta, together with sufficient information to identify the samples relating to the claim.
- 6.2** Notwithstanding anything to the contrary in these Rules, upon receipt of the notice as above, Gafta shall appoint a tribunal of three arbitrators.
- 6.3** Any documentary submissions or evidence to be submitted by the parties shall be provided in accordance with Rule 4.
- 6.4** An award made pursuant to this Rule shall be final and binding and no appeal shall lie to a board of appeal.

7. STRING ARBITRATIONS – CONSOLIDATED ARBITRATIONS AND CONCURRENT HEARINGS

- 7.1** If a contract forms part of a string of contracts which contain materially identical terms (albeit that the price may vary under each contract), the tribunal may hold a single arbitration to determine the dispute between the first seller and the last buyer in the string as though they were parties who had contracted with each other, provided all the parties in the string of contracts agree to it in writing.

Any award made in such proceedings shall, subject only to any right of appeal pursuant to Rule 10, be binding on all the parties in the string and may be enforced by an intermediate party against his immediate contracting party as though a separate award had been made pursuant to each contract.

- 7.2** In the absence of an agreement from all the parties involved, the tribunal has the right to conduct arbitral proceedings concurrently with other arbitral proceedings, and, in particular, concurrent or consolidated hearings may be held, but separate awards shall be made pursuant to each contract.

8. ISSUES OF SUBSTANTIVE JURISDICTION, PROVISIONAL ORDERS AND AWARDS ON DIFFERENT ASPECTS

8.1 Issues of Substantive Jurisdiction

- (a) The tribunal may rule on its own jurisdiction, that is, as to whether there is a valid arbitration agreement, whether the tribunal is properly constituted and what matters have been submitted to arbitration in accordance with the arbitration agreement.
- (b) In the event that the tribunal determines it has no jurisdiction, Gafta will notify the parties of the tribunal's decision. Such decision shall be final and binding upon the parties subject to any right of appeal to a board of appeal pursuant to Rule 10. Gafta will invoice the claimant for any costs, fees and expenses incurred. In the event that the tribunal determines that it has jurisdiction, no appeal shall lie to a board of appeal.
- (c) If the board of appeal upholds the tribunal's determination that it has no jurisdiction, the board of appeal shall order accordingly and Gafta shall notify the parties and the tribunal and will invoice the appellant for any costs, fees and expenses incurred.
- (d) If the board of appeal reverses the tribunal's determination that it has no jurisdiction, the board of appeal shall order accordingly, and Gafta shall notify the parties and the tribunal, and shall order that the dispute be referred to arbitration afresh, whereupon:-
 - (i) The dispute shall be deemed to be one arising out of a contract embodying these Rules.
 - (ii) The tribunal formerly appointed shall thereupon cease to act and shall not be re-appointed when the dispute is referred as aforesaid.
 - (iii) The provisions of Rule 3 shall apply, the time limits for appointment running from the date of the board of appeal's order.
 - (iv) The board of appeal may in its absolute discretion extend the time limits in these Rules, and no objection that time has expired shall be taken if the requirements of Rules were previously complied with.

8.2 Provisional Orders

Where the tribunal decides at any time to order on a provisional basis any relief which it would have power to grant in a final award, no appeal shall lie to a board of appeal until the tribunal has issued a final award determining the issues between the parties.

8.3 Awards on Different Aspects

Where the tribunal decides during the course of an arbitration to make an award dealing finally with one or more aspects of the dispute, but which leaves to be decided by the tribunal other aspect(s) of the dispute, it may make an award which shall be final and binding as to the aspect(s) with which it deals, subject to any right of appeal pursuant to Rule 10.

9. AWARDS OF ARBITRATION

- 9.1** All awards shall be in writing and shall be signed by the sole arbitrator or, in the case of an award made by a three-man tribunal, by the chairman. The tribunal shall have the power to assess and award the costs of and connected with the reference and also the fees and/or expenses incurred by the tribunal. The tribunal will assess and award costs at the conclusion of the arbitration. The fees and/or expenses of Gafta shall be those for the time being in force as prescribed by the Council of Gafta and any non-member fee shall be for the account of the non-member.

- 9.2** The tribunal shall, on the application of either party, made before the arbitration award is made, have the power to extend the time for appealing in any case in which it considers it just or necessary so to do. Any such extension must be stated in the award.
- 9.3** The tribunal shall submit the award to Gafta. Upon receipt of the signed award Gafta shall give notice to the parties named in the award that the award is at their disposal upon payment of the fees and expenses incurred by the tribunal and Gafta. Gafta shall first call upon the claimant to pay any outstanding balance. If payment is not received by Gafta within 21 days from such notice, Gafta shall call upon the respondent to take up the award. Upon receipt of the fees and/or expenses, Gafta shall date and issue the award to the parties, which date shall for the purpose of the Arbitration Act 1996 and these Rules be deemed to be the date on which the award was made.
- 9.4** Subject to any right of appeal pursuant to Rule 10 awards of arbitration shall be conclusive and binding on the parties with respect both to the matters in dispute and as to costs.
- 9.5** No award shall be questioned or invalidated on the ground that an arbitrator was not qualified to act unless such objection was made at the outset of the arbitration.

10. RIGHT OF APPEAL

- 10.1** Save as provided in Rules 6.4, 8.1(b), 8.2, 19 and 21, either party may appeal against an award to a board of appeal provided that the following conditions are complied with: -
- (a) Not later than 12 noon on the 30th consecutive day after the date on which the award was made the appellant shall: -
- (i) ensure that a written notice of appeal is received by Gafta,
 - (ii) serve a notice of his intention to appeal on the other party and ensure receipt of a copy by Gafta, and
 - (iii) ensure Gafta have received cleared funds of the appeal deposit stated on the award of arbitration on account of the costs, fees and expenses of the appeal,
- otherwise the right of appeal shall be deemed to be waived and barred.
- (b) The fees and expenses of the arbitration award incurred by the tribunal and/or Gafta shall be paid to Gafta before the appeal is heard.
- (c) The appellant shall pay such further sum or sums on account of fees, costs and expenses as may be called for by Gafta or the board of appeal at any time after the lodging of the appeal (as defined in (a) and (b) above). In the event of nonpayment the respondent may be directed by the board of appeal to pay such further sum or sums. If payment is not received from either party prior to the hearing or subsequent hearings, the board of appeal may decide to stay the proceedings until such payment is made or if the further sums are not received within 30 days of the date on which they were called for, the appeal may be deemed lapsed. The fees charged by the board of appeal shall be in accordance with the scale of fees laid down by the Council from time to time.

- 10.2** If appeals are lodged by both parties to the award Gafta shall have the power to consolidate such appeals for hearing by the same board of appeal.

11. BOARDS OF APPEAL

- 11.1** Boards of appeal shall be elected and constituted in accordance with the Gafta Rules and Regulations. Where the first tier arbitration award was made by a sole arbitrator the board of appeal will comprise

of three members. Where the first tier award was made by a tribunal of three arbitrators, then the board of appeal shall comprise of five members. Gafta will notify the parties of the names of the members of the board of appeal. The board of appeal will be provided with a copy of the first tier Award.

- 11.2** If a member of the board of appeal dies, refuses to act, resigns, or becomes incapable of acting, and/or refuses to stand down in circumstances where, in Gafta's reasonable opinion, it would be appropriate for him to do so, or if he fails to proceed with the appeal, or is found to be ineligible, or his authority is revoked by Gafta pursuant to the Gafta Rules and Regulations Gafta will appoint a substitute.

12. APPEAL PROCEDURE.

- 12.1** The board of appeal may grant an oral hearing at the request of either party, on such terms and conditions as it deems appropriate, or decide whether in the circumstances of the case it is necessary to convene one. In the event that there is to be an oral hearing, the date, time and place will be arranged by Gafta having due regard to any agreement reached by the parties, the time table below or any other timetable determined by a board of appeal. The form in which parties may join an oral hearing is at the board of appeal's discretion. In exceptional circumstances where, as a consequence, the majority of the board members are unable to travel to the designated place of hearing, the board may, at its absolute discretion and where it believes it appropriate to do so, convene a virtual hearing using such electronic media as it deems fit. The decision of the board shall be final and binding on the parties.

- 12.2** In the event of an oral hearing the parties may be represented by one of their employees, or by a Gafta Qualified Arbitrator (who has not previously acted in the case) or other representative, but they may not be represented by a solicitor or barrister, or other legally qualified advocate, wholly or principally engaged in private practice, unless legal representation is expressly agreed. In accordance with the time table notified to the parties by Gafta concise statements of case (skeleton arguments) shall be exchanged and a common bundle of documents (documentary evidence) agreed by the parties as follows: -

- (a) The appellant shall serve his concise statement of case (skeleton arguments) on the respondent with a copy to Gafta.
- (b) The respondent shall serve his concise statement of case (skeleton arguments) on the appellant with a copy to Gafta.
- (c) The appellant shall send to Gafta 5 sets of documentary evidence, in a common bundle, agreed by the respondents. (Either party may submit documentary evidence not agreed for inclusion in the common bundle of documents).

- 12.3** In the event that there is no oral hearing the parties shall serve their full submissions and documentary evidence in accordance with the time table notified to the parties by Gafta, as follows: -

- (a) The appellant shall serve his submissions together with supporting documents
- (b) The respondent shall on receipt of the appellant's submissions and any documents, serve defence submissions, together with supporting documents.
- (c) The appellant then has the right on receipt of the respondent's defence submissions and documents, to issue a statement in reply.

Submissions and documentary evidence (which may include new evidence not before the arbitrators) shall be served by sending them to the other party with copies to Gafta. Where the appeal is against the award of a sole arbitrator 4 copies, or where the appeal is against the award of a tribunal of three arbitrators 6 copies, shall be sent to Gafta.

Where no oral hearing of the appeal is to take place, members of a board of appeal need not meet in person but may communicate with each other by telephone, letter, fax and e-mail or any other

electronic means, in order to discuss the parties' submissions and to arrive at a decision on the appeal.

- 12.4** The board of appeal has the right to decide to conduct arbitral proceedings concurrently with other arbitral proceedings, and, in particular, concurrent or consolidated hearings may be held, but separate awards shall be made unless all the parties involved agree otherwise in writing.
- 12.5** An appeal involves a new hearing of the dispute and the board of appeal may confirm, vary, amend or set-aside the award of the tribunal. In particular (but not by way of restriction), the board of appeal may;
- (a) vary an award by increasing or reducing the liability of either party,
 - (b) correct any errors in the award or otherwise alter or amend it,
 - (c) award the payment of interest,
 - (d) award the payment of costs, fees and expenses of and incidental to the hearing of the arbitration and the appeal. Such costs, fees and expenses will normally follow the event.
- 12.6** An award shall be confirmed unless the board of appeal decides by a majority to vary, amend or set it aside.
- 12.7** The award of the board of appeal, whether confirming, varying, amending or setting aside the original award of arbitration, shall be signed by the chairman of the board of appeal, and, when so signed, shall be deemed to be the award of the board of appeal, and shall be final, conclusive and binding. Rule 9.3 shall apply to awards of the board of appeal.
- 12.8** No award of a board of appeal or decision by a board of appeal on any issue or aspect shall be questioned or invalidated on the ground that any of its members was not qualified to act unless objection is made within a reasonable period of the notification of the members of the board of appeal.

13. WITHDRAWALS OF APPEALS

- 13.1** The appellant shall have the right, at any time before the board of appeal makes an award, to withdraw his appeal by giving notice of such withdrawal to Gafta, and in such case Gafta shall forthwith notify all parties to the arbitration that the appeal has been withdrawn. If notice of withdrawal is received by Gafta within 10 consecutive days of the date on which the appeal was lodged in accordance with Rule 10.1, two thirds of the deposit shall be returned. Thereafter, if notice of withdrawal is received before the final award is made, the parties shall be jointly and severally liable to pay to Gafta the board of appeal's and Gafta's costs, fees and expenses.
- 13.2** In the event of withdrawal the respondent shall continue to have the right of appeal against the award to a board of appeal in accordance with the provisions of Rule 10, save that the time limit laid down in Rule 10.1 shall be 12 noon on the 30th consecutive day after the date of service of notice by Gafta to that party of the aforesaid withdrawal.

14. APPEALS ON STRING CONTRACTS – Quality and/or Condition

- 14.1** Where a "string" award is made pursuant to Rule 7.1, then, unless it is an award determining a dispute arising out of the "Rye Terms" clause, each party in the string shall be entitled to appeal against that award to a board of appeal, provided that each of the following provisions, in addition to the provisions of Rule 10, are complied with:-
- (a) If the appellant is an intermediate party he shall state in his notice of appeal whether he is appealing as a buyer or as seller.
 - (b) If the appellant is the first seller or the last buyer he shall, within the time limits set out in Rule

10.1 (a) (ii) serve written notice of his intention to appeal on the party in immediate contractual relationship with him.

- (c) If the appellant is an intermediate party and is appealing as buyer or seller he shall, within the time limits set out in Rule 10.1 (a) (ii) serve notice of his intention to appeal on both the respondent to the appeal and also his own immediate seller or buyer.
- (d) The recipient of a notice served pursuant to the above provisions may, if it wishes to commence appeal proceedings against its own immediate contracting party, pass on a like notice upon the next party in the string. Such notice shall be passed on with due despatch, in which case the time limit in Rule 10 shall be deemed to have been complied with.

14.2 All appeals to which this Rule applies and to all awards made pursuant to this Rule shall be binding on every appellant and respondent. Non-compliance with any provisions of Rule 14.1(d) shall in no way limit or affect the jurisdiction of the board of appeal.

15. APPEAL AWARDS

15.1 The board of appeal shall submit the award to Gafta. Upon receipt of the signed award Gafta shall give notice to the parties named in the award that the award is at their disposal upon payment of the fees and expenses incurred by the board of appeal and Gafta. Gafta shall first call upon the appellant to pay any outstanding balance. If payment is not received by Gafta within 21 days from such notice, Gafta shall call upon the respondent to take up the award. Upon receipt of the fees, costs and expenses, Gafta shall then date and issue the award to the parties, which date shall, for the purposes of the Arbitration Act 1996, be deemed to be the date upon which the award is made.

15.2 Appeal awards may be made available to the first tier tribunal.

16. CANCELLATION COSTS

In the event of either party cancelling or postponing a hearing, the tribunal or board of appeal (as the case may be), shall be entitled, at their discretion, to charge a cancellation fee and expenses. The fee shall be based on the Gafta notional daily sitting rate, as may vary from time to time, multiplied by the number of days which, but for the cancellation or postponement of a hearing, have been vacated.

The fee shall be calculated on a sliding scale, as follows:

If the cancellation or postponement is between 6-2 weeks before the date of the hearing, 50% of the Gafta notional daily sitting rate.

If the cancellation or postponement is within 2 weeks of the date of the hearing, including during the hearing itself, 75% of the Gafta notional daily sitting rate

17. REPRESENTATION COSTS

17.1 The parties may expressly agree in writing that they may engage legal representatives (i.e. a solicitor and a barrister, or other legally qualified advocate, or advisor, wholly or principally engaged in private practice), to represent them in the arbitration and/or in any appeal proceedings and to appear on their behalf at any oral hearings. The tribunal, and/or the board of appeal, shall determine the recoverable costs of engaging legal representatives.

17.2 Where there is no such agreement between the parties they are nevertheless free to engage legal representatives to represent them in the written proceedings but not to appear on their behalf at oral hearings. The costs of engaging legal representatives in such circumstances shall not be recoverable even if claimed.

17.3 In any event, an instructed representative is obliged to provide proof of identity of their client's company and evidence demonstrating they are instructed to act by the party in the arbitration proceedings.

17.4 Unless expressly agreed otherwise, in writing, each party shall bear all their own costs including their own legal and representation costs.

18. TRIBUNAL'S OR BOARD OF APPEAL'S OWN EVIDENCE

If at any time prior to the close of the proceedings the tribunal or the board of appeal deem it appropriate, they may take steps to ascertain the facts and the law on their own initiative, provided that they give both parties reasonable opportunity to comment on and/or provide evidence in response.

19. FEES AND EXPENSES

19.1 Each party engaging in an arbitration or an appeal pursuant to these Rules, whether or not a Member of Gafta, is deemed thereby to agree to abide by these Rules and to agree with Gafta to be liable to Gafta (jointly and severally with the other parties to the arbitration or appeal) for all fees and expenses incurred in connection with the arbitration or appeal or any remissions, which said fees and expenses shall, upon notification by Gafta be and become a debt due to Gafta.

20. CURRENCY REGULATIONS

If an appellant is precluded by currency regulations from paying any money due to be paid by him, and notifies Gafta in writing (a) in the case of inability to pay the appeal fee when giving notice of appeal, and (b) in the case of inability to pay any further sum directed to be paid, within 9 consecutive days of the money being demanded, accompanied in every case by evidence from a bank that he has already made application for the transfer of the required sum, he shall be entitled to an extension of up to 35 consecutive days from the date when the said payment became due in which to pay such sum.

21. NOTICES

21.1 Service on parties

All notices to be served on the parties pursuant to these Rules shall be in legible form by E-mail, or by other mutually recognised electronic method of rapid communication. For the purposes of time limits, the date of despatch shall, unless otherwise stated, be deemed to be the date of service.

Service on the brokers or agents named in the contract shall be deemed proper service under these Rules. So far as concerns such notices, this Rule over-rides any other provisions of the contract.

21.2 Service on Tribunals and Boards of Appeal

Unless the tribunal or board of appeal otherwise directs, all notices, proceedings and documents to be served on arbitrators and members of a board of appeal pursuant to these Rules shall be served in legible form by E-mail, or by other mutually recognised electronic method of rapid communication on the Secretary of Gafta at the offices of Gafta. For the purposes of any time limits receipt of such notices by Gafta shall be deemed to be the date of service.

21.3 Computation of Time

Where these Rules require service not later than a specified number of consecutive days after a specified date or occurrence, that specified date or occurrence shall not count as one of the consecutive days.

22. RETENTION OF DOCUMENTS

22.1 All case documents, except submissions, will be kept by Gafta for a period of 6 months from the date the award is issued unless a longer period is requested by either party in writing.

23. NON-COMPLIANCE WITH TIME LIMITS AND RULES

The following shall apply if any time limit(s) imposed by these Rules is (are) not complied with:-

(a) When such matters are raised at the arbitration as a defence to the arbitration claim, the tribunal in its discretion may admit a claim if satisfied that the circumstances were outside the reasonable contemplation of the parties when they entered into the contract and that it would

be just to extend the time, or when the conduct of one party makes it unjust to hold the other party to the strict terms of the time limit in question. Otherwise the tribunal may determine that the claim is waived and barred and refuse to admit it. If the provision of 4.1 has not been complied with, then the case shall be deemed to be waived and absolutely barred subject to the discretion of the Tribunal. There shall be no appeal to the board of appeal against the decision of the tribunal to admit a claim. If a tribunal decides not to admit the claim, then the claimant shall have the right to appeal pursuant to Rule 10, and the board of appeal shall have the power in its absolute discretion to overturn that decision and to admit the claim;

- (b) On appeal if any of the provisions of Rules 10.1(a), 10.1(b), 12.7 or 19 have not been complied with, then the appeal shall be deemed to be waived and absolutely barred, subject to the discretion of the board of appeal when raised as a defence by the appellant. The board of appeal in its absolute discretion may dispense with the necessity for compliance. In which event the board of appeal may proceed to hear and determine the appeal as if each and all of those Rules had been complied with. Any decision made pursuant to this Rule shall be final, conclusive and binding.

24. DEFAULTERS

- 24.1** In the event of any party to an arbitration or an appeal held under these Rules neglecting or refusing to carry out or abide by a final award of the tribunal or board of appeal made under these Rules, the Council of Gafta may post on the Gafta Notice Board, Web-site, and/or circulate amongst Members in any way thought fit notification to that effect. The parties to any such arbitration or appeal shall be deemed to have consented to the Council taking such action as aforesaid.
- 24.2** In the event that parties do not pay the costs, fees or expenses of the arbitration or appeal when called upon to do so by Gafta in accordance with these Rules, the Council may post on the Gafta Notice Board, Web-site, and/or circulate amongst Members in any way thought fit notification to that effect. The parties to any such arbitration or appeal shall be deemed to have consented to the Council taking such action as aforesaid.

References to the masculine include references to the feminine and also to companies, corporations or other legal persons.

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GAFTA
THE GRAIN AND FEED TRADE ASSOCIATION
9 LINCOLN'S INN FIELDS, LONDON WC2A 3BP
E-mail Address: post@gafta.com
URL: www.gafta.com

U.S. Standards

April 1998

HISTORICAL COMPILATION OF CHANGES IN THE GRAIN STANDARDS OF THE UNITED STATES

The United States Grain Standards Act (Act) was passed by Congress on August 11, 1916. The first standards established under the Act were for corn and became effective December 1, 1916. Since then, standards have been developed for barley, canola, flaxseed, mixed grain, oats, rye, sorghum, soybeans, sunflower seed, triticale, and wheat.

The standards for the various grains have been revised or amended from time to time. This publication which contains a compilation of these revisions and amendments and a cross-reference guide, supersedes "Historical Compilation of Changes in the Grain Standards of the United States" dated September 1996.

The U.S. Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, and marital or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternate means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

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SUBPART A - GENERAL PROVISIONS

Established effective June 30, 1987 (52 FR 24418, 6/30/87)

Established Subpart A - General Provisions for terms common to all grains and revised the rounding procedures as stated in the section on percentages to more generally accepted mathematical procedures. Certain sections are removed from individual grain standards and are included in Subpart A, such as test weight per bushel, moisture, and stones. The common wording for Basis of Determination and rounding procedures are removed from each standard. Also, the wording for Grade Designations and Special Grade Designations are removed from individual standards and rewritten in general terms for inclusion into Subpart A.

Revised effective May 1, 1988 (52 FR 24441, 6/30/87)

Redefined the infested designation as it applies to the representative sample, lot as a whole (stationary), and sample as a whole (continuous loading/ unloading of shiplots and bargelots).

Revised effective September 1, 1994 (57 FR 3274, 1/29/92)

Revised the method of recording the percentage of splits in soybeans from in whole percent with fractions of a percent being disregarded to the nearest tenth percent. Revised effective June 1, 1997 (61 FR 18486, 4/26/96 and 61 FR 24669, 5/16/96)
Revised the method of recording the percentage of dockage in barley from whole percent with fractions of a percent being disregarded to whole and half percent with a fraction less than one-half percent disregarded.

Revised effective June 1, 1999 (63 FR 20054, 4/23/98)

Revised the method of recording the percentage of dockage in rye from whole percent with fractions of a percent being disregarded to the nearest tenth percent.

Revised effective September 1, 2007 (71 FR 52403,9/6/06)

Revised the method of recording Test Weight (TW) for soybeans from whole and half pounds with a fraction of a half pound disregarded to the nearest tenth pound. Also, clarified that TW in canola is only determined and reported upon the request of an applicant.

SUBPART B. BARLEY

Established effective August 24, 1926

Amended effective September 15, 1927

1. Changed requirements for sound barley in grades Nos. 2 and 3 in the class Barley from 88 to 86 percent in both grades.
2. Changed percentage of oats and wild oats in grades Nos. 2 and 3 in the class Barley from 8 to 10 percent in both grades.
3. Changed the moisture content in grades Nos. 2, 3, and 4, and No. 1 Feed in the class Barley from 14.5 to 15.5 percent for each grade.

Amended effective July 21, 1933

1. Sound barley definition changed to exclude barley which was damaged or materially discolored by blight and/or mold.
2. Sample grade definition changed to include barley with more than 5 percent of barley damaged or materially discolored by blight or mold.
3. Established a grade Blighted barley for barley with more than 2 percent but not more than 5 percent of kernels damaged or materially discolored by blight and/or mold.

Revised effective July 2, 1934

1. Class I Barley was divided into two subclasses: Malting Barley and Barley.
2. Eliminated special No. 2 and No. 1 Feed, and adopted five numerical grades and Sample grade.
3. Grade requirements for class Black Barley were made the same as for the class Barley.
4. Eliminated the class Two-rowed Barley and established special grade for Two-rowed barley.
5. Eliminated grade factor general appearance and required that badly stained or materially weathered barley grade not higher than No. 4.
6. Adopted a dockage system for the class Barley.
7. Raised the percentage of sound barley in grades No. 2 and No. 3 from 86 and 86 percent to 93 and 90 percent for the class Barley.

8. Changed the basis of grade determination for all factors except dockage, temperature, odor, garlic, and insects in all classes of Barley from the grain as a whole to the grain when free from dockage.
9. Redesignated the grades Bleached barley, Garlicky barley, Weevily barley, Smutty barley, and Blighted barley as special grades and established special grades for test weight of Western barley, Bright Western barley, Stained Western barley, Two-rowed barley, Tough barley, and Ergoty barley.
10. Eliminated test weight as a numerical grading factor for Western Barley.
11. Eliminated skinned kernels as a grading factor except for Malting Barley and increased the limits for broken kernels in all classes except Malting Barley.
12. Eliminated smutty odor as a grading factor in the special grade Smutty.

Amended effective July 1, 1935

Changed the basis method for determining moisture from the Brown-Duvel to the air-oven method or any method giving similar results.

Amended effective July 1, 1937

1. Eliminated the determination of dockage on the basis of specific classes and adopted one method for determining dockage for all classes of barley.
2. Required that heat-damaged and mellow kernels be determined on the basis of the pearled dockage-free grain.
3. Added a definition for damaged barley.

Amended effective July 1, 1950

Revised the special grade for Two-rowed barley and provided special grades for Choice Malting Two-rowed Western Barley and Malting Two-rowed Western Barley.

Revised effective August 2, 1954

Excluded barley injured by heat, mold, and barley of the special grade Weevily from the definition for Choice Malting Two-rowed and Malting Two-rowed Western Barley, and provided that No. 1 Malting Two-rowed Western Barley be of somewhat higher quality than the No. 2 and No. 3.

Revised effective July 1, 1956

1. Provided for a subclass Blue Malting Barley.
2. Provided numerical grades and grade requirements for the subclasses Malting Barley and Blue Malting Barley.
3. Eliminated the class Black Barley and provided that black barley be graded as Mixed Barley.
4. Provided maximum limits of thin barley in each of the numerical grades for all subclasses of the class Barley.
5. Changed the minimum limits of sound barley from 95 and 93 percent in grades No. 1 and No. 2 to 97 and 94 percent.
6. Provided maximum limits of damaged kernels and heat-damaged kernels in each of the numerical grades for the subclass Barley of the class Barley and of damaged kernels in each of the numerical grades for the subclasses Malting Barley and Blue Malting Barley in the class Barley.

Revised effective July 1, 1960

1. Reduced the percentage of skinned and broken kernels in the definition for the subclass Malting Barley from 10.0 percent to 8.0 percent.
2. Reduced the maximum limits of skinned and broken kernels in grades No. 2 and No. 3 of the subclasses Malting Barley and Blue Malting Barley from 7.0 percent and 10.0 percent to 6.0 percent and 8.0 percent.

Amended effective February 8, 1961

Provided that the term D.L.Q. (Distinctly low quality) be construed to include barley which contains more than two crotalaria seeds in 1,000 grams.

Amended effective July 1, 1962

1. Provided that barley grown in Alaska be classed as Barley rather than Western Barley.
2. Changed the special grades Choice Malting Two-rowed Western Barley and Malting Two-rowed Western Barley to Choice Malting Two-rowed Barley and Malting Two-rowed Barley to permit the grading of the variety Betzes under these special grades.

Amended effective February 28, 1970 (34 FR 3591, 2/28/69)

Provided that the prefix U.S. be shown on all official grain grades.

Amended effective January 8, 1974

The name of the barley standards changed from “Official Grain Standards of the United States for Barley” to “United States Standards for Barley.”

Revised effective November 1, 1976 (40 FR 33428, 8/8/75)

1. Provided that barley be classed by kernel characteristics instead of area of production such as Western Barley.
2. Reduced the minimum test weight per bushel for U.S. No. 1 Choice Two-Rowed Malting Barley from 52 to 50 pounds and for U.S. No. 1, 2, and 3 Two-Rowed Malting Barley from 50 to 48 pounds.
3. Defined the term plump barley and provided a basis for reporting the amount found in malting barley.
4. Changed the special grade limit from 0.3 percent to 0.10 percent for Ergoty barley.
5. Redesignated the terms used to describe barley kernels damaged by frost, mold, or heat and established limits for such damage.

Amended effective September 8, 1977 (42 FR 30146, 6/13/77)

Certification requirements were changed so that a lot would be certificated:

1. As being of a specific U.S. grade, or
2. As being equal to or better in quality, as defined by the U.S. Standards for Barley, than the grade specified by the contract; i.e., U.S. No. 2 or better, U.S. No. 3 or better, etc.

Amended effective October 28, 1983 (48 FR 44167, 9/28/83)

Changed inspection procedures so the determination of odor may be performed either prior to or after mechanical cleaning of the sample.

Amended effective June 30, 1987 (52 FR 24418, 6/30/87)

1. Removed the requirement, “semisteely in mass,” from the definition of malting barley and removed the special grades “Tough,” “Stained,” “Bleached,” and “Bright.”
2. Removed the terms “frost-damaged kernels (minor),” “mold-damaged kernels (minor),” and “heat-damaged kernels (minor)” and substitute the terms “injured-by-frost kernels,” “injured-by-mold kernels,” and “injured-by-heat kernels,” respectively, and deleted such terms, except for injured-by-heat, from the definition of damage.

3. Removed the term “black barley” as a grade-determining factor and included black barley under the definition of “other grains.”
4. Removed the requirement that barley containing smut in excessive amounts be graded Sample grade.
5. Removed the requirement for wild brome grass seeds in the definition of Sample grade.
6. Removed rounding procedures for inclusion into Subpart A, General Provisions.

Amended effective May 1, 1988 (52 FR 24441, 6/30/87)

1. Redesignated the special grade “weevily” to “infested” to more appropriately describe grain containing live insects injurious to stored grain.
2. Revised tolerances for “infested.”

Amended effective June 1, 1997 (61 FR 18486, 4/26/96 and 61 FR 24669, 5/16/96)

1. Modified the classification system of barley by establishing two classes: Malting barley and Barley. Revised Two-rowed Malting barley by removing the U.S. No. 1 Choice grade designation. Amended the definition for suitable malting type to include other malting varieties used by private malting and brewing companies.
2. Amended the subclass definitions for Six-rowed and Two-rowed barley by deleting the reference to Malting barley.
3. Revised the dockage certification procedure by reporting results in half and whole percent with a fraction less than one-half being disregarded.
4. Amended the definition of thins to require the use of a single sieve (5/64 x 3/4 slotted-hole) only in the class Barley.
5. Eliminated the numerical grade restriction for badly stained and materially weathered from the standards.

SUBPART C. CANOLA

Established effective February 28, 1992 (57 FR 3274, 1/29/92)

Revised effective September 1, 2007 (71 FR 52403, 9/6/06)

1. Clarified reporting requirements for test weight per bushel (TW)

SUBPART D. CORN

Established effective December 1, 1916

Revised effective July 15, 1918

1. Defined corn as shelled corn of the flint or dent varieties.
2. Changed the heading of the grade factor heat-damaged and mahogany kernels to heat-damaged kernels and raised the allowance for this factor in the six numerical grades from 0.0, 0.0, 0.0, 0.5, 1, and 3 percent to 0.0, 0.1, 0.3, 0.5, 1.0, and 3.0 percent.
3. Added minimum test weight per bushel of 51, 49, 47, and 44 pounds for the grades Nos. 3, 4, 5, and 6.
4. Added the terms commercially objectionable foreign odor and heating and dropped the term fire-burned in the definition for Sample grade.
5. Deleted the terms immature and badly blistered from the definition of grade No. 6.

Amended effective October 3, 1921

Changed from a 14/64-inch sieve to a 12/64-inch sieve for determining foreign material and cracked corn.

Amended effective August 15, 1924

Changed the grading of corn infested with live weevils from Sample grade to a grade Weevily corn.

Revised effective September 1, 1934

1. Reduced the number of numerical grades from six to five, redesignated the grade Weevily corn as a special grade, and established a special grade for Flint corn.
2. Total damage was liberalized from 2, 4, 6, 8, 10, and 15 percent to 3, 5, 7, 10, and 15 percent; and heat damage was liberalized from 0.0, 0.1, 0.3, 0.5, 1, and 3 percent to 0.1, 0.2, 0.5, 1.0, and 3.0 percent in the several numerical grades.

3. The definition of Sample grade was changed to include musty and sour corn which was previously included in grade No. 6.
4. Test weights for the several grades were changed from 55, 53, 51, 49, 47, and 44 to 54, 53, 51, 48, and 44.
5. The percentage of other grains was limited to 10 percent. Prior to this change, there was nothing in the corn standards about other grains, and other grains were limited by the amount of foreign material and cracked corn.
6. Moisture in grades 4 and 5 was changed from 19.5 and 21.5 percent to 20.0 and 23.0 percent.
7. Cracked corn and foreign material in grade No. 5 was changed from 6 percent to 7 percent.

Amended effective July 1, 1935

Changed the basic method for determining moisture from the Brown-Duvel to the water-oven method or any method giving similar results.

Amended effective January 20, 1937

Redefined the special grade Flint corn and added a special grade Flint and Dent corn.

Revised effective October 1, 1959

1. Changed the basic method for determining moisture from the water-oven method to the air-oven method.
2. Changed the minimum test weight per bushel from 54, 53, 51, 48, and 44 pounds to 56, 54, 52, 49, and 46 pounds for grades Nos. 1 through 5.

Amended effective February 8, 1961

Provided that the term D.L.Q. (Distinctly low quality) be construed to include corn which contains more than two crotalaria seeds in 1,000 grams.

Amended effective June 3, 1966

Interpretations regarding the term “yellow kernels of corn with a slight tinge of red” and “white kernels of corn with a slight tinge of light straw or pink color” were published as an added part of the standards.

Amended effective March 30, 1969

The corn standards were assigned new section numbers (§§ 26.151 - 26.153 to §§ 26.351 - 26.353).

Amended effective February 28, 1970 (34 FR 3591, 2/28/69)

Provided that the prefix U.S. be shown on all official grain grades.

Amended effective January 8, 1974

The name of the corn standards changed from "Official Grain Standards of the United States for Corn" to "United States Standards for Corn."

Amended effective September 8, 1977 (42 FR 30146, 6/13/77)

Certification requirements were changed so that a lot would be certificated:

1. As being of a specific U.S. grade, or
2. As being equal to or better in quality, as defined by the U.S. Standards for Corn, than the grade specified by the contract; i.e., U.S. No. 2 or better, U.S. No. 3 or better, etc.

Amended effective February 1, 1978 (43 FR 2816, 1/20/78)

1. Established a special grade Waxy corn comprising corn of any class which consists of 95 percent or more waxy corn.
2. Established a new requirement "slightly yellow" in the determination of other colors in White Waxy Corn.

Amended effective October 28, 1983 (48 FR 44167, 9/28/83)

Changed inspection procedures so the determination of odor may be performed either prior to or after mechanical cleaning of the sample.

Amended effective September 9, 1985 (49 FR 35340, 9/7/84)

1. Included a definition for D.L.Q. (Distinctly low quality).
2. Included in the definition of Sample grade specific limits for stones, glass, castor beans, cockleburs, particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), and animal filth.
3. Deleted corn from § 810.901 Interpretation with respect to the term D.L.Q. (Distinctly low quality) and included the numerical limit for crotalaria seeds in the Sample grade definition.
4. Deleted moisture content as a grade-determining factor.

Amended effective June 30, 1987 (52 FR 24418, 6/30/87)

1. Removed Interpretations (§§ 810.904 and 810.905) with respect to the term “yellow kernels of corn with a slight tinge of red,” and with respect to the term “white kernels of corn with a slight tinge of straw or pink color,” respectively.
2. Removed rounding procedures for inclusion into Subpart A, General Provisions.

Amended effective May 1, 1988 (52 FR 24441, 6/30/87)

1. Redesignated the special grade “weevily” to the term “infested” to more appropriately describe grain containing live insects injurious to stored grain.
2. Revised tolerances for “infested.”

Amended effective September 1, 1996 (60 FR 61194, 11/29/95)

1. Report test weight to the nearest tenth of a pound.
2. Eliminate the count limit on stones and reduce the U.S. Sample grade aggregate weight tolerance from more than 0.2 percent by weight to more than 0.1 percent by weight.
3. Offer stress crack testing as official criteria (effective January 1, 1996).

SUBPART E. FEED OATS AND MIXED FEED OATS

Established effective September 1, 1925

Revised effective July 2, 1934

1. Changed the definition for oats so that oats containing more than 10 percent of wild oats was classified as feed oats and was graded under the grades of feed oats rather than as Sample grade oats as was the case before this change.
2. Established special grades for Tough, Bleached, Weevily, Smutty, and Ergoty feed oats and Mixed feed oats.

Amended effective July 1, 1935

1. Changed the basic method for determining moisture from the Brown-Duvel to the air-oven method or any method giving similar results.
2. Added a definition for fine seeds.
3. Changed the special grades for Smutty feed oats and Smutty mixed feed oats to provide for percentage determination instead of smutball count determination.

Canceled effective June 1, 1959

Mixtures of oats and wild oats, not coming within the requirements of the oats standards, would be graded under the mixed grain standards effective August 1, 1959.

SUBPART F. FLAXSEED

Established effective August 1, 1934

Amended effective July 1, 1935

1. Required that dockage be expressed in whole percent instead of in whole and half percent.
2. Changed the basic method for determining moisture from the Brown-Duvel to the air-oven method or any method giving similar results.

Amended effective February 8, 1961

Provided that the term D.L.Q. (Distinctly low quality) be construed to include flaxseed which contains more than two crotalaria seeds in 1,000 grams.

Revised effective July 15, 1965

1. Lowered the maximum moisture limits in the numerical grades from 11.0 percent to 9.5 percent.
2. Provided maximum limits for heat-damaged flaxseed of 0.2 percent in grade No. 1 and 0.5 percent in grade No. 2. The previous standards had no limit for this factor.
3. Reduced maximum limits of damaged flaxseed in grade No. 1 from 20 percent to 10.0 percent and in grade No. 2 from 30 percent to 15.0 percent.
4. The definition of Sample grade was made more specific by including castor beans, crotalaria seed, stones, unknown foreign substances, and commonly recognized harmful or toxic substances.
5. The flaxseed standards were recodified in the interest of clarity and to conform to the codification used in the wheat standards.

Amended effective February 28, 1970

Provided that the prefix U.S. be shown on all official grain grades.

Amended effective January 8, 1974

The name of the flaxseed standards changed from "Official Grain Standards of the United States for Flaxseed" to "United States Standards for Flaxseed."

Amended effective September 8, 1977 (42 FR 30146, 6/13/77)

Certification requirements were changed so that a lot would be certificated:

1. As being of a specific U.S. grade, or
2. As being equal to or better in quality, as defined by the U.S. Standards for Flaxseed, than the grade specified by the contract; i.e., U.S. No. 2 or better, U.S. No. 3 or better, etc.

Amended effective October 28, 1983 (48 FR 44167, 9/28/83)

Changed inspection procedures so the determination of odor may be performed either prior to or after mechanical cleaning of the sample.

Revised effective July 13, 1986 (49 FR 49427, 12/20/84)

1. Updated the format of the standards to conform to other grain standards.
2. Deleted moisture content as a criterion in designating flaxseed Sample grade.
3. Included in the definition of Sample grade specific limits for stones, pieces of glass, castor beans, particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), rodent pellets, bird droppings, and other animal filth.
4. Deleted flaxseed from § 810.901 Interpretation with respect to the term D.L.Q. (Distinctly low quality) and included the numerical limit for crotalaria seeds in the Sample grade definition.

Revised effective June 30, 1987 (52 FR 24418, 6/30/87)

Removed rounding procedures for inclusion into Subpart A, General Provisions.

SUBPART G. MIXED GRAIN

Established effective July 2, 1934

Amended effective July 25, 1934

Provided that the quantity of smut in the special grade Smutty mixed grain in which wheat or rye predominates be increased from 10 to 14 smut balls of average size in 250 grams of grain.

Amended effective July 1, 1935

1. Changed the basic method for determining moisture from the Brown-Duvel to the air-oven method for the kind of grain which predominates in the mixture or any method which gives equivalent results.
2. Provided that the grade designation for Mixed Grain include the name and approximate percentage of each kind of grain in the mixture.
3. Changed the special grade Smutty mixed grain to provide that mixed grain in which oats predominates should be determined on the basis of weight rather than on the basis of number of smut balls in 250 grams of mixed grain.

Revised effective August 1, 1959

1. Added definitions for wild oats and stones.
2. Provided for certain mixtures of oats and wild oats which had previously been graded Feed Oats and Mixed Feed Oats and which did not fall into the oats standards as revised June 1, 1959.

Revised effective December 1, 1960

1. Added a definition for mixed feed oats.
2. Provided grades for No. 1 and No. 2 Mixed Feed Oats based on the quality factors of foreign material, damaged kernels, heat-damaged kernels and test weight per bushel.

Amended effective February 8, 1961

Provided that the term D.L.Q. (Distinctly low quality) be construed to include grain which contains more than two crotalaria seeds in 1,000 grams.

Amended effective February 28, 1970 (34 FR 3591, 2/28/69)

Provided that the prefix U.S. be shown on all official grain grades.

Amended effective January 8, 1974

The name of the mixed grain standards changed from "Official Grain Standards of the United States for Mixed Grain" to "United States Standards for Mixed Grain."

Amended effective September 8, 1977 (42 FR 30146, 6/13/77)

Certification requirements were changed so that a lot may be certificated:

1. As being of a specific U.S. grade, or
2. As being equal to or better in quality, as defined by the U.S. Standards for Mixed Grain, than the grade specified by the contract; i.e., U.S. No. 2 or better.

Revised effective January 28, 1985 (49 FR 3445, 1/27/84)

1. Updated the format of the standards to conform to other grain standards.
2. Deleted all reference to mixed feed oats and wild oats from the standards.
3. Deleted the special grade "Tough mixed grain."
4. Tightened the limit for the special grade "Ergoty mixed grain" to 0.10 percent from 0.30 percent.
5. Redefined mixed grain by incorporating a minimum requirement of 50 percent of whole kernels of grain for which standards have been established, and/or whole and broken soybeans which will not pass through a 5/64-inch triangular-hole sieve, and/or whole flaxseed passing through the sieve.
6. Included a new factor, "Foreign material and fines."
7. Changed the basis for determining the percentage of each type of grain present in the mixture and the amount of damaged kernels, to the basis of the grain after sieving with a 5/64-inch triangular-hole sieve.
8. Deleted mixed grain from § 810.901 Interpretation with respect to the term D.L.Q. (Distinctly low quality) and included the numerical limit for crotalaria seeds in the requirements for Sample grade Mixed Grain.
9. Required that the special grades "Smutty mixed grain" and "Garlicky mixed grain" be applicable to mixtures in which triticale predominates.

Revised effective June 30, 1987 (52 FR 24418, 6/30/87)

Removed rounding procedures for inclusion into Subpart A, General Provisions.

Amended effective May 1, 1988 (52 FR 24441, 6/30/87)

1. Redesignated the special grade "weevily" to "infested" to more appropriately describe grain containing live insects injurious to stored grain.
2. Revised tolerances for "infested."

SUBPART H. OATS

Established effective June 16, 1919

Amended effective August 15, 1924

Changed the grading of oats infested with live weevils from Sample grade to a grade Weevily oats.

Revised effective September 1, 1925

1. Changed definition of oats from cultivated oats with “not more than 25 percent of foreign material, other grains, and wild oats” to “any grain which consisted of 80 percent or more cultivated oats and not more than 10 percent of foreign material.”
2. Dropped the grade Clipped Oats.

Amended effective August 30, 1928

Established a grade for Cereal oats.

Revised effective July 2, 1934

1. Changed definition of oats to permit not more than 10 percent of wild oats.
2. Liberalized the factor of general appearance. Stained appearance was eliminated, but slightly weathered oats was to be graded not higher than No. 3, and badly stained or materially weathered was to be graded not higher than No. 4.
3. Raised test weight in grades Nos. 2, 3, and 4 from 29, 26, and 23 pounds to 30, 27, and 24 pounds.
4. Lowered sound cultivated oats in grades No. 1 and No. 2 from 98 and 95 percent to 97 and 94 percent.
5. Provided that musty oats be graded Sample grade instead of No. 4.
6. Redesignated the grades for Bleached oats, Weevily oats, and Cereal oats as special grades and established special grades for Tough oats, Heavy oats, Extra Heavy oats, Bright oats, Smutty oats, Ergoty oats, and Garlicky oats.
7. The special grade Cereal oats was based on “more than 20 percent of oats and/or other matter passing 0.064 x 3/8-inch slotted sieve” instead of on appearance of being sized.

Amended effective July 1, 1935

1. Changed the basic method for determining moisture from the Brown-Duvel to the air-oven method or any method giving similar results.

2. Increased maximum limits of foreign material in grades No. 2 and No. 3 from 2 and 3 percent to 3 and 4 percent.
3. Amended special grade Cereal oats to exclude fine seeds. Fine seeds defined so they functioned as part of foreign material.
4. Changed the determination of Smutty oats from “in excess of a quantity equal to 30 balls of average size in 250 grams of oats” to “smut masses or smut balls in excess of 0.2 percent.”

Amended effective July 1, 1937

Changed special grade Cereal oats to special grade Thin oats.

Amended effective July 1, 1941

Provided a special grade Special Red Oats for Columbia or other red oats having similar characteristics.

Amended effective July 1, 1947

Provided for a special grade Medium oats for grades Nos. 3 and 4 and Sample grade for oats having test weight of 30 or more but less than 35 pounds.

Revised effective June 1, 1959

1. Changed the minimum test weight per bushel from 32, 30, 27, and 24 pounds to 34, 32, 30, and 27 pounds for grades Nos. 1 to 4.
2. Changed the minimum test weight per bushel from 35 pounds to 36 pounds for the special grade Heavy oats.
3. Changed the minimum moisture requirements for tough oats from 14.5 percent to 14.0 percent.
4. The various classes of oats were more specifically defined, and other physical characteristics in addition to color were included in their determination.

Amended effective February 8, 1961

Provided that the term D.L.Q. (Distinctly low quality) be construed to include oats which contain more than two crotalaria seeds in 1,000 grams.

Amended effective February 28, 1970 (34 FR 3591, 2/28/69)

Provided that the prefix U.S. be shown on all official grain grades.

Amended effective January 8, 1974

The name of the oats standards changed from “Official Grain Standards of the United States for Oats” to “United States Standards for Oats.”

Revised effective June 1, 1975 (39 FR 32125, 9/5/74)

1. All class names deleted.
2. Increased the minimum test weight requirement for grade U.S. No. 1 from 34 pounds to 36 pounds and for grade U.S. No. 2 from 32 pounds to 33 pounds.
3. Increased the test weight requirement for Extra-heavy oats from 38 pounds or more to 40 pounds or more and for Heavy oats from 36 pounds or more but less than 38 pounds to 38 pounds or more but less than 40 pounds.
4. Tightened the allowable limits of ergot by requiring that oats which contain ergot in excess of 0.10 percent be graded Ergoty oats.

Amended effective September 8, 1977 (42 FR 30146, 6/13/77)

Certification requirements were changed so that a lot would be certificated:

1. As being of a specific U.S. grade, or
2. As being equal to or better in quality, as defined by the U.S. Standards for Oats, than the grade specified by the contract; i.e., U.S. No. 2 or better, U.S. No. 3 or better, etc.

Amended effective April 14, 1986 (49 FR 49431, 12/20/84)

1. Deleted the special grade “Tough oats.”
2. Deleted moisture content as a criterion in designating oats Sample grade.
3. Included in the definition of Sample grade specific limits for broken glass, castor beans, particles of an unknown foreign substance(s), or a commonly recognized harmful or toxic substance(s), cocklebur, rodent pellets, bird droppings, and other animal filth.

Revised effective June 30, 1987 (52 FR 24418, 6/30/87)

Removed rounding procedures for inclusion into Subpart A, General Provisions.

Amended effective May 1, 1988 (52 FR 24441, 6/30/87)

1. Redesignated the special grade “weevily” to “infested” to more appropriately describe grain containing live insects injurious to stored grain.
2. Revised tolerances for “infested.”

SUBPART I. RYE

Established effective July 1, 1923

Amended effective August 15, 1924

Liberalized the factor of heat-damaged kernels in grades No. 1 and No. 2 from no heat damage in either grade to 0.1 and 0.2 percent.

Revised effective July 2, 1934

1. Eliminated moisture as a numerical grading factor and established a special grade Tough rye containing more than 14 percent but not more than 16 percent moisture.
2. Provided that musty and slightly sour rye be graded Sample grade instead of No. 4.
3. Provided that moisture be determined on dockage-free grain.
4. Redesignated the grade Garlicky rye as a special grade and changed requirements for this grade from "one or more garlic bulblets" to "two or more green garlic bulblets or an equivalent quantity of dry or partly dry bulblets" per 1,000 grams of rye. Divided the special grade into Light Garlicky and Garlicky rye, based on the number of bulblets.
5. Redesignated the grade Smutty rye as a special grade, changed the requirements from "in excess of a quantity equal to 2 balls of average size in 50 grams" to "in excess of a quantity equal to 10 balls of average size in 250 grams" of rye, and divided the special grade into Light Smutty and Smutty rye based on the quantity of smut.
6. Changed the definition of rye to permit not more than 10 percent of other grains before the removal of the dockage.

Amended effective July 25, 1934

Increased the amount of smut in the special grade Smutty rye from "in excess of a quantity equal to 10 balls of average size" to "in excess of a quantity equal to 14 balls of average size" in 250 grams of rye.

Amended effective July 1, 1935

Changed the basic method for determining moisture from the Brown-Duvel to the air-oven method or any method giving similar results.

Amended effective July 1, 1941

Provided a special grade for Plump rye and maximum limits of Thin rye in grades Nos. 1, 2, and 3.

Amended effective July 1, 1951

Decreased the maximum limits of Thin rye permitted in grades Nos. 1, 2, and 3 from 20, 20, and 30 percent to 10, 15, and 25 percent.

Amended effective February 8, 1961

Provided that the term D.L.Q. (Distinctly low quality) be construed to include rye which contains more than two crotalaria seeds in 1,000 grams.

Amended effective March 30, 1969

A new section "Grade Designations" added to conform in format to other grain standards.

Amended effective February 28, 1970 (34 FR 3591, 2/28/69)

Provided that the prefix U.S. be shown on all official grain grades.

Amended effective January 8, 1974

The name of the rye standards changed from "Official Grain Standards of the United States for Rye" to "United States Standards for Rye."

Amended effective September 8, 1977 (42 FR 30146, 6/13/77)

Certification requirements were changed so that a lot would be certificated:

1. As being of a specific U.S. grade, or
2. As being equal to or better in quality, as defined by the U.S. Standards for Rye, than the grade specified by the contract; i.e., U.S. No. 2 or better, U.S. No. 3 or better, etc.

Amended effective October 28, 1983 (48 FR 44167, 9/28/83)

Changed inspection procedures so the determination of odor may be performed either prior to or after mechanical cleaning of the sample.

Revised effective May 25, 1985 (49 FR 22060, 5/25/84)

1. Updated the format of the standards to conform to other grain standards.
2. Deleted the special grade "Tough rye."
3. Included in the definition of Sample grade specific limits for stones, pieces of glass, castor beans, particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), rodent pellets, bird droppings, and other animal filth.

4. Deleted moisture content as a criterion in designating rye Sample grade.
5. Deleted rye from § 810.901 Interpretation with respect to the term D.L.Q. (Distinctly low quality) and included the numerical limit for crotalaria seeds in the Sample grade definition.
6. Smut balls, in addition to being considered in determining the special grade, also are considered foreign material.
7. Deleted the presence of a quantity of smut so great that one or more grade requirements cannot be accurately determined as a criterion in designating rye Sample grade.
8. Ergot is stated in hundredth percent.
9. Raised the limit for heat-damaged kernels in grade U.S. No. 1 to 0.2 percent from 0.1 percent.
10. Reduced the maximum number of rodent or bird pellets or other animal filth permitted in the numerical grades to 1 from 2.

Revised effective June 30, 1987 (52 FR 24418, 6/30/87)

Removed rounding procedures for inclusion into Subpart A, General Provisions.

Amended effective May 1, 1988 (52 FR 24441, 6/30/87)

1. Redesignated the special grade “weevily” to “infested” to more appropriately describe grain containing live insects injurious to stored grain.
2. Revised tolerances for “infested.”

Revised effective June 1, 1999 (63 FR 20054, 4/23/98)

Amended Subpart A--General Provisions by revising the method of recording the percentage of dockage in rye from whole percent with fractions of a percent being disregarded to the nearest tenth percent.

SUBPART J. SORGHUM

Established effective December 1, 1924

Revised effective September 1, 1934 (03/31/34 FR)

1. Class names were changed from types such as Kafir, Milo, etc., to class names based on color such as White Grain Sorghums, Yellow Grain Sorghums, etc. Some subclass names were based on type characters and others on color.
2. A dockage system was set up instead of the subfactor "sand, dirt, and finely broken kernels" in the factor "foreign material and cracked kernels."
3. Provided that musty and sour sorghum be graded Sample grade instead of No. 4.
4. Eliminated general appearance from numerical grades and established special grades for Bright and Discolored grain sorghums.
5. Added "other grains" to the factor cracked kernels and foreign material, and increased the amount allowed in grades Nos. 1 to 3 from 3, 6, and 10 percent to 4, 8, and 12 percent.
6. Revised damaged kernels definition to include damaged kernels of other grains and nongrain sorghums.
7. Redesignated the grades for Weevily and Smutty grain sorghums as special grades and revised the special grade for Smutty grain sorghums by eliminating odor as a factor and specified a quantity of smut equal to 10 smut masses in 50 grams of grain sorghums.
8. Changed the definition of foreign material and cracked kernels to cracked kernels, foreign material and other grains and changed the sieve used to determine this factor from one with an 8/64-inch triangular hole to one with a 5/64-inch triangular hole, a somewhat smaller opening.

Amended effective July 1, 1935 (3/28/35 FR)

1. Required dockage to be expressed in whole percent instead of in whole and half percent.
2. Changed the basic method for determining moisture from the Brown-Duvel to the air-oven method or any method giving similar results.

Amended effective February 8, 1961

Provided that the term D.L.Q. (Distinctly low quality) be construed to include sorghum which contains more than two crotalaria seeds in 1,000 grams.

Revised effective August 1, 1962 (3/31/62 FR)

1. Provided four classes: Yellow Grain Sorghum, White Grain Sorghum, Brown Grain Sorghum, and Mixed Grain Sorghum. The class Red Grain Sorghum was dropped and all subclasses were eliminated.
2. Provided that white grain sorghum with brown undercoats be classed as Brown Grain Sorghum.
3. Changed the minimum test weight per bushel from 55, 53, 51, and 49 pounds for grades Nos. 1 to 4 to 57, 55, 53, and 51 pounds.
4. Changed the maximum moisture limits from 14, 15, and 16 percent in grades Nos. 1 through 3 to 13.0, 14.0, and 15.0 percent. No change was made in the maximum moisture limits of grade No. 4.
5. Eliminated the grading factor nongrain sorghums and included nongrain sorghum in the definition of other grains.
6. Eliminated the special grades Bright grain sorghums and Discolored grain sorghums and provided that grain sorghum which is distinctly discolored shall be graded not higher than No. 3.

Amended effective February 28, 1970 (34 FR 3591, 2/28/69)

Provided that the prefix U.S. be shown on all official grain grades.

Amended effective January 8, 1974

The name of the grain sorghum standards changed from "Official Grain Standards of the United States for Grain Sorghum" to "United States Standards for Grain Sorghum."

Revised effective June 1, 1974 (39 FR 3943, 1/31/74)

1. Changed the designation grain sorghum to sorghum.
2. Redefined the class White Sorghum to permit the inclusion of not more than 2.0 percent of sorghum of other colors.
3. Redefined the class Yellow Sorghum to include sorghum with white pericarps which contain more than 2.0 percent of sorghum of other colors but not more than 10.0 percent of sorghum with brown pericarps or brown subcoats.

Amended effective September 8, 1977 (42 FR 30146, 6/13/77)

Certification requirements were changed so that a lot would be certificated:

1. As being of a specific U.S. grade, or
2. As being equal to or better in quality, as defined by the U.S. Standards for Sorghum, than the grade specified by the contract; i.e., U.S. No. 2 or better, U.S. No. 3 or better, etc.

Amended effective October 28, 1983 (48 FR 44167, 9/28/83)

Changed inspection procedures so the determination of odor may be performed either prior to or after mechanical cleaning of the sample.

Amended effective July 1, 1984 (48 FR 44169, 9/28/83)

Redefined the class White sorghum to include sorghum with translucent pericarps, and white-colored sorghum containing spots which singly or in combination cover 25.0 percent or less of the kernels. Concurrently, sorghum with white but spotted pericarps was deleted from the definition of the class Yellow sorghum.

Amended effective September 9, 1985 (49 FR 35744, 9/12/84)

Deleted moisture content as a grade-determining factor.

Revised effective June 30, 1987 (52 FR 24418, 6/30/87)

Removed rounding procedures for inclusion into Subpart A, General Provisions.

Amended effective May 1, 1988 (52 FR 24441, 6/30/87)

1. Redesignated the special grade "weevily" to "infested" to more appropriately describe grain containing live insects injurious to stored grain.
2. Revised tolerances for "infested."

Revised effective June 1, 1993 (57 FR 58967, 12/14/92)

1. Reduced the maximum BNFM limits for U.S. Nos. 2, 3, and 4 from 8.0, 12.0, and 15.0 percent to 7.0, 10.0, and 13.0 percent, respectively; and established grade limits for foreign material for U.S. Nos. 1 (1.5%), 2 (2.5%), 3 (3.5%), and 4 (4.5%).
2. Reduced the amount of Brown sorghum allowed in Yellow sorghum from 10.0 percent to 3.0 percent.
3. Modified the classification terminology Yellow sorghum to "Sorghum" and Brown sorghum to "Tannin" sorghum.
4. Revised the definitions for all classes to reflect the changes.

1. Deleted the reference to tannin content from definitions of Sorghum, Tannin sorghum and White sorghum, and defined these classes based on the presence or absence of a pigmented testa (subcoat);
2. Revised the definition of nongrain sorghum by deleting sorghum-sudangrass hybrids, sorgrass, and added language referencing seeds of *Sorghum bicolor* (L.) Moench that appear atypical of grain sorghum;
3. Reduced the grading limits for broken kernels and foreign material (BNFM) and the subfactor foreign material (FM);
4. Inserted a total count limit of 10 for other material used to determine sample grade factors;
5. Revised the certification of sorghum test weight to tenths of a pound per bushel;
6. Revised the sorghum breakpoints and associated grade limits for U.S. Nos. 1, 2, 3, and 4 BNFM and FM.

SUBPART K. SOYBEANS

Established effective November 20, 1940

Standards for soybeans were recommended by the U.S. Department of Agriculture in 1925. These standards were revised in 1935 and brought under the U.S. Grain Standards Act by an amendment to the Act in 1940.

Revised effective September 1, 1941

1. Increased the percentage of splits in grades No. 1 and No. 2 from 1.0 and 10.0 percent to 10 and 15 percent.
2. Reduced the maximum moisture limits from 15.0, 15.0, and 16.5 percent in grades Nos. 1, 2, and 3 to 13, 14, and 16 percent.
3. Established a dockage system based on an 8/64-inch round hole sieve and expressed on the certificate in terms of whole percent. A fraction of a percent was disregarded.
4. Increased the maximum percentage of foreign material from 0.5, 2.0, 4.0, and 6.0 percent in grade Nos. 1 through 4 to 1, 2, 3, and 5 percent.
5. Increased the maximum percentage of damaged kernels permitted in grade No. 1 from 1.5 to 2 percent.
6. The factor "other colors" was eliminated in the grade table. A footnote was added which applied to the No. 1 and No. 2 grade, providing that grade No. 1 of each of the classes Yellow Soybeans and Green Soybeans may contain not more than 2 percent and that grade No. 2 of each of these classes may contain not more than 3 percent of black, brown, or bicolored soybeans singly or combined.
7. Limits for other classes were changed. Brown and black soybeans may contain not more than 10 percent of soybeans of other colors and yellow and green soybeans may contain not more than 10 percent of other colors, including not more than 5 percent of brown, black, or bicolored soybeans.
8. Established a special grade Weevily soybeans.

Amended effective September 1, 1942

Changed the method of determining moisture from the water-oven to the air-oven.

Revised effective September 1, 1949

1. Classifying a part of the foreign material as dockage was eliminated.
2. The maximum limits of splits were increased from 15, 20, and 30 percent for grades Nos. 2, 3, and 4 to 20, 30, and 40 percent.
3. The maximum limits for foreign material were increased from 1, 2, 3, and 5 percent for grades Nos. 1 through 4 to 2.0, 3.0, 4.0, and 6.0 percent. This change was necessary due to elimination of the dockage factor.
4. The definitions for the classes Yellow Soybeans and Green Soybeans were changed to provide that all soybeans with yellow or green seedcoats which were yellow in cross section be classified as yellow soybeans and only soybeans that were green in cross section and had green seedcoats be classified as green soybeans.
5. Established a special grade Garlicky soybeans.

Revised effective September 1, 1955

1. Reduced the foreign material in the numerical grades from 2.0, 3.0, 4.0, and 6.0 percent to 1.0, 2.0, 3.0, and 5.0 percent.
2. Fixed special limits on heat damage of 0.2, 0.5, 1.0, and 3.0 percent in the numerical grades.
3. Redefined splits as pieces of soybeans that are not damaged.
4. Required that purple mottled and stained soybeans be graded not higher than No. 3.

Amended effective February 8, 1961

Provided that the term D.L.Q. (Distinctly low quality) be construed to include soybeans which contain more than two crotalaria seeds in 1,000 grams.

Amended effective October 30, 1963

Provided that the term purple mottled or stained includes soybeans which are discolored by a fungus. Purple mottled or stained soybeans would be graded not higher than No. 3.

Amended effective March 22, 1966

Provided that the term bicolored soybeans be construed to include soybeans with seedcoats of two colors, one of which is black or brown, when the black and/or brown color covers 50 percent or more of the seedcoat. The hilum of a soybean is not considered a part of the seedcoat.

Amended effective September 1, 1969 (34 FR 7282, 5/3/69)

Stinkbug-stung kernels considered damaged kernels at the rate of one-fourth of the actual percentage of the stung kernels.

Amended effective February 28, 1970 (34 FR 3591, 2/28/69)

Provided that the prefix U.S. be shown on all official grain grades.

Amended effective January 8, 1974

The name of the soybean standards changed from “Official Grain Standards of the United States for Soybeans” to “United States Standards for Soybeans.”

Amended effective September 8, 1977 (42 FR 30146, 6/13/77)

Certification requirements changed so that a lot would be certificated:

1. As being of a specific U.S. grade, or
2. As being equal to or better in quality, as defined by the U.S. Standards for Soybeans, than the grade specified by the contract; i.e., U.S. No. 2 or better, U.S. No. 3 or better, etc.

Revised effective September 9, 1985 (50 FR 18455, 5/1/85)

1. Updated the format of the standards to conform to other grain standards.
2. Deleted the classes Green, Black, and Brown soybeans and included them under the definition of Soybeans of other colors.
3. Included in the definition of Sample grade specific limits for stones, pieces of glass, castor beans, particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), rodent pellets, bird droppings, and other animal filth.
4. Deleted soybeans from § 810.901 Interpretation with respect to the term D.L.Q. (Distinctly low quality) and included the numerical limit for crotalaria seeds in the Sample grade definition.
5. Deleted § 810.902 Interpretation with respect to the term “Purple mottled or stained” and included a definition for the term under Terms Defined.
6. Deleted moisture content as a grade-determining factor.

Revised effective June 30, 1987 (52 FR 24418, 6/30/87)

Removed rounding procedures for inclusion into Subpart A, General Provisions.

Amended effective May 1, 1988 (52 FR 24441, 6/30/87)

1. Redesignated the special grade “weevily” to “infested” to more appropriately describe grain containing live insects injurious to stored grain.
2. Revised tolerances for “infested.”

Revised effective September 1, 1994 (59 FR 10569, 3/7/94)

1. Revised the reporting requirements to report the percentage of splits in tenths percent.
2. Reduced the U.S. Sample grade criteria for stones from eight or more to four or more and reduce the U.S. Sample grade aggregate weight criteria for stones from more than 0.2 percent by weight to more than 0.1 percent by weight.
3. Reduced the U.S. Sample grade criteria for pieces of glass from two to zero.
4. Eliminated the grade limitation on purple mottled or stained soybeans and establish a special grade, Purple Mottled or Stained.
5. Eliminated the grade limitation on soybeans that are materially weathered.
6. Clarified the reference to Mixed soybeans.
7. Established a cumulative total for factors which may cause a sample to grade U.S. Sample grade.

Revised effective September 1, 2007 (71 FR 52403,9/6/06)

1. Changed the minimum test weight per bushel (TW) from a grade determining factor to an informational factor.
2. Revised the reporting requirements for TW from whole and half pounds with a fraction of a half pound disregarded to reporting to the nearest tenth of a pound.

SUBPART L. SUNFLOWER SEED

Established effective September 1, 1984 (49 FR 22761, 6/1/84)

Revised effective June 30, 1987 (52 FR 24418, 6/30/87)

Removed rounding procedures for inclusion into Subpart A, General Provisions.

Amended effective May 1, 1988 (52 FR 24441, 6/30/87)

1. Redesignated the special grade “weevily” to “infested” to more appropriately describe grain containing live insects injurious to stored grain.
2. Revised tolerances for “infested.”

SUBPART M. TRITICALE

Established effective May 1, 1977 (42 FR 9377, 2/16/77)

Amended effective September 8, 1977 (42 FR 30146, 6/13/77)

Certification requirements were changed so that a lot would be certificated:

1. As being of a specific U.S. grade, or
2. As being equal to or better in quality, as defined by the U.S. Standards for Triticale, than the grade specified by the contract; i.e., U.S. No. 2 or better, U.S. No. 3 or better, etc.

Amended effective October 28, 1983 (48 FR 44167, 9/28/83)

Changed inspection procedures so the determination of odor may be performed either prior to or after mechanical cleaning of the sample.

Amended effective May 1, 1986 (49 FR 49424, 12/20/84)

1. Reduced the limit for castor beans permitted in the numerical grades to 1 from 2.
2. Deleted the presence of a quantity of smut so great that one or more grade requirements cannot be accurately determined as a criterion in designating triticale Sample grade.

Revised effective June 30, 1987 (52 FR 24418, 6/30/87)

Removed rounding procedures for inclusion into Subpart A, General Provisions.

Amended effective May 1, 1988 (52 FR 24441, 6/30/87)

1. Redesignated the special grade "weevily" to "infested" to more appropriately describe grain containing live insects injurious to stored grain.
2. Revised tolerances for "infested."

SUBPART N. WHEAT

Established standards for Hard Red Winter Wheat, Soft Red Winter Wheat, Common White Wheat, and Club Wheat effective July 1, and standards for all other wheat effective August 1, 1917

Revised effective July 15, 1918

1. Eliminated the subclasses Red Spring Humpback and Soft Red. Wheat of the variety Humpback was included in the subclass Red Spring. A grade "Garlicky" was established which applied to all classes and took the place of subclass Soft Red in the class Soft Red Winter Wheat. The class name Common and Red Durum Wheat was changed to Durum Wheat.
2. Changed the minimum limits of dark, hard, and vitreous kernels in the subclass Dark Hard Spring from 85 percent to 75 percent, in the subclass Dark Hard Winter from 90 percent to 80 percent, and for No. 1 Dark Hard Winter from 95 percent to 80 percent.
3. Changed the definition for the subclass Hard White from "not more than 20 percent of kernels of soft and chalky texture" to "75 percent or more of hard (not soft and chalky) kernels," and for the subclass Soft White from "more than 20 percent of kernels of soft and chalky texture" to "less than 75 percent of hard (not soft and chalky) kernels."
4. Changed the minimum test weight per bushel for grade No. 1 for all subclasses of Hard Red Spring Wheat from 59 pounds to 58 pounds. Changed the minimum test weight per bushel for all subclasses of Durum Wheat, Hard Red Winter Wheat, and the subclass Red Winter of the class Soft Red Winter Wheat from 61, 59, 57, 55, and 53 pounds for grades Nos. 1 through 5 to 60, 58, 56, 54, and 51 pounds. Changed the minimum test weight per bushel for the subclass Red Walla of the class Soft Red Winter Wheat from 60, 58, 56, 54, and 52 pounds for grades Nos. 1 through 5 to 58, 56, 54, 52, and 49 pounds, and from 52 pounds to 51 pounds for grade No. 5 for all subclasses of White Wheat.
5. Changed the maximum limits of damaged kernels in grade No. 1 from 1 percent to 2 percent and of heat-damaged kernels from no heat-damaged kernels and 0.1 percent in grades No. 1 and No. 2 to 0.1 percent and 0.2 percent.
6. Changed the names of grading factors "Inseparable foreign material" and "Kinghead, corncockle, vetch, darnel, and wild rose" to "Foreign material other than dockage" and "Matter other than cereal grains." Changed the maximum limits of foreign material other than dockage from 0.5, 1, 2, 4, and 6 percent for grades Nos. 1 through 5 to 1, 2, 3, 5, and 7 percent, and of matter other than cereal grains from 0.25, 0.5, 1, 2, and 3 percent for grades Nos. 1 through 5 to 0.5, 1.0, 2.0, 3.0, and 5.0 percent.

7. Changed the maximum limits of wheats of other classes for all classes except Durum Wheat from 2, 4, and 6 percent in grades Nos. 1, 2, and 3 to 5, 10, and 10 percent.

Changed the maximum limits of wheats of other classes in the subclasses Amber Durum and Durum in the class Durum Wheat from 2 percent in grade No. 1 to 5 percent.

Changed the maximum limits of wheat of other classes in the subclass Red Durum in the class Durum Wheat from 2, 4, and 6 percent for grades Nos. 1 through 3 to 5, 10, and 10 percent.

Changed the maximum limits of Common White, White Club, and Durum Wheat, singly or combined, in the classes Hard Red Spring Wheat and Hard Red Winter Wheat from 1, 2, 3, 5, and 5 percent for grades Nos. 1 through 5 to 2, 5, 10, 10, and 10 percent.

Changed the maximum limits of Soft Red Winter, Common White, and White Club wheat, singly or combined, in the subclasses Amber Durum and Durum of the class Durum Wheat from 1, 5, 5, 5, and 5 percent in grades Nos. 1 through 5 to 2, 5, 10, 10, and 10 percent.

Changed the maximum limits of Soft Red Winter, Common White, and White Club wheat, singly or combined, in the subclass Red Durum of the class Durum Wheat from 1, 2, 3, 5, and 5 percent for grades Nos. 1 through 5 to 2, 5, 10, 10, and 10 percent.

Changed the maximum limits of Durum wheat in the classes Soft Red Winter Wheat and White Wheat from 1 percent in each of the grades Nos. 1 through 5 to 2, 3, 10, 10, and 10 percent.

8. Changed the maximum moisture limits for the classes Hard Red Spring Wheat and Durum Wheat from 13.5, 14.5, 14.5, 15.5, and 15.5 percent for grades Nos. 1 through 5 to 14.0, 14.5, 15.0, 16.0, and 16.0 percent.

Changed the maximum moisture limits for the classes Hard Red Winter Wheat, Soft Red Winter Wheat, and White Wheat from 13, 13, 14, 14, and 15 percent for grades Nos. 1 through 5 to 13.5, 14.0, 14.5, 15.5, and 15.5 percent.

9. Added a grade for Garlicky wheat, Treated wheat, and Smutty wheat and changed the method of expressing the grades for Mixed Wheat.

10. Excluded emmer, spelt, and einkorn from the definition for wheat.

11. Changed the method of expressing dockage from whole and half percent to whole percent.

Amended effective August 15, 1921

Eliminated “bright” from the No. 1 grade requirements.

Amended effective July 17, 1922

Combined the classes Common White Wheat and White Club Wheat into one class White Wheat with three subclasses Hard White, Soft White, and Western White. In the class Soft Red Winter Wheat, changed the subclass Red Walla to Western Red.

Amended effective August 15, 1924

1. Established the grade No. 1 Hard Spring for Hard Red Spring Wheat with 85 percent or more dark, hard, and vitreous kernels and test weight of not less than 60 pounds.
2. Provided grades for Mixed Durum, for Mixed Wheat with more than 70 percent of Durum and not more than 5 percent of Soft Red Winter and/or White Wheat.
3. Changed the test weight per bushel requirements for the several numerical grades of the subclass Western Red from 58, 56, 54, 52, and 49 to 60, 58, 56, 54, and 51.
4. Changed the grading of wheat infested with live weevils from Sample grade to a grade Weevily Wheat.
5. Excluded Polish and poulard wheat from the definition of wheat.
6. Revised the definition for treated wheat.

Revised effective July 2, 1934

1. Removed moisture as a specific numerical grading factor and established a special grade Tough wheat for wheat between 14.5 and 16 percent moisture for the classes Hard Red Spring Wheat, Durum Wheat, and Red Durum Wheat and for wheat between 14 and 15.5 percent moisture for the classes Hard Red Winter Wheat, Soft Red Winter Wheat, and White Wheat. Wheat with more than the maximum moisture permitted in the special grade Tough wheat was graded Sample grade.
2. Divided the class Durum Wheat into two classes, Durum Wheat and Red Durum Wheat. Durum Wheat was divided into three subclasses, Hard Amber Durum, Amber Durum, and Durum. The subclass White Club was added to the class White Wheat, and a slight change was made in the definition of the subclass Western White.
3. Changed the grading of musty and sour wheat from No. 5 to Sample grade.
4. The grade No. 1 Hard Spring was dropped and No. 1 Heavy was adopted for Hard Red Spring Wheat with a test weight of 60 pounds.

5. The minimum percentage of dark, hard, and vitreous kernels in the subclass Dark Hard Winter was changed from 80 percent to 75 percent.
6. Redesignated the grades Treated wheat, Garlicky wheat, Smutty wheat, and Weevily wheat as special grades and added a special grade Ergoty wheat.
7. The special grade Garlicky wheat was liberalized from “one or more garlic bulblets” to “two or more green garlic bulblets or an equivalent quantity of dry or partly dry bulblets” per 1,000 grams of wheat and the special grade was divided into Light garlicky and Garlicky, based on the number of bulblets.
8. The special grade Smutty wheat was liberalized from “in excess of 2 balls of average size in 50 grams of wheat” to “10 balls of average size in 250 grams of wheat,” and the special grade was divided into Light smutty and Smutty based on the quantity of smut.
9. A limit of 10 percent of Red Durum was allowed in Mixed Durum.
10. Damaged and heat-damaged was applied to kernels and pieces of kernels of other grains as well as to the wheat kernels.
11. The determination of other grains in the definition of wheat was on the basis of the wheat before the removal of the dockage rather than on the dockage-free basis as before.
12. Changed the maximum limits of wheats of other classes in all classes of wheat from 5 to 10 percent for grade No. 2.

Amended effective July 25, 1934

Increased the amount of smut in the special grade Smutty wheat from “in excess of a quantity equal to 10 balls of average size,” to “in excess of a quantity equal to 14 balls of average size” in 250 grams of wheat.

Amended effective July 1, 1935

Changed the basic moisture method from the Brown-Duvel to the air-oven or any method giving similar results.

Revised effective October 1, 1937

1. Prescribed the manner in which the grade designation for Mixed Wheat was to be written and changed the grade requirements for Mixed Durum to provide that wheat with not less than 60 percent of kernels that are hard and vitreous and of amber color be designated as Amber Mixed Durum.
2. Provided limits of 7 percent of shrunken and broken kernels in the top two grades and 10 percent in grade No. 3.

Amended effective August 2, 1954

Changed the method of expressing smut dockage.

Revised effective June 15, 1957

1. Changed the maximum limits of foreign material from 1.0, 2.0, 3.0, 5.0, and 7.0 percent in grades Nos. 1 through 5 to 0.5, 1.0, 2.0, 3.0, and 5.0 percent.
2. Eliminated the factor "matter except other grains."
3. Changed the maximum limits of shrunken and broken kernels from 7 percent for grades No. 1 and No. 2 and 10 percent for grade No. 3 to 5.0 percent and 8.0 percent.
4. Changed the maximum limits of wheats of other classes in grade No. 2 from 10 percent to 5.0 percent.
5. Changed the minimum limits of dark, hard and vitreous kernels in the subclass Hard Winter Wheat from 25 percent to 40 percent.
6. Eliminated Amber Mixed Durum and Mixed Durum from the grade designation in the class Mixed Wheat.
7. Provided that distinctly low quality be determined on the basis of the grain as a whole.

Amended effective February 8, 1961

Provided that the term D.L.Q. (Distinctly low quality) be construed to include wheat which contains more than two crotalaria seeds in 1,000 grams.

Revised effective June 1, 1964 (29 FR 1309, 2593, 5378, 5/29/64)

1. Changed the method of expressing dockage from whole percent to whole and half percent.
2. Eliminated the subclasses Red Winter Wheat and Western Red Wheat in the class Soft Red Winter Wheat.
3. Provided that the name and percentage of White Club Wheat and other White Wheat be given as a part of the grade designation in the subclass Western White Wheat.
4. The clause "and may include not more than 10.0 percent of wheats of other classes" was deleted from the definition for the classes Hard Red Spring Wheat, Durum Wheat, Red Durum Wheat, Hard Red Winter Wheat, Soft Red Winter Wheat, and White Wheat.

5. Changed the definition for the class Mixed Wheat.
6. Changed the maximum limits of shrunken and broken kernels from 5.0 percent for grades No. 1 and No. 2 and 8.0 percent for grade No. 3 to 3.0, 5.0, 8.0, 12.0, and 20.0 percent for grades No. 1, No. 2, No. 3, No. 4, and No. 5, respectively.
7. Added a factor "total defects" which included damaged kernels, foreign material, and shrunken and broken kernels and provided maximum limits of 3.0, 5.0, 8.0, 12.0, and 20.0 percent for grades No. 1, No. 2, No. 3, No. 4, and No. 5, respectively.
8. Combined the tables of grade requirements for all classes of wheat into one table.
9. Reduced the minimum moisture requirements for the special grade Tough wheat for the classes Hard Red Winter Wheat, Soft Red Winter Wheat, and White Wheat from 14.0 percent and for the classes Hard Red Spring Wheat, Durum Wheat, and Red Durum Wheat from 14.5 percent to 13.5 percent for all classes. Eliminated the maximum moisture requirement for the special grade Tough wheat for all classes and deleted reference to moisture in the definition for Sample grade.
10. Provided a special grade Heavy wheat for all classes to be applied to grades No. 1, No. 2, and No. 3. Eliminated the grade No. 1 Heavy in the class Hard Red Spring Wheat.
11. Deleted smut dockage in the special grade Smutty wheat.
12. Moisture in Durum Wheat was rescinded not to become effective until June 1, 1965, so Durum Wheat with over 16 percent moisture is graded Sample grade. Durum Wheat with over 14.5 percent but not over 16.0 percent moisture is graded special grade Tough wheat.
13. Changed the maximum limits of wheat of other classes in grade No. 1 from 5.0 to 3.0 percent. A new factor, Contrasting Classes, was created and defined as: (a) Durum Wheat, Red Durum Wheat, and White wheat in the classes Hard Red Spring Wheat and Hard Red Winter Wheat; (b) Hard Red Spring Wheat, Red Durum Wheat, Hard Red Winter Wheat, Soft Red Winter Wheat, and White Wheat in the class Durum Wheat; (c) Durum Wheat and Red Durum Wheat in the class Soft Red Winter Wheat; and (d) Durum Wheat, Red Durum Wheat, Hard Red Spring Wheat, and Hard Red Winter Wheat in the class White Wheat. The maximum limits of contrasting classes in all classes of wheat were set at 0.5, 1.0, 2.0, 10.0, and 10.0 for grades No. 1, No. 2, No. 3, No. 4, and No. 5, respectively.

NOTE: The provision rescinding the moisture requirement for Sample grade and the special grade Tough wheat in Durum Wheat until June 1, 1965, was not extended; and on June 1, 1965, the moisture requirement for the special grade Tough wheat was reduced from 14.5 percent to 13.5 percent, and the reference to moisture in the definition in Sample grade was deleted.

Amended effective June 15, 1965

Changed the maximum limits of contrasting classes in grades No. 1, No. 2, and No. 3 from 0.5, 1.0, and 2.0 percent to 1.0, 2.0, and 3.0 percent, respectively, in all classes of wheat except Mixed Wheat.

Amended effective January 31, 1969 (33 FR 16065, 11/1/68)

1. Lowered the test weight per bushel requirements for White Club Wheat to those established for Hard Red Spring Wheat.
2. Redefined Sample grade to include factors previously considered under the term "otherwise of distinctly low quality."

Amended effective March 30, 1969

The wheat standards were assigned new section numbers (§§ 26.101 - 26.129 changed to read §§ 26.301 - 26.329).

Amended effective February 28, 1970 (34 FR 3591, 2/28/69)

Provided that the prefix U.S. be shown on all official grain grades.

Amended effective August 10, 1973 (38 FR 21639, 8/10/73)

The determination for crotalaria seeds, large stones, castor beans, broken glass, animal filth, unknown foreign substances, and commonly recognized harmful or toxic substances changed from the basis of the dockage-free wheat to the basis of the wheat as a whole.

Amended effective January 8, 1974

The name of the wheat standards changed from "Official Grain Standards of the United States for Wheat" to "United States Standards for Wheat."

Revised effective May 1, 1977 (41 FR 26670, 6/29/76)

1. Deleted the class Red Durum Wheat.
2. Established a new class Unclassed Wheat.
3. Deleted the subclasses in the class Hard Red Winter Wheat.
4. Changed the basis of determination for heat-damaged kernels, damaged kernels (total), and foreign material from a dockage-free basis to a dockage and shrunken and broken kernel-free basis.

5. Changed the limits for heat-damaged kernels in grades U.S. Nos. 1 and 2 from 0.1 and 0.2 percent, respectively, to 0.2 percent for both grades.
6. Deleted the special grade Heavy wheat.
7. Deleted the special grade Tough wheat.
8. The components and percentages for the subclass Western White Wheat and the classes Unclassed Wheat and Mixed Wheat to be shown under "Remarks" on the inspection certificate.

Amended effective May 1, 1977 (42 FR 9379, 2/16/77)

1. Section 26.303(b), heading changed to read "Certain Quality Determinations."
2. Included broken glass in the definition of sample grade to correct an inadvertent omission.

Amended effective September 8, 1977 (42 FR 30146, 6/13/77)

Certification requirements were changed so that a lot would be certificated:

1. As being of a specific U.S. grade, or
2. As being equal to or better in quality, as defined by the U.S. Standards for Wheat, than the grade specified by the contract; i.e., U.S. No. 2 or better, U.S. No. 3 or better, etc.

Amended effective October 28, 1983 (48 FR 44167, 9/28/83)

Changed inspection procedures so the determination of odor may be performed either prior to or after mechanical cleaning of the sample.

Amended effective May 1, 1985 (49 FR 20640, 5/16/84)

1. Deleted the special grade "Light garlicky wheat." The special grade "Garlicky wheat" is redefined as wheat containing more than 2 green bulblets or an equivalent quantity of dry or partly dry bulblets in 1,000 grams. The work portion is reduced to 250 grams for counts in excess of 10 green garlic bulblets.
2. Reduced the limit for castor beans permitted in the numerical grades to 1 from 2.
3. Clarified the grade chart to show that when Hard Red Spring wheat or White Club wheat predominates in Mixed wheat, the test weight requirements for those wheats would apply.
4. Deleted the presence of a quantity of smut so great that one or more grade requirements cannot be accurately determined as a criterion in designating wheat Sample grade.

5. The components of the subclass Western White wheat are listed in the order of predominance on the official certificate.
6. Changed inspection procedures so the factors wheat of other classes, contrasting classes, and subclasses are analyzed on a work portion of wheat free from dockage and shrunken and broken kernels.

Revised effective May 1, 1987 (52 FR 30325, 8/26/86)

Revised § 810.305(b) to state the percentage of dockage in whole and tenth percents to the nearest 0.1 percent.

Revised effective June 30, 1987 (52 FR 24418, 6/30/87)

Removed rounding procedures for inclusion into Subpart A, General Provisions.

Amended effective May 1, 1988 (52 FR 24441, 6/30/87)

1. Redesignated the special grade “weevily” to “infested” to more appropriately describe grain containing live insects injurious to stored grain.
2. Revised tolerances for “infested.”
3. Revised the definition for Sample grade to include a limit of 32 insect-damaged kernels per 100 grams of representative sample.

Revised effective May 1, 1990 (54 FR 48735, 11/27/89)

Replaced the single class White wheat with two classes, Hard White wheat and Soft White wheat. The class Soft White wheat has three subclasses, Common White wheat, White Club wheat, and Western White wheat. The class Hard White wheat has no subclasses. This changes provides greater consistency in applying the standards; makes the standards easier to interpret; and facilitates trade in both hard and soft white wheat.

Revised effective May 1, 1993 (57 FR 58966, 12/14/92)

1. Removed the description Red Durum wheat from the definition of Unclassed wheat.
2. Tightened the limit for stones from 8 or more to 4 or more and reduced the aggregate weight criteria from more than 0.2 percent by weight to more than 0.1 percent by weight.
3. Reduced the tolerances for pieces of glass from 2 or more to 1 or more (0 tolerance).

4. Established a cumulative total for factors which may cause a sample to grade U.S. Sample grade. Any combination of stones, crotalaria seeds, castor beans, particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance, or animal filth per 1,000 grams would cause the wheat to be graded U.S. Sample grade if the total exceeds a count of 4.
5. Tightened the limit for ergot from 0.30 percent to 0.05 percent by weight.
6. Tightened the limit for the special grade "Light smutty" wheat from more than 14 smut balls to more than 5 smut balls.
7. Tightened the limits for foreign material for U.S. Nos. 1, 2, and 3 to 0.4, 0.7, and 1.3 percent, respectively.

Revised effective May 1, 2006 (70 FR 8233, 02/18/05)

1. Changed the definition of contrasting classes in Hard Red Winter wheat and Hard Red Spring wheat such that Hard White wheat is not a contrasting class but is considered as wheat of other classes.
2. Added the sample size used to determine sample grade factors.

Revised effective May 1, 2014 (78 FR 27857, 05/13/13)

Changed the definition of contrasting classes in Hard White wheat such that Hard Red Winter wheat and Hard Red Spring wheat are not contrasting classes but are considered as wheat of other classes.

Subpart B -- United States Standards for Barley

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Terms Defined

§ 810.201 Definition of barley.

Grain that, before the removal of dockage, consists of 50 percent or more of whole kernels of cultivated barley (*Hordeum vulgare* L.) and not more than 25 percent of other grains for which standards have been established under the United States Grain Standards Act. The term “barley” as used in these standards does not include hull-less barley or black barley.

§ 810.202 Definition of other terms.

(a) *Black barley*. Barley with black hulls.

(b) *Broken kernels*. Barley with more than 1/4 of the kernel removed.

(c) *Classes*. There are two classes of barley: Malting barley and Barley.

(1) *Malting barley* is divided into the following two subclasses:

(i) *Six-rowed Malting barley* has a minimum of 95.0 percent of a six-rowed suitable malting type that contains not more than 1.9 percent injured-by-frost kernels, 0.4 percent frost-damaged kernels, 0.2 percent injured-by-heat kernels, 0.1 percent heat-damaged kernels, 1.9 percent injured-by-mold kernels, and 0.4 percent mold-damaged kernels. Six-rowed Malting barley must not be infested, blighted, ergoty, garlicky, or smutty as defined in §810.107(b) and §810.206.

(ii) *Two-rowed Malting barley*. Barley that has a minimum of 95.0 percent of a two-rowed suitable malting type that contains not more than 1.9 percent injured-by-frost kernels, 0.4 percent frost-damaged kernels, 0.2 percent injured-by-heat kernels, 0.1 percent heat-damaged kernels, 1.9 percent injured-by-mold kernels, and 0.4 percent mold-damaged kernels. Two-rowed Malting barley must not be infested, blighted, ergoty, garlicky, or smutty as defined in § 810.107(b) and § 810.206.

(2) *Barley*. Any barley of a six-rowed or two-rowed type. The class Barley is divided into the following three subclasses:

(i) *Six-rowed barley*. Any six-rowed barley that contains not more than 10.0 percent of two-rowed varieties.

(ii) *Two-rowed barley*. Any two-rowed barley with white hulls that contains not more than 10.0 percent of six-rowed varieties.

(iii) *Barley*. Any barley that does not meet the requirements for the subclasses Six-rowed barley or Two-rowed barley.

(d) *Damaged kernels.* Kernels, pieces of barley kernels, other grains, and wild oats that are badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat-damaged, injured-by-heat, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

(e) *Dockage.* All matter other than barley that can be removed from the original sample by use of an approved device according to procedures prescribed in FGIS instructions. Also, underdeveloped, shriveled, and small pieces of barley kernels removed in properly separating the material other than barley and that cannot be recovered by properly rescreening or recleaning.

(f) *Foreign material.* All matter other than barley, other grains, and wild oats that remains in the sample after removal of dockage.

(g) *Frost-damaged kernels.* Kernels, pieces of barley kernels, other grains, and wild oats that are badly shrunken and distinctly discolored black or brown by frost.

(h) *Germ-damaged kernels.* Kernels, pieces of barley kernels, other grains, and wild oats that have dead or discolored germ ends.

(i) *Heat-damaged kernels.* Kernels, pieces of barley kernels, other grains, and wild oats that are materially discolored and damaged by heat.

(j) *Injured-by-frost kernels.* Kernels and pieces of barley kernels that are distinctly indented, immature, or shrunken in appearance or that are light green in color as a result of frost before maturity.

(k) *Injured-by-heat kernels.* Kernels, pieces of barley kernels, other grains, and wild oats that are slightly discolored as a result of heat.

(l) *Injured-by-mold kernels.* Kernels and pieces of barley kernels containing slight evidence of mold.

(m) *Mold-damaged kernels.* Kernels, pieces of barley kernels, other grains, and wild oats that are weathered and contain considerable evidence of mold.

(n) *Other grains.* Black barley, corn, cultivated buckwheat, einkorn, emmer, flaxseed, guar, hull-less barley, nongrain sorghum, oats, Polish wheat, popcorn, poulard wheat, rice, rye, safflower, sorghum, soybeans, spelt, sunflower seed, sweet corn, triticale, and wheat.

(o) *Plump barley.* Barley that remains on top of a 6/64 x 3/4 slotted-hole sieve after sieving according to procedures prescribed in FGIS instructions.

(p) *Sieves.*

(1) 5/64 x 3/4 slotted-hole sieve. A metal sieve 0.032 inch thick with slotted perforations 0.0781 (5/64) inch by 0.750 (3/4) inch.

(2) 5.5/64 x 3/4 slotted-hole sieve. A metal sieve 0.032 inch thick with slotted perforations 0.0895 (5.5/64) inch by 0.750 (3/4) inch.

(3) 6/64 x 3/4 slotted-hole sieve. A metal sieve 0.032 inch thick with slotted perforations 0.0937 (6/64) inch by 0.750 (3/4) inch.

(q) *Skinned and broken kernels*. Barley kernels that have one-third or more of the hull removed, or that the hull is loose or missing over the germ, or broken kernels, or whole kernels that have a part or all of the germ missing.

(r) *Sound barley*. Kernels and pieces of barley kernels that are not damaged as defined under (d) of this section.

(s) *Suitable malting type*. Varieties of malting barley that are recommended by the American Malting Barley Association and other malting type(s) used by the malting and brewing industry. The varieties are listed in AMS's instructions.

(t) *Thin barley*. Thin barley shall be defined for the appropriate class as follows:

(1) *Malting barley*. Six-rowed Malting barley that passes through a 5/64 x 3/4 slotted-hole sieve and Two-rowed Malting barley which passes through a 5.5/64 x 3/4 slotted-hole sieve in accordance with procedures prescribed in AMS's instructions.

(2) *Barley*. Six-rowed barley, Two-rowed barley, or Barley that passes through a 5/64 x 3/4 slotted-hole sieve in accordance with procedures prescribed in AMS's instructions.

(u) *Wild oats*. Seeds of *Avena fatua* L. and *A. sterilis* L.

Principles Governing the Application of Standards

§ 810.203 Basis of determination.

All other determinations. Each determination of heat-damaged kernels, injured-by-heat kernels, and white or blue aleurone layers in Six-rowed barley is made on pearled, dockage-free barley. Other determinations not specifically provided for under the General Provisions are made on the basis of the grain when free from dockage, except the determination of odor is made on either the basis of the grain as a whole or the grain when free from dockage.

Grades and Grade Requirements

§ 810.204 Grades and grade requirements for Six-rowed Malting barley.

SIX-ROWED MALTING BARLEY									
Grade	Minimum Limits of -			Maximum Limits of -					
	Test weight per bushel (pounds)	Suitable malting type (percent)	Sound barley ¹ (percent)	Damaged kernels ¹ (percent)	Wild oats (percent)	Foreign material (percent)	Other grains (percent)	Skinned and broken kernels (percent)	Thin barley (percent)
U.S. No. 1	47.0	97.0	98.0	2.0	1.0	0.5	2.0	4.0	7.0
U.S. No. 2	45.0	97.0	98.0	3.0	1.0	1.0	3.0	6.0	10.0
U.S. No. 3	43.0	95.0	96.0	4.0	2.0	2.0	5.0	8.0	15.0
U.S. No. 4	43.0	95.0	93.0	5.0	3.0	3.0	5.0	10.0	15.0

¹ Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels or considered against sound barley.

Notes: Malting barley must not be infested in accordance with § 810.107(b) and must not contain any special grades as defined in § 810.206. Six-rowed Malting barley varieties not meeting the requirements of this section must be graded in accordance with standards established for the class barley.

§ 810.205 Grades and grade requirements for Two-rowed Malting barley.

§ 810.205 Grades and grade requirements for Two-rowed Malting barley.									
Grade	Minimum Limits of -			Maximum Limits of -					
	Test weight per bushel (pounds)	Suitable malting type (percent)	Sound barley ¹ (percent)	Damage Kernels ¹ (percent)	Wild Oats (percent)	Foreign material (percent)	Other grains (percent)	Skinned and broken kernels (percent)	Thin barley (percent)
U.S. No. 1	50.0	97.0	98.0	2.0	1.0	0.5	2.0	4.0	5.0
U.S. No. 2	48.0	97.0	98.0	3.0	1.0	1.0	3.0	6.0	7.0
U.S. No. 3	48.0	95.0	96.0	4.0	2.0	2.0	5.0	8.0	10.0
U.S. No. 4	48.0	95.0	93.0	5.0	3.0	3.0	5.0	10.0	10.0

¹ Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels or considered against sound barley.

Notes: Malting barley must not be infested in accordance with §810.107(b) and must not contain any special grades as defined in § 810.206. Two-rowed Malting barley varieties not meet the requirements of this section must be graded in the accordance with standards established for the class Barley.

§ 810.207 Grades and grade requirements for barley.

Grade	Minimum limits of		Maximum limits of				
	Test weight per bushel (pounds)	Sound barley (percent)	Damaged kernels ¹ (percent)	Heat damaged kernels (percent)	Foreign material (percent)	Broken kernels (percent)	Thin barley (percent)
U.S. No. 1	47.0	97.0	2.0	0.2	1.0	4.0	10.0
U.S. No. 2	45.0	94.0	4.0	0.3	2.0	8.0	15.0
U.S. No. 3	43.0	90.0	6.0	0.5	3.0	12.0	25.0
U.S. No. 4	40.0	85.0	8.0	1.0	4.0	18.0	35.0
U.S. No. 5	36.0	75.0	10.0	3.0	5.0	28.0	75.0

U.S. Sample Grade:
 U.S. Sample grade shall be barley that:
 (a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, 4, or 5; or
 (b) Contains 8 or more stones or any number of stones which have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (*Crotalaria spp.*), 2 or more castor beans (*Ricinus communis* L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cocklebur (*Xanthium spp.*) or similar seeds singly or in combination, 10 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1-1/8 to 1-1/4 quarts of barley; or
 (c) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or
 (d) Is heating or otherwise of distinctly low quality.

¹ Includes heat-damaged kernels. Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels.

Special Grades and Special Grade Requirements

§ 810.207 Special grades and special grade requirements.

- (a) Blighted barley. Barley that contains more than 4.0 percent of fungus-damaged and/or mold-damaged kernels.
- (b) Ergoty barley. Barley that contains more than 0.10 percent ergot.
- (c) Garlicky barley. Barley that contains three or more green garlic bulblets, or an equivalent quantity of dry or partly dry bulblets in 500 grams of barley.
- (d) Smutty barley. Barley that has kernels covered with smut spores to give a smutty appearance in mass, or which contains more than 0.20 percent smut balls.

U.S. Standards

February 1992

Subpart C -- United States Standards for Canola

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Terms Defined

§ 810.301 Definition of canola.

Seeds of the genus *Brassica* from which the oil shall contain less than 2 percent erucic acid in its fatty acid profile and the solid component shall contain less than 30.0 micromoles of any one or any mixture of 3-butenyl glucosinolate, 4-pentenyl glucosinolate, 2-hydroxy-3-butenyl, or 2-hydroxy-4-pentenyl glucosinolate, per gram of air-dried, oil free solid. Before the removal of dockage, the seed shall contain not more than 10.0 percent of other grains for which standards have been established under the United States Grain Standards Act.

§ 810.302 Definition of other terms.

(a) *Conspicuous admixture*. All matter other than canola including, but not limited to, ergot, sclerotinia, and stones, which is conspicuous and readily distinguishable from canola and which remains in the sample after the removal of machine separated dockage. Conspicuous admixture is added to machine separated dockage in the computation of total dockage.

(b) *Damaged kernels*. Canola and pieces of canola that are heat-damaged, sproutdamaged, mold-damaged, distinctly green damaged, frost damaged, rimed damaged, or otherwise materially damaged.

(c) *Distinctly green kernels*. Canola and pieces of canola which, after being crushed, exhibit a distinctly green color.

(d) *Dockage*. All matter other than canola that can be removed from the original sample by use of an approved device according to procedures prescribed in FGIS instructions. Also, underdeveloped, shriveled, and small pieces of canola kernels that cannot be recovered by properly rescreening or recleaning. Machine separated dockage is added to conspicuous admixture in the computation of total dockage.

(e) *Ergot*. Sclerotia (sclerotium, sing.) of the fungus, *Claviceps* species, which are associated with some seeds other than canola where the fungal organism has replaced the seed.

(f) *Heat-damaged kernels*. Canola and pieces of canola which, after being crushed, exhibit that they are discolored and damaged by heat.

(g) *Inconspicuous admixture*. Any seed which is difficult to distinguish from canola. This includes, but is not limited to, common wild mustard (*Brassica kaber* and *B. juncea*), domestic brown mustard (*Brassica juncea*), yellow mustard (*B. hirta*), and seed other than the mustard group.

(h) *Sclerotia (sclerotium, sing.)*. Dark colored or black resting bodies of the fungi *Sclerotinia* and *Claviceps*.

(i) *Sclerotinia*. Genus name which includes the fungus *Sclerotinia sclerotiorum* which produces sclerotia. Canola is only infrequently infected, and the sclerotia, unlike sclerotia of ergot, are usually associated within the stem of the plants.

Principles Governing the Application of Standards

§ 810.303 Basis of determination.

Each determination of conspicuous admixture, ergot, sclerotinia, stones, damaged kernels, heat-damaged kernels, distinctly green kernels, and inconspicuous admixture is made on the basis of the sample when free from dockage. Other determinations not specifically provided for under the general provisions are made on the basis of the sample as a whole, except the determination of odor is made on either the basis of the sample as a whole or the sample when free from dockage. The content of glucosinolates and erucic acid is determined on the basis of the sample according to procedures prescribed in FGIS instructions.

Grades and Grade Requirements

§ 810.304 Grades and grade requirements for canola.

Grading factors	Grades, U.S. Nos.		
	1	2	3
Damaged kernels:			
Heat damaged	0.1	0.5	2.0
Distinctly green	2.0	6.0	20.0
Total	3.0	10.0	20.0
Conspicuous admixture:			
Ergot	0.05	0.05	0.05
Sclerotinia	0.05	0.10	0.15
Stones	0.05	0.05	0.05
Total	1.0	1.5	2.0
Inconspicuous admixture	5.0	5.0	5.0
Maximum count limits of:			
Other material:			
Animal filth	3	3	3
Glass	0	0	0
Unknown foreign substance	1	1	1
U.S. Sample grade Canola that:			
(a) Does not meet the requirements for U.S. Nos. 1, 2, or 3; or			
(b) Has a musty, sour, or commercially objectionable foreign odor; or			
(c) Is heating or otherwise of distinctly low quality.			

Special Grades and Special Grade Requirements

§ 810.305 Special grades and special grade requirements.

Garlicky canola. Canola that contains more than two green garlic bulblets or an equivalent quantity of dry or partly dry bulblets in approximately a 500 gram portion.

Nongrade Requirements

§ 810.306 Nongrade requirements.

Glucosinolates. Content of glucosinolates in canola is determined according to procedures prescribed in FGIS instructions.

Subpart D -- United States Standards for Corn

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Terms Defined

§ 810.401 Definition of corn.

Grain that consists of 50 percent or more of whole kernels of shelled dent corn and/or shelled flint corn (*Zea mays* L.) and not more than 10.0 percent of other grains for which standards have been established under the United States Grain Standards Act.

§ 810.402 Definition of other terms.

- (a) *Broken corn*. All matter that passes readily through a 12/64 round-hole sieve and over a 6/64 round-hole sieve according to procedures prescribed in FGIS instructions.
- (b) *Broken corn and foreign material*. All matter that passes readily through a 12/64 round-hole sieve and all matter other than corn that remains in the sieved sample after sieving according to procedures prescribed in FGIS instructions.
- (c) *Classes*. There are three classes for corn: Yellow corn, White corn, and Mixed corn.
- (1) *Yellow corn*. Corn that is yellow-kerneled and contains not more than 5.0 percent of corn of other colors. Yellow kernels of corn with a slight tinge of red are considered Yellow corn.
- (2) *White corn*. Corn that is white-kerneled and contains not more than 2.0 percent of corn of other colors. White kernels of corn with a slight tinge of light straw or pink color are considered White corn.
- (3) *Mixed corn*. Corn that does not meet the color requirements for either of the classes Yellow corn or White corn and includes white-capped Yellow corn.
- (d) *Damaged kernels*. Kernels and pieces of corn kernels that are badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat-damaged, insectbored, mold-damaged, sprout-damaged, or otherwise materially damaged.
- (e) *Foreign material*. All matter that passes readily through a 6/64 round-hole sieve and all matter other than corn that remains on top of the 12/64 round-hole sieve according to procedures prescribed in FGIS instructions.
- (f) *Heat-damaged kernels*. Kernels and pieces of corn kernels that are materially discolored and damaged by heat.
- (g) *Sieves*.
- (1) *12/64 round-hole sieve*. A metal sieve 0.032 inch thick with round perforations 0.1875 (12/64) inch in diameter which are 1/4 inch from center to center. The perforations of each row shall be staggered in relation to the adjacent row.
- (2) *6/64 round-hole sieve*. A metal sieve 0.032 inch thick with round perforations 0.0937 (6/64) inch in diameter which are 5/32 inch from center to center. The perforations of each row shall be staggered in relation to the adjacent row.

Principles Governing the Application of Standards

§ 810.403 Basis of determination.

Each determination of class, damaged kernels, heat-damaged kernels, waxy corn, flint corn, and flint and dent corn is made on the basis of the grain after the removal of the broken corn and foreign material. Other determinations not specifically provided for under the general provisions are made on the basis of the grain as a whole, except the determination of odor is made on either the basis of the grain as a whole or the grain when free from broken corn and foreign material.

Grades and Grade Requirements

§ 810.404 Grades and grade requirements for corn.

Grade	Minimum test weight per bushel (pounds)	Maximum limits of:		
		Damaged kernels		Broken corn and foreign material (percent)
		Heat damaged kernels (percent)	Total (percent)	
U.S. No. 1	56.0	0.1	3.0	2.0
U.S. No. 2	54.0	0.2	5.0	3.0
U.S. No. 3	52.0	0.5	7.0	4.0
U.S. No. 4	49.0	1.0	10.0	5.0
U.S. No. 5	46.0	3.0	15.0	7.0
U.S. Sample Grade U.S. Sample grade is corn that: (a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, 4, or 5; or (b) Contains stones with an aggregate weight in excess of 0.1 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (<i>Crotalaria spp.</i>), 2 or more castor beans (<i>Ricinus communis</i> L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cockleburrs (<i>Xanthium spp.</i>), or similar seeds singly or in combination, or animal filth in excess of 0.20 percent in 1,000 grams; or (c) Has a musty, sour, or commercially objectionable foreign odor; or (d) Is heating or otherwise of distinctly low quality				

Special Grades and Special Grade Requirements

§ 810.405 Special grades and special grade requirements.

- (a) *Flint corn.* Corn that consists of 95 percent or more of flint corn.
- (b) *Flint and dent corn.* Corn that consists of a mixture of flint and dent corn containing more than 5.0 percent but less than 95 percent of flint corn.
- (c) *Waxy corn.* Corn that consists of 95 percent or more waxy corn, according to procedures prescribed in FGIS instructions

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Subpart F -- United States Standards for Mixed Grain

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Terms Defined

§ 810.801 Definition of mixed grain.

Any mixture of grains for which standards have been established under the United States Grain Standards Act, provided that such mixture does not come within the requirements of any of the standards for such grains; and that such mixture consists of 50 percent or more of whole kernels of grain and/or whole or broken soybeans which will not pass through a 5/64 triangular-hole sieve and/or whole flaxseed that passes through such a sieve after sieving according to procedures prescribed in FGIS instructions.

§ 810.802 Definition of other terms.

(a) *Damaged kernels.* Kernels and pieces of grain kernels for which standards have been established under the Act that are badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat-damaged, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

(b) *Foreign material and fines.* All matter other than whole flaxseed that passes through a 5/64 triangular-hole sieve, and all matter other than grains for which standards have been established under the Act, that remains in the sieved sample.

(c) *Grades.* U.S. Mixed Grain, or U.S. Sample grade Mixed Grain, and special grades.

(d) *Heat-damaged kernels.* Kernels and pieces of grain kernels for which standards have been established under the Act, that are materially discolored and damaged by heat.

(e) *Sieve. 5/64 triangular-hole sieve.* A metal sieve 0.032 inch thick with equilateral triangular perforations the inscribed circles of which are 0.0781 (5/64) inch in diameter.

Principles Governing the Application of Standards

§ 810.803 Basis of determination.

Each determination of damaged and heat-damaged kernels and the percentage of each kind of grain in the mixture is made on the basis of the sample after removal of foreign material and fines. Other determinations not specifically provided for under the general provisions are made on the basis of the grain as a whole, except the determination of odor is made on either the basis of the grain as a whole or the grain when free from foreign material and fines.

Grades and Grade Requirements

§ 810.804 Grades and grade requirements for mixed grain.

(a) *U.S. Mixed Grain (grade)*. Mixed grain with not more than 15.0 percent of damaged kernels, and not more than 3.0 percent of heat-damaged kernels, and that otherwise does not meet the requirements for the grade U.S. Sample grade Mixed Grain.

(b) *U.S. Sample grade Mixed Grain*. Mixed grain that:

(1) Does not meet the requirements for the grade U.S. Mixed Grain; or

(2) Contains more than 16.0 percent moisture; or

(3) Contains 8 or more stones that have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more *Crotalaria* (*Crotalaria spp.*), 2 or more castor beans (*Ricinus communis* L.), 8 or more cockleburs (*Xanthium spp.*) or similar seeds singly or in combination, 4 or more pieces of an unknown foreign substance(s) or a recognized harmful or toxic substance(s), 10 or more rodent pellets, bird droppings, or an equivalent quantity of other animal filth per 1,000 grams of mixed grain; or

(4) Is musty, sour, or heating; or

(5) Has any commercially objectionable foreign odor except smut or garlic; or

(6) Is otherwise of distinctly low quality.

Special Grades and Special Grade Requirements

§ 810.805 Special grades and special grade requirements.

(a) *Blighted mixed grain*. Mixed grain in which barley predominates and that contains more than 4.0 percent of fungus-damaged and/or mold-damaged barley kernels.

(b) *Ergoty mixed grain*.

(1) Mixed grain in which rye or wheat predominates and that contains more than 0.30 percent ergot, or

(2) Any other mixed grain that contains more than 0.10 percent ergot.

(c) *Garlicky mixed grain*.

(1) Mixed grain in which wheat, rye, or triticale predominates, and that contains 2 or more green garlic bulblets, or an equivalent quantity of dry or partly dry bulblets in 1,000 grams of mixed grain; or

(2) Any other mixed grain that contains 4 or more green garlic bulblets, or an equivalent quantity of dry or partly dry bulblets, in 500 grams of mixed grain.

(d) *Smutty mixed grain.*

(1) Mixed grain in which rye, triticale, or wheat predominates, and that contains 15 or more average size smut balls, or an equivalent quantity of smut spores in 250 grams of mixed grain, or

(2) Any other mixed grain that has the kernels covered with smut spores to give a smutty appearance in mass or that contains more than 0.2 percent smut balls.

(e) *Treated mixed grain.* Mixed grain that has been scoured, limed, washed, sulfured, or treated in such a manner that its true quality is not reflected by the grade designation U.S. Mixed Grain or U.S. Sample grade Mixed Grain.

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Subpart G -- United States Standards for Oats

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Terms Defined

§ 810.1001 Definition of oats.

Grain that consists of 50 percent or more of oats (*Avena sativa* L. and *A. byzantina* C. Koch) and may contain, singly or in combination, not more than 25 percent of wild oats and other grains for which standards have been established under the United States Grain Standards Act.

§ 810.1002 Definition of other terms.

(a) *Fine seeds*. All matter that passes through a 5/64 triangular-hole sieve after sieving according to procedures prescribed in FGIS instructions.

(b) *Foreign material*. All matter other than oats, wild oats, and other grains.

(c) *Heat-damaged kernels*. Kernels and pieces of oat kernels, other grains, and wild oats that are materially discolored and damaged by heat.

(d) *Other grains*. Barley, corn, cultivated buckwheat, einkorn, emmer, flaxseed, guar, hull-less barley, nongrain sorghum, Polish wheat, popcorn, poulard wheat, rice, rye, safflower, sorghum, soybeans, spelt, sunflower seed, sweet corn, triticale, and wheat.

(e) *Sieves*.

(1) *5/64 triangular-hole sieve*. A metal sieve 0.032 inch thick with equilateral triangular perforations the inscribed circles of which are 0.0781 (5/64) inch in diameter.

(2) *0.064 x 3/8 oblong-hole sieve*. A metal sieve 0.032 inch thick with oblong perforations 0.064 inch by 0.375 (3/8) inch.

(f) *Sound oats*. Kernels and pieces of oat kernels (except wild oats) that are not badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat-damaged, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

(g) *Wild oats*. Seeds of *Avena fatua* L. and *A. sterilis* L.

Principles Governing the Application of Standards

§ 810.1003 Basis of determination.

Other determinations not specifically provided for under the general provisions are made on the basis of the grain as a whole.

Grades and Grade Requirements

§ 810.1004 Grades and grade requirements for oats.

Grade	Minimum limits-		Maximum limits-		
	Test weight per bushel (pounds)	Sound oats (percent)	Heatdamaged kernels (percent)	Foreign material (percent)	Wild oats (percent)
U.S. No. 1	36.0	97.0	0.1	2.0	2.0
U.S. No. 2	33.0	94.0	0.3	3.0	3.0
U.S. No. 3 ¹	30.0	90.0	1.0	4.0	5.0
U.S. No. 4 ²	27.0	80.0	3.0	5.0	10.0

U.S. Sample grade--

U.S. Sample grade are oats which:

- (a) Do not meet the requirements for the grades U.S. Nos. 1, 2, 3, or 4; or
- (b) Contain 8 or more stones which have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (*Crotalaria spp.*), 2 or more castor beans (*Ricinus communis* L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cocklebur (*Xanthium spp.*) or similar seeds singly or in combination, 10 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1-1/8 to 1-1/4 quarts of oats; or
- (c) Have a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or
- (d) Are heating or otherwise of distinctly low quality.

¹ Oats that are slightly weathered shall be graded not higher than U.S. No. 3.

² Oats that are badly stained or materially weathered shall be graded not higher than U.S. No. 4.

Special Grades and Special Grade Requirements

§ 810.1005 Special grades and special grade requirements.

- (a) *Bleached oats*. Oats that in whole or in part, have been treated with sulfurous acid or any other bleaching agent.
- (b) *Bright oats*. Oats, except bleached oats, that are of good natural color.
- (c) *Ergoty oats*. Oats that contain more than 0.10 percent ergot.
- (d) *Extra-heavy oats*. Oats that have a test weight per bushel of 40 pounds or more.
- (e) *Garlicky oats*. Oats that contain 4 or more green garlic bulblets or an equivalent quantity of dry or partly dry bulblets in 500 grams of oats.
- (f) *Heavy oats*. Oats that have a test weight per bushel of 38 pounds or more but less than 40 pounds.
- (g) *Smutty oats*. Oats that have kernels covered with smut spores to give a smutty appearance in mass, or that contain more than 0.2 percent of smut balls.
- (h) *Thin oats*. Oats that contain more than 20.0 percent of oats and other matter, except fine seeds, that pass through a 0.064 x 3/8 oblong-hole sieve but remain on top of a 5/64 triangular-hole sieve after sieving according to procedures prescribed in FGIS instructions.

Subpart I -- United States Standards for Sorghum

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Terms Defined

§ 810.1401 Definition of sorghum.

Grain that, before the removal of dockage, consists of 50 percent or more of whole kernels of sorghum (*Sorghum bicolor* (L.) Moench) excluding nongrain sorghum and not more than 10.0 percent of other grains for which standards have been established under the United States Grain Standards Act.

§ 810.1402 Definitions of other terms.

(a) *Broken kernels*. All matter which passes through a 5/64 triangular-hole sieve and over a 2.5/64 round-hole sieve according to procedures prescribed in FGIS instructions.

(b) *Broken kernels and foreign material*. The combination of broken kernels and foreign material as defined in paragraphs (a) and (f) of this section.

(c) *Classes*. There are four classes of sorghum: Sorghum, Tannin sorghum, White sorghum, and Mixed sorghum.

(1) *Sorghum*. Sorghum which lacks a pigmented testa (subcoat) and contains less than 98.0 percent White sorghum and not more than 3.0 percent Tannin sorghum. The pericarp color of this class may appear white, yellow, pink, orange, red, or bronze.

(2) *Tannin sorghum*. Sorghum which has a pigmented testa (subcoat) and contains not more than 10.0 percent non-Tannin sorghum. The pericarp color of this class is usually brown but may also be white, yellow, pink, orange, red, or bronze.

(3) *White sorghum*. Sorghum which lacks a pigmented testa (subcoat) and contains not more than 2.0 percent sorghum of other classes. The pericarp color of this class is white or translucent and includes sorghum containing spots that, singly or in combination, cover 25.0 percent or less of the kernel.

(4) *Mixed sorghum*. Sorghum which does not meet the requirements for any of the classes Sorghum, Tannin sorghum, or White sorghum.

(d) *Damaged kernels*. Kernels, pieces of sorghum kernels, and other grains that are badly ground damaged, badly weather damaged, diseased, frost-damaged, germ-damaged, heatdamaged, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

(e) *Dockage*. All matter other than sorghum that can be removed from the original sample by use of an approved device according to procedures prescribed in FGIS instructions. Also, underdeveloped, shriveled, and small pieces of sorghum kernels removed in properly separating the material other than sorghum.

(f) *Foreign material*. All matter, except sorghum, which passes over the number 6 riddle and all matter other than sorghum that remains on the top of the 5/64 triangular-hole sieve according to procedures prescribed in FGIS instructions.

(g) *Heat-damaged kernels*. Kernels, pieces of sorghum kernels, and other grains that are materially discolored and damaged by heat.

(h) *Nongrain sorghum*. Seeds of broomcorn, Johnson-grass, Sorghum alnum Parodi, and sudangrass; and seeds of Sorghum bicolor (L.) Moench that appear atypical of grain sorghum.

(i) *Pericarp*. The pericarp is the outer layers of the sorghum grain and is fused to the seedcoat.

(j) *Sieves*.

(1) *1.98 mm (5/64 (0.0781) inches) triangular-hole sieve*. A metal sieve 0.81 mm (0.032 inches) thick with equilateral triangular perforations the inscribed circles of which are 1.98 mm (0.0781 inches) in diameter.

(2) *0.99 mm (2 1/2/64 (0.0391) inches) round-hole sieve*. A metal sieve 0.81 mm (0.032 inch) thick with round holes 0.99 mm (0.0391 inches) in diameter.

Principles Governing the Application of Standards

810.1403 Basis of determination.

Each determination of broken kernels and foreign material is made on the basis of the grain when free from dockage. Each determination of class, damaged kernels, heatdamaged kernels, and stones is made on the basis of the grain when free from dockage and that portion of the broken kernels, and foreign material that will pass through a 1.98 mm (5/64 inch) triangular-hole sieve. Other determinations not specifically provided for in the general provisions are made on the basis of the grain as a whole except the determination of odor is made on either the basis of the grain as a whole or the grain when free from dockage, broken kernels, and foreign material removed by the 1.98 mm (5/64 inch) triangular-hole sieve.

Sorghum Grades and Grade Requirements

§ 810.1404 - Grades and grade requirements for sorghum.

Grading factors	Grades U.S. Nos. ¹			
	1	2	3	4
Minimum pound limits of				
Test weight per bushel:	57.0	55.0	53.0	51.0
Maximum percent limits of				
Damaged kernels:				
Heat (part of total)	0.2	0.5	1.0	3.0
Total	2.0	5.0	10.0	15.0
Broken kernels and foreign material:				
Foreign material (part of total)	1.0	2.0	3.0	4.0
Total	3.0	6.0	8.0	10.0
Maximum count limits of				
Other material:				
Animal filth	9	9	9	9
Castor beans	1	1	1	1
Crotalaria seeds	2	2	2	2
Glass	1	1	1	1
Stones ²	7	7	7	7
Unknown foreign substance	3	3	3	3
Cocklebur	7	7	7	7
Total ³	10	10	10	10
<p>U.S. Sample grade is sorghum that:</p> <p>(a) Does not meet the requirements for U.S. Nos. 1, 2, 3, or 4; or</p> <p>(b) Has a musty, sour or commercially objectionable foreign odor (except smut odor); or</p> <p>(c) Is badly weathered, heating or distinctly low quality.</p> <p>¹ Sorghum which is distinctly discolored shall not grade higher than U.S. No. 3.</p> <p>² Aggregate weight of stones must also exceed 0.2 percent of the sample weight.</p> <p>³ Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, unknown foreign substances or cocklebur.</p>				

Special Grades and Special Grade Requirements

§ 810.1405 Special grades and special grade requirements.

Smutty sorghum. Sorghum that has kernels covered with smut spores to give a smutty appearance in mass, or that contains 20 or more smut balls in 100 grams of sorghum.

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Subpart J -- United States Standards for Soybeans

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Terms Defined

§ 810.1601 Definition of soybeans.

Grain that consists of 50 percent or more of whole or broken soybeans (*Glycine max* (L.) Merr.) that will not pass through an 8/64 round-hole sieve and not more than 10.0 percent of other grains for which standards have been established under the United States Grain Standards Act.

§ 810.1602 Definition of other terms.

(a) *Classes*. There are two classes of soybeans: Yellow soybeans and Mixed soybeans.

(1) *Yellow soybeans*. Soybeans that have yellow or green seed coats and which in cross section, are yellow or have a yellow tinge, and may include not more than 10.0 percent of soybeans of other colors.

(2) *Mixed soybeans*. Soybeans that do not meet the requirements of the class Yellow soybeans.

(b) *Damaged kernels*. Soybeans and pieces of soybeans that are badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat-damaged, insectbored, mold-damaged, sprout-damaged, stinkbug-stung, or otherwise materially damaged. Stinkbug-stung kernels are considered damaged kernels at the rate of one-fourth of the actual percentage of the stung kernels.

(c) *Foreign material*. All matter that passes through an 8/64 round-hole sieve and all matter other than soybeans remaining in the sieved sample after sieving according to procedures prescribed in FGIS instructions.

(d) *Heat-damaged kernels*. Soybeans and pieces of soybeans that are materially discolored and damaged by heat.

(e) *Purple mottled or stained*. Soybeans that are discolored by the growth of a fungus; or by dirt; or by a dirt-like substance(s) including nontoxic inoculants; or by other nontoxic substances.

(f) *Sieve. 8/64 round-hole sieve*. A metal sieve 0.032 inch thick perforated with round holes 0.125 (8/64) inch in diameter.

(g) *Soybeans of other colors*. Soybeans that have green, black, brown, or bicolored seed coats. Soybeans that have green seed coats will also be green in cross section. Bicolored soybeans will have seed coats of two colors, one of which is brown or black, and the brown or black color covers 50 percent of the seed coats. The hilum of a soybean is not considered a part of the seed coat for this determination.

(h) *Splits*. Soybeans with more than one-fourth of the bean removed and that are not damaged.

Principles Governing the Application of Standards

§ 810.1603 Basis of determination.

Each determination of class, heat-damaged kernels, damaged kernels, splits, and soybeans of other colors is made on the basis of the grain when free from foreign material. Other determinations not specifically provided for under the general provisions are made on the basis of the grain as a whole.

Grades, Grade Requirements, and Grade Designations

§ 810.1604 Grades and grade requirements for soybeans

Grading factors	Grades U. S. Nos.			
	1	2	3	4
Maximum percent limits of				
Damaged kernels:				
Heat (part of total)	0.2	0.5	1.0	3.0
Total	2.0	3.0	5.0	8.0
Foreign material	1.0	2.0	3.0	5.0
Splits	10.0	20.0	30.0	40.0
Soybeans of other colors ¹	1.0	2.0	5.0	10.0
Maximum count limits of				
Other materials:				
Animal filth	9	9	9	9
Castor beans	1	1	1	1
Crotalaria seeds	2	2	2	2
Glass	0	0	0	0
Stones ²	3	3	3	3
Unknown foreign substance	3	3	3	3
Total ³	10	10	10	10
<p>U.S. Sample grade are soybeans that:</p> <p>(a) Do not meet the requirements for U.S. Nos. 1, 2, 3, or 4; or</p> <p>(b) Have a musty, sour, or commercially objectionable foreign odor (except garlic odor); or</p> <p>(c) Are heating or otherwise of distinctly low quality.</p>				
<p>¹ Disregard for Mixed soybeans.</p> <p>² In addition to the maximum count limit, stones must exceed 0.1 percent of the sample weight.</p> <p>³ Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, and unknown foreign substances. The weight of stones is not applicable for total other material.</p>				

Special Grades and Special Grade Requirements

§ 810.1605 Special grades and special grade requirements.

(a) *Garlicky soybeans.* Soybeans that contain five or more green garlic bulblets or an equivalent quantity of dry or partly dry bulblets in a 1,000-gram portion.

(b) *Purple mottled or stained.* Soybeans with pink or purple seed coats as determined on a portion of approximately 400 grams with the use of an FGIS Interpretive Line Photograph.

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Terms Defined

§ 810.2201 Definition of wheat.

Grain that, before the removal of dockage, consists of 50 percent or more common wheat (*Triticum aestivum* L.), club wheat (*T. compactum* Host.), and durum wheat (*T. durum* Desf.) and not more than 10 percent of other grains for which standards have been established under the United States Grain Standards Act and that, after the removal of the dockage, contains 50 percent or more of whole kernels of one or more of these wheats.

§ 810.2202 Definition of other terms.

(a) *Classes.* There are eight classes for wheat: Durum wheat, Hard Red Spring wheat, Hard Red Winter wheat, Soft Red Winter wheat, Hard White wheat, Soft White wheat, Unclassed wheat, and Mixed wheat.

(1) *Durum wheat.* All varieties of white (amber) durum wheat. This class is divided into the following three subclasses:

(i) *Hard Amber Durum wheat.* Durum wheat with 75 percent or more of hard and vitreous kernels of amber color.

(ii) *Amber Durum wheat.* Durum wheat with 60 percent or more but less than 75 percent of hard and vitreous kernels of amber color.

(iii) *Durum wheat.* Durum wheat with less than 60 percent of hard and vitreous kernels of amber color.

(2) *Hard Red Spring wheat.* All varieties of Hard Red Spring wheat. This class shall be divided into the following three subclasses:

(i) *Dark Northern Spring wheat.* Hard Red Spring wheat with 75 percent or more of dark, hard, and vitreous kernels.

(ii) *Northern Spring wheat.* Hard Red Spring wheat with 25 percent or more but less than 75 percent of dark, hard, and vitreous kernels.

(iii) *Red Spring wheat.* Hard Red Spring wheat with less than 25 percent of dark, hard, and vitreous kernels.

(3) *Hard Red Winter wheat.* All varieties of Hard Red Winter wheat. There are no subclasses in this class.

(4) *Soft Red Winter wheat.* All varieties of Soft Red Winter wheat. There are no subclasses in this class.

(5) *Hard White wheat.* All hard endosperm white wheat varieties. There are no subclasses in this class.

(6) *Soft White wheat*. All soft endosperm white wheat varieties. This class is divided into the following three subclasses:

(i) *Soft White wheat*. Soft endosperm white wheat varieties which contain not more than 10 percent of white club wheat.

(ii) *White Club wheat*. Soft endosperm white club wheat varieties containing not more than 10 percent of other soft white wheats.

(iii) *Western White wheat*. Soft White wheat containing more than 10 percent of white club wheat and more than 10 percent of other soft white wheats.

(7) *Unclassed wheat*. Any variety of wheat that is not classifiable under other criteria provided in the wheat standards. There are no subclasses in this class. This class includes any wheat which is other than red or white in color.

(8) *Mixed wheat*. Any mixture of wheat that consists of less than 90 percent of one class and more than 10 percent of one other class, or a combination of classes that meet the definition of wheat.

(b) *Contrasting classes*. Contrasting classes are:

(1) Durum wheat, Soft White wheat, and Unclassed wheat in the classes Hard Red Spring wheat and Hard Red Winter wheat.

(2) Hard Red Spring wheat, Hard Red Winter wheat, Hard White wheat, Soft Red Winter wheat, Soft White wheat, and Unclassed wheat in the class Durum wheat.

(3) Durum wheat and Unclassed wheat in the class Soft Red Winter wheat.

(4) Durum wheat, Hard Red Spring wheat, Hard Red Winter wheat, Soft Red Winter wheat, and Unclassed wheat in the class Soft White wheat.

(5) Durum wheat, Soft Red Winter wheat, and Unclassed wheat, in the class Hard White wheat.

(c) *Damaged kernels*. Kernels, pieces of wheat kernels, and other grains that are badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat-damaged, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

(d) *Defects*. Damaged kernels, foreign material, and shrunken and broken kernels. The sum of these three factors may not exceed the limit for the factor defects for each numerical grade.

(e) *Dockage*. All matter other than wheat that can be removed from the original sample by use of an approved device according to procedures prescribed in FGIS instructions. Also, underdeveloped, shriveled, and small pieces of wheat kernels removed in properly separating the material other than wheat and that cannot be recovered by properly rescreening or recleaning.

(f) *Foreign material*. All matter other than wheat that remains in the sample after the removal of dockage and shrunken and broken kernels.

(g) *Heat-damaged kernels*. Kernels, pieces of wheat kernels, and other grains that are materially discolored and damaged by heat which remain in the sample after the removal of dockage and shrunken and broken kernels.

(h) *Other grains*. Barley, corn, cultivated buckwheat, einkorn, emmer, flaxseed, guar, hull-less barley, nongrain sorghum, oats, Polish wheat, popcorn, poulard wheat, rice, rye, safflower, sorghum, soybeans, spelt, sunflower seed, sweet corn, triticale, and wild oats.

(i) *Shrunken and broken kernels*. All matter that passes through a 0.064 x 3/8 oblong-hole sieve after sieving according to procedures prescribed in the FGIS instructions.

(j) *Sieve*. 0.064 x 3/8 oblong-hole sieve. A metal sieve 0.032 inch thick with oblong perforations 0.064 inch by 0.375 (3/8) inch.

Principles Governing the Application of Standards

§ 810.2203 Basis of determination.

Each determination of heat-damaged kernels, damaged kernels, foreign material, wheat of other classes, contrasting classes, and subclasses is made on the basis of the grain when free from dockage and shrunken and broken kernels. Other determinations not specifically provided for under the general provisions are made on the basis of the grain when free from dockage, except the determination of odor is made on either the basis of the grain as a whole or the grain when free from dockage.

Grades and Grade Requirements

§ 810.2204 Grades and grade requirements for wheat.

(a) Grades and grade requirements for all classes of wheat, except Mixed wheat.

Grading factors	Grades U.S. Nos.				
	1	2	3	4	5
Minimum pound limits of:					
Test weight per bushel					
Hard Red Spring wheat or White Club wheat	58.0	57.0	55.0	53.0	50.0
All other classes and subclasses	60.0	58.0	56.0	54.0	51.0
Maximum percent limits of:					
Defects:					
Damaged kernels					
Heat (part of total)	0.2	0.2	0.5	1.0	3.0
Total	2.0	4.0	7.0	10.0	15.0
Foreign material	0.4	0.7	1.3	3.0	5.0
Shrunken and broken kernels	3.0	5.0	8.0	12.0	20.0
Total ¹	3.0	5.0	8.0	12.0	20.0
Wheat of other classes: ²					
Contrasting classes	1.0	2.0	3.0	10.0	10.0
Total ³	3.0	5.0	10.0	10.0	10.0
Stones	0.1	0.1	0.1	0.1	0.1
Maximum count limits of:					
Other material in one kilogram:					
Animal filth	1	1	1	1	1
Castor beans	1	1	1	1	1
Crotalaria seeds	2	2	2	2	2
Glass	0	0	0	0	0
Stones	3	3	3	3	3
Unknown foreign substances	3	3	3	3	3
Total ⁴	4	4	4	4	4
Insect-damaged kernels in 100 grams	31	31	31	31	31
<p>U.S. Sample grade is Wheat that:</p> <p>(a) Does not meet the requirements for U.S. Nos. 1, 2, 3, 4, or 5; or</p> <p>(b) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor) or</p> <p>(c) Is heating or of distinctly low quality.</p> <p>¹ Includes damaged kernels (total), foreign material, shrunken and broken kernels.</p> <p>² Unclassed wheat of any grade may contain not more than 10.0 percent of wheat of other classes.</p> <p>³ Includes contrasting classes.</p> <p>⁴ Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, or unknown foreign substance.</p>					

(b) Grades and grade requirements for Mixed wheat. Mixed wheat is graded according to the U.S. numerical and U.S. Sample grade requirements of the class of wheat that predominates in the mixture, except that the factor wheat of other classes is disregarded.

Special Grades and Special Grade Requirements

§ 810.2205 Special grades and special grade requirements.

- (a) *Ergoty wheat.* Wheat that contains more than 0.05 percent of ergot.
- (b) *Garlicky wheat.* Wheat that contains in a 1,000 gram portion more than two green garlic bulblets or an equivalent quantity of dry or partly dry bulblets.
- (c) *Light smutty wheat.* Wheat that has an unmistakable odor of smut, or which contains, in a 250-gram portion, smut balls, portions of smut balls, or spores of smut in excess of a quantity equal to 5 smut balls, but not in excess of a quantity equal to 30 smut balls of average size.
- (d) *Smutty wheat.* Wheat that contains, in a 250-gram portion, smut balls, portions of smut balls, or spores of smut in excess of a quantity equal to 30 smut balls of average size.
- (e) *Treated wheat.* Wheat that has been scoured, limed, washed, sulfured, or treated in such a manner that the true quality is not reflected by either the numerical grades or the U.S. Sample grade designation alone.

RULES FOR ANY MODE OR MODES OF TRANSPORT

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CIP Carriage and Insurance Paid To (Insert named place of destination) Incoterms[®] 2020



FCA Free Carrier (Insert named place of delivery) Incoterms[®] 2020



DAP Delivered at Place (Insert named place of destination) Incoterms[®] 2020



DPU Delivered at Place Unloaded (Insert named place of destination) Incoterms[®] 2020



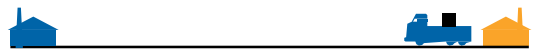
CPT Carriage Paid To

(Insert named place of destination) Incoterms[®] 2020



DDP Delivered Duty Paid

(Insert named place of destination) Incoterms[®] 2020



RULES FOR SEA AND INLAND WATERWAY TRANSPORT

FAS Free Alongside Ship



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CFR Cost and Freight



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FOB Free on Board

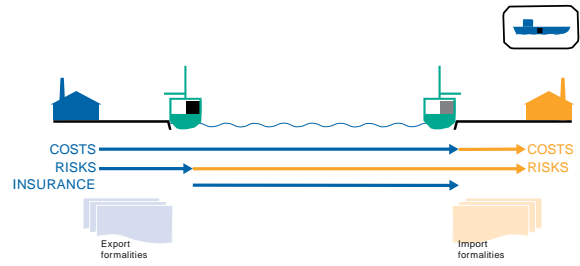


(Insert named port of loading) Incoterms[®] 2020



CIF Cost, Insurance and Freight

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