### Chapter 33

#### Glossary of Terms

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

Duodenum is the first portion of the small intestine.

Endogenous (in nutrition) refers to compounds such as enzymes and hormones that are internally produced by the body.

Endosperm is part of the seed which provides food for the developing embryo.

Enzyme is a protein formed in animal or plant cells that act as biological catalysts to increase the rate of chemical reactions.

Essential amino acid is 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 is used to measure the amount of fats and oils in feeds and feed ingredients based on their solubility in ether.

Excreta is the products of excretion from an animal's body which are primarily feces and urine.

Exogenous (in nutrition) originates from outside of the body.

Fat soluble vitamins include vitamins A, D, E and K (menadione).

Fatty acids are components of a fat molecule that have different carbon lengths and may be unsaturated or saturated.

Feed conversion is the amount of feed required by an animal for a unit of weight gain.

Fermentation is the chemical changes brought about by enzymes produced by various microorganisms.

Flowability is the ability of a mass of feed particles or grains to move by gravity out of storage or transport containers.

Fumonisins are 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 stands for Gross energy, the total heat of combustion of a feed or feed ingredient burned in a bomb calorimeter.

Germ is the embryo of a seed.

Glycerol is a three carbon component of fat.

Ground, grinding is a mechanical process to reduce particle size by impact, shearing or attrition.

Hulls are the outer covering of seed kernels.

Hydrogenation is the chemical addition of hydrogen to any unsaturated compound (double bond), often to fatty acids.

Hydrolysis is the chemical process where a compound is split into simpler units with the uptake of water.

Ileum is the lower portion of the small intestine.

IU stands for 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 digestable 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 hoofed 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.