

Chapter 33

Glossary of Terms

Absorption	(in animal nutrition) the movement of nutrients from the digestive tract into the blood or lymph system.
Acidosis	an undesirable condition that can occur in ruminant animals when fed diets high in readily fermentable carbohydrates such as starch.
Additive	an ingredient added in small quantities to the diet for the purpose of fortifying it with trace nutrients or medicines.
ADF	Acid detergent fiber. the fraction of a feedstuff that is not soluble in an acidic detergent in a laboratory procedure used to determine some components of fiber.
ADG	Average daily gain. the rate of body weight gain of an animal expressed on a daily basis.
ADICP	Acid detergent insoluble crude protein. a measure of by-pass or ruminally undegradable protein of a feed ingredient.
Adipose	fat tissue in an animal or carcass.
ADIN	Acid detergent insoluble nitrogen. a measure of the insoluble portion of nitrogen in a feed ingredient; used to calculate ADICP.
Ad libitum	(feeding) unlimited access to feed or water.
Aerobic	Living or functioning in the presence of oxygen.
Aflatoxin	a carcinogenic mycotoxin produced by molds under specific environmental conditions in growing and stored grains.
Aleurone	the protein portion of the endosperm of a seed.
Amino acids	nitrogen containing organic molecules that are the building blocks of proteins, and essential components of nutrition.
Amylase	an enzyme that can hydrolyze starch to maltose or glucose.
Anaerobic	living or functioning in the absence of oxygen.
Antibiotic	a substance produced by a microorganism that has an inhibitory effect on other microorganisms.
Anti-nutritional factors	chemical components of feed ingredients that reduce the nutritional value of a feed ingredient.
Antioxidant	a substance that prevents fats from becoming rancid through oxidation.
Apparent digestibility	the amount of a nutrient that is absorbed from the gastrointestinal tract.
Arginine	an essential amino acid.
As fed	as consumed by the animal.
Ash	the residue remaining after complete incineration at 500° to 600° C of a feed; comprised of metallic oxides.

Assay	the determination of the chemical components of a feed ingredient or complete feed.
Availability	(nutrient) – the proportion of a nutrient that is utilized by the animal.
Bacteria	single celled living organisms that multiply by simple division. Some are beneficial while others can cause illness.
Balanced diet	a combination of feed ingredients that provide the essential nutrients in the required amounts to meet the animal's needs.
Barrow	castrated male pig.
Beta-carotene	a precursor source of vitamin A found in some plants and plant products.
Biopsy	the removal and examination of tissue or other material from the living body.
Boar	intact, uncastrated male pig.
Bran	seed coat of cereal grains.
Brewer's grains	a grain co-product of the brewing industry.
Beer	(in ethanol production) – a term that refers to the fermented mash that contains ethanol.
By-pass protein	protein not broken down by microbes in the rumen and available for further digestion in the small intestine.
Calorie	a unit of energy measurement defined as the amount of heat required to raise the temperature of one gram of water from 14.5 to 15.5° C.
Carbohydrates	organic substances containing carbon, hydrogen and oxygen; many different kinds are found in plant tissues and include starch, sugar, cellulose, hemicellulose, pectins and gums.
Carcinogen	substances that can cause cancer.
Carotene	a yellow organic compound that is a precursor for vitamin A.
Cecum	a section of the gastrointestinal tract that follows the small intestine and precedes the large intestine which contains a significant amount of bacteria that break down fiber not digested in the small intestine.
Cellulose	a polymer of glucose that has a linkage between glucose molecules resistant to hydrolysis in pigs and poultry, but can be broken down by microbes in the rumen of cattle and sheep and converted into energy.
Co-product	secondary products produced in addition to principle products.
Co-products, ethanol dry-grind	The water and solids remaining after distillation of ethanol is called whole stillage , comprised primarily of water, fiber, protein and fat. This mixture is centrifuged to separate coarse solids from liquid. The coarse solids are also called wet cake and contain about 35% dry matter. Wet cake can be sold to local cattle feeders without drying, or dried to produce dried distiller's grains (DDG) . The liquid, now called as thin stillage , goes through an evaporator to remove additional moisture and the resulting co-product is called condensed distiller's solubles which contains approximately 30% dry matter. Condensed distiller's solubles can be sold locally to cattle feeders.

•	Or, the wet cake can be mixed with condensed distiller's solubles and dried to produce distiller's dried grains with solubles (DDGS) which has 88% dry matter.
Colon	the lower portion of the large intestine.
Complete feed	a single feed mixture which may be used as the only source of the nutrients required by an animal except water.
Condense	a process to reduce an item such as stillage to a denser form by removing moisture.
Condensed distiller's solubles	– see Co-products, ethanol dry milling.
Corn germ meal	a co-product from wet milling ethanol plants that contains about 20% crude protein, 2% fat and 9% fiber with an amino acid balance that makes it a useful feed ingredient in swine and poultry diets.
Corn steep liquor	a high energy liquid co-product produced in wet milling ethanol plants that is sometimes combined with corn gluten feed or sold separately as a liquid protein source for beef and dairy cattle.
Crude fat	the portion of a feed or feed ingredient that is soluble in ether and is often referred to as ether extract.
Crude fiber	the less digestible portion of a feed ingredient composed of cellulose, hemicellulose, lignin and other complex carbohydrates.
Crude protein	an estimate of the protein in a feed or feed ingredient, calculated by measuring the nitrogen content (proteins contain about 16% nitrogen) and multiplying by a factor of 6.25 to obtain the crude protein percentage.
Cystine	a sulfur containing amino acid that can replace up to 50% of the swine requirement for methionine.
DDGS	Distiller's dried grains with solubles. In dry-grind ethanol production, a blend of the wet cake and at least 75% condensed solubles, dried to a moisture content of ~ 10%. See Co-products, ethanol dry-grind.
Deamination	removal of the amino group from an amino acid.
Diet	a regulated selection or mixture of feed ingredients provided on a continuous basis or prescribed schedule.
Digestibility	a measure of the extent that the nutrients in a feed are digested and absorbed by an animal.
Digestible energy (DE)	gross energy of the feed minus the energy remaining in feces.
Digestion	the process occurring in the gastrointestinal tract that breaks down complex nutrients into forms that can be absorbed by an animal.
DON	Deoxynivalenol. a mycotoxin sometimes abbreviated as DON and often referred to as vomitoxin because it causes reduced feed intake and feed refusal at low concentrations in the diet and vomiting at higher dietary concentrations.
DL-methionine	a source of synthetic methionine.
Dressing percent	also known as carcass yield and is the portion of the carcass remaining after the removal of most internal organs, feet and in most cases, the head.
Drug	as defined by the U.S. Food and Drug Administration is a substance intended for the use in the diagnosis, cure, mitigation, treatment or prevention of disease in humans and other animals.

Dry grind	refers to an ethanol production process that involves grinding the whole corn kernel and fermenting the resultant corn meal without separating out the component parts.
Dry matter (DM)	the portion of a feed remaining after water is removed by drying in an oven.
Duodenum	the first portion of the small intestine.
Endogenous	(in nutrition) – compounds such as enzymes and hormones that are internally produced by the body.
Endosperm	part of the seed which provides food for the developing embryo.
Enzyme	a protein formed in animal or plant cells that act as biological catalysts to increase the rate of chemical reactions.
Essential amino acid	an amino acid that cannot be synthesized in the body in sufficient quantities for the body's needs and must be supplied in the diet.
Ether extract	used to measure the amount of fats and oils in feeds and feed ingredients based on their solubility in ether.
Excreta	the products of excretion from an animal's body which are primarily feces and urine.
Exogenous	(in nutrition) originating from outside of the body.
Fat soluble vitamins	vitamins A, D, E and K (menadione).
Fatty acids	components of a fat molecule that have different carbon lengths and may be unsaturated or saturated.
Feed conversion	the amount of feed required by an animal for a unit of weight gain.
Fermentation	chemical changes brought about by enzymes produced by various microorganisms.
Flowability	the ability of a mass of feed particles or grains to move by gravity out of storage or transport containers.
Fumonisin	a mycotoxin produced by specific molds that can be present in feed ingredients and reduce animal health and performance.
Fractionation	processes used in dry-grind ethanol plants to separate various components of the corn kernel to improve ethanol yield and produce a variety of co-products with different nutritional composition.
Gastric	refers to the stomach of animals.
Gastrointestinal	refers to the stomach and the rest of the intestinal tract used in digestion and absorption of nutrients.
GE	Gross energy. the total heat of combustion of a feed or feed ingredient burned in a bomb calorimeter.
Germ	the embryo of a seed.
Glycerol	a three carbon component of fat.
Ground, grinding	a mechanical process to reduce particle size by impact, shearing or attrition.
Hulls	the outer covering of seed kernels.
Hydrogenation	the chemical addition of hydrogen to any unsaturated compound (double bond), often to fatty acids.
Hydrolysis	the chemical process where a compound is split into simpler units with the uptake of water.
Ileum	the lower portion of the small intestine.
IU	International units. an arbitrary scale used to compare the biological activity of some vitamins.

Insoluble fiber	the portion of non-starch polysaccharides that is not easily fermented in the lower intestinal tract of animals
In vitro	refers to things that occur outside the animal's body in an artificial environment such as a test tube. In vivo – refers to things that occur within the animal's body.
Iodine number	the amount of iodine (in grams) that can be taken up by 100 grams of fat or fatty acids and is a measure of unsaturation.
Jejunum	the middle portion of the small intestine.
Kcal (kilocalorie)	is a unit of energy equal to 1,000 calories.
Kjeldahl	a method to determine the nitrogen content of a feed ingredient to be used in calculating and estimating crude protein.
Lesion	an unhealthy change in color, size or structure of body tissues.
Lignin	an indigestible inorganic component of fiber.
Linoleic acid	an essential fatty acid.
Lipid	fat.
Liquifaction	the process of converting solids into liquid.
Macro (major) minerals	minerals present or required in large amounts relative to the animals requirement and include (calcium, phosphorus, sodium, potassium, magnesium, sulfur and chloride).
Maillard products	a group of poorly digestible protein-carbohydrate complexes that are produced in feed ingredients that are subjected to significant amounts of heating and are characterized by darkening of color (browning), burned flavor and burned smell.
Mash	a mixture of water and corn meal prior to fermentation in a dry grind ethanol plant.
Meal	a grain or feed ingredient or diet that has been ground or otherwise reduced in particle size.
Megacalorie	Mcal. unit of energy equal to 1,000,000 calories or 1,000 kilocalories.
Metabolism	the net effect of biochemical changes in the body including building up (anabolism) and breaking down (catabolism).
ME	Metabolizable energy. gross energy minus fecal and urinary energy from feeding a complete feed or feed ingredient.
Micro (trace) minerals	minerals present or required in small amounts in feeds and feed ingredients relative to the animal's requirement and include (iron, copper, zinc, iodine, selenium and manganese).
Modified wet cake	a blend of partially dried wet distiller's grains with condensed distiller's solubles which has dry matter of approximately 50%. See also Co-products, ethanol dry milling.
Monogastric	refers to animals such as swine and poultry that have a single, simple stomach.
Mycotoxicosis	poisoning of an animal that occurs when consuming significant quantities of mycotoxins.
Mycotoxins	toxic substances produced by specific types of molds under specific types of climatic and environmental conditions.
NDF	Neutral detergent fiber. fiber components in plant and grain cell walls that is undigestible for monogastric animals.
NE	Net energy metabolizable energy minus the heat increment.
NFE	Nitrogen free extract. is a calculated estimate of the

	carbohydrate fraction of a feed ingredient by subtracting moisture, fat, fiber, protein and ash from 100%.
NPN	non-protein nitrogen — any one of a group of nitrogen containing compounds that are not true proteins that can be precipitated from a solution (e.g. ammonia and urea).
Nutrient	any chemical substance that provides nourishment to the body.
Ochratoxin	a mycotoxin produced by aspergillus mold which attacks the kidneys, reduces growth performance and may cause birth defects.
Oleic acid	an 18 carbon fatty acid that contains one double bond and is found in animal and vegetable fat.
Oxidation	the union of a substance with oxygen.
Palmitic acid	a saturated fatty acid with 16 carbons.
pH	a measure of the acidity or alkalinity of a substance; pH = 7 is neutral.
Phytic acid	alternative chemical forms of phytate or phytin and are naturally occurring bound phosphorus compounds in grains and grain co-products that have low digestibility and availability for monogastric animals.
Phytase	is a commercially available enzyme added to monogastric diets to improve digestibility of phosphorus in the phytic acid form in grains and grain co-products for monogastric animals.
ppm	parts per million – a unit of concentration for compounds found in small amounts in feeds and feed ingredients and is equal to mg/kg.
Premix	a mixture of the proper proportions of vitamins and trace minerals that when added to animal diets will meet the requirements for those nutrients.
Propionic acid	one of the volatile fatty acids commonly found in rumen contents.
Proximate analysis	a combination of analytical procedures used to describe feeds and feed ingredients.
Rancid	a term used to describe fats that have undergone partial decomposition.
Ration	a fixed portion of feed, usually expressed as the amount of a diet allowed daily.
Rumen	the second compartment of a ruminant stomach.
Ruminant	any group of hooved mammals that have a four compartment, complex stomach and that chew their cud while ruminating.
Rumination	the process of regurgitating previously eaten feed, reswallowing the liquids and rechewing the solids (cud).
RUP	ruminally undegradable protein. sometimes referred to as by-pass protein, which is protein that is not degraded by microbes in the rumen and enters the small intestine of ruminants. Generally, undegradable protein is heat damaged protein.
Saccharification	is a process involving hydrolysis (break down) of starch using water and enzymes in ethanol production.
Saturated fat	a fat that contains no fatty acids with double bonds and is solid at room temperature.
Silage	feed resulting from storage and fermentation of wet crops under

	anaerobic storage conditions.
Soluble fiber	the portion of non-starch polysaccharides in a feed that is readily fermented by microbes in the lower intestinal tract of animals
Solubles	(syrup) see Co-products, ethanol dry milling. In drymill ethanol production, the liquid portion of stillage separated from the coarse grain by centrifugation and concentrated to about 30% solids by evaporation.
Starch	a white, tasteless, odorless polysaccharide carbohydrate found in large quantities in corn, sorghum, wheat and other grains that yields glucose upon hydrolysis.
Steeping	in wetmill corn processing, a process that involves soaking corn kernels under controlled conditions for temperature, time and concentration of sulfuric acid and lactic acid to soften the corn kernel before separating the germ, bran, gluten and starch in wet milling ethanol production.
Stillage	see Co-products, ethanol dry milling.
Stomach	the part of the digestive tract where chemical digestion is initiated in most animal species.
Syrup	see Co-products, ethanol dry milling.
TDF	total dietary fiber which is a measure of non-starch polysaccharides in a feed or feed ingredient and includes soluble and insoluble fiber
TDN	total digestible nutrients – a value that indicates the relative energy value of a feed for an animal.
Trace minerals	see micro minerals.
Ulcer	erosion or disintegration of stomach tissue.
Unsaturated fat	a fat containing from one to three fatty acids that contain one or more double bonds.
Urea	a synthetic, highly concentrated nitrogen product sometimes used as a nitrogen source in rations for ruminants.
VFA	volatile fatty acids which include propionic, acetic and butyric acids.
Volatile fatty acids	short chain fatty acids produced in the rumen of cattle and the cecum and colon of monogastrics that provide energy value to the animal.
Wet cake	see Co-products, ethanol dry milling.
Wet distiller's grains	see Co-products, ethanol dry milling.
Wet milling	processes used to separate various components of the corn kernel into associated fractions including high fructose corn syrup, corn oil, starch and fiber.
Zearalenone	a mycotoxin produced by fusarium molds under specific climatic and environmental conditions; it has estrogenic effects, causing reproduction problems in animals.