

EVALUATING COMMERCIAL HORSE FEEDS

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There are approximately 2,500 feed mills registered in the United States with the Food and Drug Administration (FDA). This total does not include mills that do not use drugs in their formula feeds. Horses and pets account for approximately ten percent of the total commercial feed tonnage. Recently, many feed companies have recognized the growth and economic importance of the horse industry. Aggressive marketing campaigns have increased the use of commercial feeds by horse owners.

Feed Labeling Regulations

Labeling is required for all commercial feed products and is used as a method of communication between the feed manufacturer and purchasers or consumers.

Feed labeling is controlled by regulatory agencies. Most state agencies subscribed to the Model Feed Bill, developed by the American Feed Control Officials (AFCO) and the American Feed Industry Association (AFIA). The bill promotes uniformity in laws and regulations from state to state, thereby facilitating interstate trade of manufactured feeds. The Model Feed Bill includes definitions, registration of brand feed names, labeling, etc.

Labeling:

- Identifies the product
- Provides instructions on how to use
- Identifies the use
- Provides any cautions concerning use

Label (tag) information includes:

- Weight
- Brand (trade) and company name
- Product name
- Directions for use
- Guaranteed analysis (minimum and maximum) to support claims
- Feed ingredients (common name or collective term, collective terms are partially permitted in Florida, Hawaii, and California)
- Precautionary statements
- Name and mailing address of manufacturer

Tags on medicated feed include in addition to the above:

- Purpose statement (medicated, species intended, fed as a sole ration, continuously, specific period)
- Caution statement (must be prominent on front)
- Active drug ingredient(s)
- Feed ingredients
- Detailed use description

Customized rations also should be accompanied by a tag, delivery slip, or other document with:

- Name and address of manufacturer



| | |
|-----------------------------|--|
| Grain Products | Barley, corn, oats, wheat, rice and rye |
| Animal Protein Products | Fish meal, hydrolyzed poultry feathers, meat meal, dried whole milk, skimmed milk, dried whey |
| Plant Protein Products | Cottonseed meal, linseed meal, soybean meal, soybeans (heat processed), yeast (cultured) |
| Processed Grain By-products | Brewers dried grains, distillers dried grains, corn gluten feed, wheat millings, bran (rice and wheat) |
| Forage Products | Alfalfa meal (dehydrated or sun-cured), grass hay (Species name included), lespedeza meal |
| Roughage Products | Apple products (dried), barley hulls, beet pulp (dried), hulls (oat, peanut and rice) |

Source: D. R. Kappa. 1992. Elements of nutrition: a primer for practitioners AAEP. 38th Proceedings. P. 669-679.

- Name and address of purchaser
- Date of delivery
- Product name
- Trade name if any
- Net weight of each commercial feed used in the mixture
- Directions for use

Tags are required to be:

- Attached to individual bags of feed
- Available for inspection if sold in bulk

Ingredient Listing

Usually ingredients are listed starting with the item making up the largest percentage of the mixture and continuing with those added in smaller quantities. Although human food items are normally presented in a similar fashion, the Model

Feed Bill does not specify this style and many states do not require this type of listing. States that do not require ingredient listings are: Virginia, Missouri and Oregon. Any change in the percentage order of ingredients would necessitate printing a new feed tag. Collective feed names are used to avoid preparation of new tags if one or more ingredients was discontinued (Table 1).

When collective feed names are used, individual ingredients within a group cannot be listed on the tag. Collective feed names are used on feed tags when diets are developed based on least cost formulation, which ensures a constant guaranteed analysis. Least cost diet formulation will select the most inexpensive ingredients to provide the collective feed name tag eliminates the necessity of printing a new feed tag to verify ingredient changes.

Guaranteed analysis of feeds are listed as:

- Minimum percentage of crude protein
- Minimum percentage of crude fat

- Maximum percentage of crude fiber
- Maximum percentage of ash

Ash values are useful in providing a quick estimate of whether excessive amounts of limestone or salt have been added to a feed. Limestone is one of the cheapest feed ingredients as compared to phosphorus, one of the most expensive. Minimum and maximum levels of (Ca) are therefore very useful for mineral supplements, since inexpensive ingredients such as limestone could be used as a "filler". Mineral supplements and concentrate feeds containing greater than 52 percent total calcium, phosphorus and minerals must include the following minerals in the guaranteed analysis:

- Minimum and maximum percentage of calcium (Ca)
- Minimum and maximum percentage of phosphorus (P)
- Minimum and maximum percentage of salt (NaCl)

Commercial Feed Classes

Commercial manufactured equine feeds are divided into the following categories:

- Textured concentrates (sweet)
- Processed concentrates (pelleted or extruded)
- Complete feeds
- Supplements (protein, mineral, trace mineral and/or vitamin)

Textured concentrates, typically referred to as "sweet" feeds, are whole grains mixed with molasses to improve palatability. The grain may or may not be processed: crimped, cracked, rolled or flaked, to improve digestibility. The grain mix may be fortified with a mineral, vitamin and protein pre-mix to provide all the necessary nutrients needed to balance the forage portion of the diet. Properly fortified concentrate mixes eliminate the need for the feeding of additional supplements.

Table 2. FEED TAG EXAMPLE

"Good Old Boy"
Horse Feed
Guaranteed Analysis

| | |
|-------------------------|-------|
| Crude Protein (minimum) | 12.0% |
| Crude Fat (minimum) | 2.5% |
| Crude Fiber (maximum) | 14.0% |
| Calcium (minimum) | 0.80% |
| Calcium (maximum) | 1.00% |
| Phosphorus (minimum) | .45% |

Ingredients: Grain products, plant protein products, processed grain by-products, forage products, riboflavin, calcium pantothenate, niacin, vitamin B12 supplement, choline chloride, vitamin A palmitate, D activated animal steryl (source of vitamin D3), vitamin E supplement, methionine, menadione sodium bisulfate (source of vitamin K activity) animal fat (preserved with BHA), defluorinated phosphate, magnesium sulfate, potassium sulfate salt, manganous oxide, iron carbonate, iron sulfate, copper oxide, cobalt carbonate, calcium iodate, zinc oxide, cane molasses, sodium selenite.

Weight Loss Feed Company
Lizard Lick, Any State, 05820
Net Weight shown on bag

Pelleting and extruding are two methods of processing concentrate mixes to improve digestibility, feed efficiency and intake. Pelleting eliminates fines and feed wastage which ensures a nutrient balanced feed. Extruded feeds are processed under extreme pressure which "explodes" the feed nugget, increasing its surface area and digestibility. Although both processing methods are expensive and increase production costs, the pelleting of a feed enables a manufacturer to more effectively formulate least cost diets which ultimately reduces the overhead cost of pelleting as compared to extruded feeds.

"Complete" feeds are a combination of concentrates and forages into one product. Complete feeds are used when poor quality or no forages are available or medical conditions of the horse dictate that it not be fed hay or grazed on pasture. Fibrous feed such as beet pulp, chopped alfalfa hay, rice hulls and wheat middlings are used to elevate the fiber content of a complete feed. Due to the higher fiber content, complete feeds contain less energy than concentrate mixes.

Protein, mineral, trace mineral and/or vitamin supplements are designed to be fed with concentrate mixes that are not fortified or when feeding poor quality forages.

Feed Tag Evaluation

Although feed tags provide limited information,

they do serve a vital function. By law, feed companies are required to list ingredients contained in the feed, as well as the standard nutrient content (Table 2). In addition to the ingredients, feed manufacturers must display a minimum percent crude protein (CP), minimum percent fat and a maximum percent crude fiber (CF). Feed manufacturers are required to list the percent calcium (Ca), given a minimum and maximum range, the minimum percent phosphorus (P) and the minimum percent salt (NaCl) if the total of the three minerals exceed 5.5 percent of the grain (concentrate) mix. All state Departments of Agriculture do random testing of manufactured feeds to ensure tag accuracy. Significant deviation from guaranteed analysis is ample justification for feed control officials to take action. Allowance for variability in sampling and laboratory analysis is permitted. The North Carolina Department of Agriculture publishes an analysis of official feed samples, including violations in an annual feed report "The Bulletin".

Nutrient Evaluation

In general, horse owners place unwarranted importance on the protein content of a feed. Feeds are quite often purchased solely on percent protein, with little or no concern for the other important nutrients. Crude protein is actually calculated by measuring the nitrogen (N) content in a feedstuff. Protein is composed of a variety of nitrogen-containing amino acids organized in a building block fashion. Since the average nitrogen content of amino acids is 16 percent, multiplication of the percent nitrogen measured by 6.25 will give the crude protein (C.P.) content.

Table 3. Relationship of Crude Fiber to Expected Digestible Energy in Mixed Concentrate Feeds¹

| <u>Crude Fiber %</u> | <u>Digestible Energy Mcal/Lb</u> |
|----------------------|----------------------------------|
| 2.0 | 1.62 |
| 4.0 | 1.55 |
| 6.0 | 1.45 |
| 8.0 | 1.35 |
| 10.0 | 1.25 |
| 12.0 | 1.15 |

¹Source: Adapted from Stud Manager's Handbook, Volume 18, 1983. Feedstuff evaluation and nutrient value for horses. D. G. Meadows, pages 262-266.

Unfortunately, the crude protein content of a feed does not reflect the amount of protein actually digested and available to the horse.

The digestible protein (D.P.) represents that portion of the crude protein which can actually be used by the horse. On average, the digestible protein represents approximately 75 to 80 percent of the crude protein. Since the estimation of digestible protein content in feedstuffs is inaccurate, the National Research Council has recommended that horse rations be balanced on percent crude protein and percent lysine, an essential amino acid.

Most commercial protein concentrates also list several of the essential amino acids, which the horse must obtain from its feed. Of the essential amino acids, lysine is the most limiting to young horses for growth and may be supplemented. As a horse matures, the lysine requirement decreases from .65 percent for a suckling to .55 percent for a weanling and .45 percent for a yearling. Supplemental lysine is not necessary for horses two years-of-age or older. Soybean meal, milk protein and alfalfa are feed ingredients that are high in lysine. Generally, grains and grasses are low in lysine. Most commercial protein concentrates also contain a vitamin, and trace mineral premix. Such supplements are not necessary when feeding properly balanced concentrates with average to good quality forages.

The percent fat or ether extract (EE) is the measure of the non-carbohydrate portion of the feed. Fat is extremely dense in energy and contains approximately 2.25 times as much energy as carbohydrate or protein. The fat level of most carbohydrate based concentrate mixes usually range from a minimum of 2 to a maximum of 4 percent. "High" fat diets contain over 6% fat.

Crude fiber is a measure of the bulk or fibrous portion of the grain mix consisting of mostly cellulose and lignin. Although horses digest cellulose quite well in the large intestine lignin is indigestible. Bacteria in the horse's large intestine can digest cellulose and produce by-products that are available to the horse, however, lignin is indigestible. The fiber content of grains range from 2

percent for the energy dense grains such as corn, up to 12 to 14 percent for the grains such as oats (Table 3). Feeds that are low in fiber tend to be more digestible with a higher energy content.

Altering the fat or content of a concentrate will alter the energy content. The addition of fat, which contains 2.25 times more energy than the carbohydrates typically found in grain, will elevate the energy density or calories per pound of concentrate. Conversely, the addition of minerals which contain no energy, lowers the caloric density of the concentrate mix. Properly formulated diets will have the ratio of nutrients adjusted to maintain a constant nutrient to calorie ratio.

Ideally, salt should be present in concentrate mixes at the rate of one half percent for idle, non-working horses and one percent for working horses. Salt should always be supplemented free choice.

A great deal of variability exists among most commercial feeds and supplements in the calcium, phosphorus and salt levels. The calcium and phosphorus content will vary depending upon the age and production status of the horses being fed. Although the quantity of calcium and phosphorus will vary, the ratio of the two minerals should remain within 1:1:1 up to 2:1 parts calcium to phosphorus in the total ration.

Feed tags typically do not disclose trace mineral and vitamin content. Contact the feed manufacturer to determine the level of these nutrients in a commercial feed. Feed manufacturers may provide either a laboratory feed analysis or an estimated analysis based on the feed ingredient formula. The laboratory analysis is a more accurate evaluation.

Potential Toxic Problems

Most horse owners tend to relate health and performance related problems to improperly manufactured or preserved feeds. However, inadvertent feed manufacturing problems are rare. Most problems result from mixing horse feed immediately after the equipment was used for non-equine diets that contained medications and growth promotants not approved for equine use. Monensin,

a growth promotant supplemented in cattle feedlot diets is toxic when fed to horses. Stringent quality control measures by feed manufacturers have made improperly manufactured feed situations less frequent.

The presence of mycotoxins, produced by molds in grains is a problem that equally confronts feed manufacturers, farmers and horse owners. Mycotoxins develop in feedstuffs used in commercial feeds or home mixes, due to stress during the growing season (drought) or improper storage. Commercial feed companies add mold inhibitors to concentrate mixes to preserve feeds and increase the shelf-life of the product. However, mold inhibitors do not reduce or eliminate mold already present. If mold-contaminated grains are originally used in a concentrate formulation, the mold and potential toxins will remain intact in the presence of a mold inhibitor. If feeds are mishandled on the farm through poor storage or left in feed mangers, feed may mold regardless of the presence of mold inhibitors. Moldy feed should not be offered to horses.

Recommendations

Identify the nutrient(s) of major concern for your horse=s needs. Purchase the most balanced feed that meets these needs. Then follow feeding directions! Do not attempt to reduce feed costs by diluting a balanced concentrate mix or supplement with another cheaper feedstuff or product. Such practices will typically dilute out the balanced nutrient content of the original product, reduce the quality of the diet and may create nutrient deficiencies and interactions that could be detrimental to your horse.

