

G1403

(Revised December 2007)

Basics of Feeding Horses: Reading the Feed Tag

Kathy P. Anderson, Extension Horse Specialist

Horses need a balanced ration for proper growth, maintenance and reproduction. This NebGuide explains what necessary nutrients do and how to read the tag of a manufactured horse feed.

Horse owners who purchase ready-mixed feeds rely on the company to provide a balanced, quality ration. However, understanding how to read the feed tag can help you provide the correct diet. Every bag of commercially prepared feed should have a tag stitched to the bottom. Just like the ingredient labels on everything from a loaf of bread to a can of soup, the tag on the feed bag tells what's inside and what it will do for your horse.

Remember the tag represents *only* what's in the bag, and that other factors are involved in choosing the correct feed for your horse. Selection of a horse feed also depends on the animal's age, use, activity level and what else it may be eating (type of hay, pasture or supplements). The information on the tag certainly is the place to start; however, most horse owners must gather some additional information to select the most optimum feed.

A feed tag lists the amounts of some vital vitamins and minerals, plus percentages of protein, fat and fiber. It will provide, in general terms, what ingredients are mixed together to create those items. The ingredients used and their amounts make feeds different. The feed tag doesn't provide estimates of energy or how much of each ingredient is in the ration.

What the Feed Label Includes

Product Name and Purpose Statement

The product name must accurately reflect the intended use of the feed. The purpose statement indicates the class or classes of horses for which the feed is intended (growing foal, lactating mare, etc.). This helps purchasers select the best feed for their types of horses. For example, a feed designed for mature horses in light work would be labeled "maintenance feed," to imply it is inappropriate for growing foals.

Commercial Feed Class

Commercial manufacturers divide equine feeds into four categories:

- textured concentrates (sweet feed);
- processed concentrates (pelleted or extruded);
- complete feeds; and
- supplements (protein, mineral, trace minerals and/or vitamins).

Textured concentrates, typically called sweet feeds, are grains mixed with molasses to improve palatability. Grains may be whole or 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 necessary nutrients to supplement the forage portion of the diet. Properly fortified concentrate mixes eliminate the need to feed additional supplements.

Pelleting and extruding are two methods of processing concentrate mixes to improve digestibility and intake.

- Pelleted feeds help ensure a nutrient-balanced feed by eliminating fines and sorting.
- Extruded feeds are processed under extreme pressure that explodes the feed nugget, increases its surface area and increases the rate of passage.

Both processing methods are expensive and increase product cost.

Concentrates and forages are combined into one product to make complete feeds.

- Complete feeds are used when forage quality is poor or unavailable, or when medical conditions dictate.
- Fibrous feeds such as beet pulp, chopped alfalfa hay, rice hulls and wheat middlings elevate fiber content of a complete feed.

Due to their high fiber content, complete feeds contain less energy than concentrate mixes. Protein, mineral, trace mineral and/or vitamin supplements are designed to be fed with unfortified concentrate mixes or when poor quality forages are fed.

Guaranteed Analysis

The guaranteed analysis provides information on concentrations of specific nutrients. As such, horse owners can use the guaranteed analysis to select commercial feeds that will combine correctly with the types of forages fed, and relate the feed's nutrient content to the horse's nutrient requirements. By law, feed companies are required to list ingredients contained in the feed, as well as the standard nutrient content (*Figure 1*). Feed manufacturers are required to list minimum levels of crude protein, crude fiber and crude fat (expressed as percentages), minimum and maximum percentages of calcium, and minimum values for phosphorus (percent), copper (parts per million or ppm), zinc (ppm), selenium (ppm) and vitamin A (International Units per pound). In addition to the required analysis, companies sometimes will list other ingredients, such as biotin or vitamin E, especially where the amount might be of special interest.

**Husker 12% Textured Horse Feed
for Maintenance of Mature Horses**

Guaranteed Analysis

- Crude Protein (Min) 12%
- Crude Fat (Min) 3%
- Crude Fiber (Max) 12%
- Calcium (Ca) (Max) 1.5%
- Phosphorus (P) (Min) 1%
- Copper (Cu) (Min) 20 ppm
- Zinc (Zn) (Min) 40 ppm
- Selenium (Se) (Min) 0.1 ppm
- Vitamin A (Min) 2,000 IU/lb

Ingredient Statement

Grain Products, Plant Protein Products, Processed Grain By-Products, Molasses Products, Roughage Products 25%, Vitamin A Supplement, Vitamin D3 Supplement, Vitamin E Supplement, Vitamin B12 Supplement, Riboflavin Supplement, Pyridoxine Hydrochloride, Folic Acid, Biotin, Thiamin, Calcium Carbonate, Salt, Dicalcium Phosphate, Manganous Oxide, Ferrous Sulfate, Copper Oxide, Magnesium Oxide, Zinc Oxide, Ethylenediamine Dihydroiodide, Cobalt Carbonate, Potassium Chloride.

Feeding Directions: Feed 1/2 to 1 lb of feed per 100 lb of body weight for the maintenance of mature horses. Feed good, clean hay at the rate of 1 to 1 1/2 lb per 100 lb body weight daily. Provide fresh, clean water at all times, except to hot, tired horses.

Important: Feed hay along with this ration, as per directions.

**Manufactured by
Husker Feeds
Somewhere, NE 00000**

Figure 1. Feed Tag Example

Minimum Percentage of Crude Protein: In general, horse owners place unwarranted importance on the protein content of a feedstuff. Feeds often are purchased solely on the crude protein percentage, with little or no concern for the other important nutrients.

Horses require certain amounts of dietary protein to meet a variety of their needs, such as muscle maintenance and development, enzyme synthesis and hormone synthesis. For example, a 1,200-pound mature horse at maintenance may need the total ration to supply 1.5 to 1.75 pounds of protein per day to meet these needs. The percentage crude protein is

the portion of the total weight of the feed that is crude protein. To determine the amount of crude protein supplied in a given amount of feed, multiply pounds of feed by percent crude protein. For example, 10 lbs of a commercial feed that is 10 percent crude protein supplies one pound of protein (10 lbs X 10 percent crude protein = 1 lb of crude protein).

Crude protein ranges from 8 percent to 16 percent in most commercially prepared horse feeds. Young growing horses and brood mares need feeds with higher protein content than most other horses. The National Research Council (NRC, 2007) recommends horse rations be balanced on percent crude protein and percent lysine, an essential amino acid.

The lysine level actually is more critical than the protein content for a young, growing horse. Growth will be compromised in young horses consuming a diet deficient in lysine even if crude protein and other amino acids supplied are adequate. As a horse matures, the lysine requirement decreases from 0.65 percent for a weanling to 0.45 percent for a yearling. Soybean meal, milk protein and alfalfa are feed ingredients high in lysine. Grains and grasses generally are low in lysine.

Minimum Percentage of Crude Fat: Percentage of crude fat is one indicator of a feed's energy content. Fat is energy-dense, providing nearly 2.5 times as much energy, pound per pound, than carbohydrates or protein. The higher the minimum percentage of crude fat, the higher the calories provided per pound of feed. The higher the energy content, the fewer the pounds of feed are needed to meet energy requirements. Most carbohydrate-based concentrate mixes without added fat generally range from a minimum of 2 percent to a maximum of 4 percent fat. However, some commercial feeds contain 5 percent to 10 percent supplemental fat, meaning the tag will show a minimum crude fat percentage ranging from 6 percent to 14.5 percent.

Maximum Percentage of Crude Fiber: The crude fiber level on a feed tag is the best indicator of energy content (*Table I*). Fiber provides energy, but at low amounts when compared to carbohydrates or fat. As fiber increases, energy content decreases. Most grains are relatively low in fiber; hays and forages are high in fiber. Grain fiber content ranges from 2 percent for energy-dense grains such as corn, to 12 or 14 percent for bulk grains such as oats. Rations with fiber levels higher than 10 percent include roughage products such as alfalfa hay.

Fiber is important in a concentrate mix and necessary to

Table I. Relationship of crude fiber to expected digestible energy in mixed concentrate feeds.

<i>Crude fiber %</i>	<i>Digestible energy Mcal/Lb</i>
2.0	1.62
4.0	1.55
6.0	1.45
8.0	1.35
10.0	1.25
12.0	1.15

Adapted from Stud Manager's Handbook. Volume 18. Feedstuff Evaluation and Nutrient Value for Horses, D.G. Meadows, pages 262-266.

ensure normal digestive tract functioning. Concentrate mixes containing less than 7 percent fiber are dense in energy and require more precise feed management. Concentrates with 8 percent to 11 percent fiber are moderate in energy, while concentrates with greater than 12 percent fiber are low in energy. Crude fiber content of more than 12 percent is not a practical aid in gauging energy content.

Some high-energy, low-fiber feeds can be used free choice. However, because overfeeding energy is one of the major causes of laminitis (founder), extreme care needs to be taken to limit intake. This often is accomplished by mixing the concentrate in a 50:50 ration with chopped hay.

Minimum and Maximum Percentage of Calcium, Minimum Percentage Phosphorus: Calcium and phosphorus probably are the two most crucial mineral levels to note on a feed tag. These minerals are vital for development, maintenance and repair of the musculoskeletal system. Furthermore, both calcium and phosphorus must be present in sufficient quantities in order to fulfill their functions. Horses in production and growth require more calcium and phosphorus than mature horses at maintenance. For example, a weanling ration will have at least 0.7 percent calcium and 0.4 percent phosphorus, whereas a mature horse requires 0.3 percent calcium and 0.2 to 0.5 percent phosphorus.

Most feeds supply higher levels than this; commonly feeds contain 0.8 - 0.9 percent calcium and phosphorus values of 0.6 - 0.8 percent. Recommendations for total amounts of calcium are more than for phosphorus. 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.

To ensure adequate amounts and balance, a source of calcium commonly is added to feeds formulated for horses so that calcium equals or exceeds phosphorus. This reduces concern for variations of mineral content found in the forage portion of the diet. The percentage of calcium listed on the feed tag typically ranges from lows of 0.4 percent to highs at or near 1.0 percent. Phosphorus typically ranges from lows of 0.3 percent to highs of 0.5 percent or greater.

Feeds may be formulated to take into account the calcium and phosphorus content of forages. Legume hay (such as alfalfa) typically has a greater calcium content than grass hay. Therefore, if feeding grass hay, the formulated feed should be higher in calcium than if feeding alfalfa. Some feed labels go into detail as to which forage is most appropriate.

Minimum Copper, Zinc and Selenium in Parts Per Million (ppm): These minerals are required in small amounts, yet are essential for a horse's well-being. Copper and zinc are important for growth and normal bone and joint development. Selenium is "linked" with vitamin E in horse immune and reproductive systems. As the content of these minerals in hays and forages is variable, commercial feeds commonly are formulated with small amounts added to ensure adequate intakes. Other mineral recommendations are copper, 10 ppm; zinc, 40 ppm; and selenium, 0.1 ppm.

Salt: Ideally salt should be present in concentrate mixes at the rate of 0.5 percent for idle, non-working horses and 1.0

percent for working horses. Horses typically will consume 1 to 3 ounces of free-choice salt daily. Free-choice consumption of trace mineralized salt containing less than 2 percent trace minerals will satisfy less than 33 percent of the horse trace-mineral requirement.

Ingredient List

The ingredient list indicates all ingredients in the commercial feed. The feed tag ingredient listed first is in the greatest amount and the last is in the least amount. For example, grains will be listed first, with minerals and vitamin-containing compounds at the end. Grains may be listed by name (oats, corn) or the tag may indicate grain products. Grain products are grains receiving some type of chemical or physical processing prior to being added to the feed.

Collective feed names are used to avoid preparation of new labels if one or more ingredients is changed (*Table II*). When collective feed names are used, individual ingredients within a group aren't listed on the label. Collective feed names are used on feed labels 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 guaranteed analysis. As a result, the percentage of ingredients selected may vary with each diet formulation.

Table II. Collective feed terms by ingredient.

Group Grain Products	Barley, corn, oats, wheat, rice, rye
Animal Protein Products	Fish meal, hydrolyzed poultry feathers, meat meal, bone meal, dried whole milk, skimmed milk, dried whey
Plant Protein Products	Cottonseed meal, linseed meal, soy bean 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 AA & P. 38th Proceedings. P. 669-679.

Other Information on Feed Tags

Many feed tags will supply some additional information to ensure the content's proper use. They often offer feeding directions, suggesting the amount to be fed; recommendations on feeding management; and/or type of forage the feed will supplement to meet horse requirements. Additionally, tags will have the manufacturer's name and address, as well as the guarantee of the net weight of the feed contained in the bag.

Potential Toxic Problems

Most horse owners tend to identify health and performance-related problems with improperly manufactured or preserved feeds; however, inadvertent feed manufacturing problems rarely occur. Problems most commonly occur from mixing horse feed immediately after formulating non-equine diets that contain medications and growth promotants not approved for horses. Consult a veterinarian if considering purchasing a feed that contains any medication or growth promotant. A few horse feeds currently marketed contain low levels of antibiotics, but strict feeding guidelines must be followed. Furthermore, never give horses feeds that contain growth promotants such as those found in some cattle feeds. Ionophores such as monensin, a feed additive for cattle, is extremely toxic when fed to horses.

Let's Go to the Feed Store

Horse owners will want to know how to read a feed tag to become more educated feed buyers. Shopping for feed will get the most nutrition for the money. First, determine what type of horse will be fed: weanling, lactating mare, working feedlot horse, etc. Then decide the type of forage to be fed. The energy and protein content of the hay or pasture will help determine the levels of energy and protein needed in the purchased feed.

For example, say an owner of a hard-working ranch gelding which eats grass hay and pasture figures the horse needs a grain concentrate containing 13 percent to 14 percent crude protein. Most feed stores will have numerous rations containing 14 percent crude protein in pellets or grain concentrate. Other similar feeds might be 12 percent to 10 percent crude protein, which are just below what is needed by this gelding. Another option is to look at "non-horse" feeds, such as cattle creep feeds or feedlot feeds. These may be around 13 percent crude protein, and much less expensive than feeds specific for horses. These types of feeds are fine for horses, provided they are certain to be free of drugs or additives.

Once knowledgeable on reading feed tags, a horse owner can examine and determine the type of feed that best fits the horse's situation. For example, a feed that lists crude protein as 10 percent and crude fiber as 15 percent is designed for mature idle horses or ones at very minimal work. A feed with 12 percent crude protein, calcium of 1.15 percent, phosphorus of 0.7 percent, and a copper level of 55 ppm likely is designed for broodmares in the first eight months of gestation. The extra mineral support will aid in foal skeletal development, but the mare has no increased mineral requirement until the last trimester.

Another feed may list 12 percent crude protein, 7 percent crude fat, and lysine, methionine, biotin, vitamin E and thiamin levels on the tag. This feed most likely is designed for horses in high performance sports such as racing, endurance riding or three-day eventing. The supplemental fat supplies extra energy and calories. The protein level is fairly low or moderate, indicating the horse is mature. The extras listed on the tag inform the buyer of the (presumably) high levels of these ingredients, which would benefit the working horse.

Summary

Today's horse owners might find horse nutrition complicated, but also accurate. Horse feeds can be customized at low cost in ways never before possible. Identify the nutrient(s) of major concern for your horse's stage of production, age, and/or activity. Purchase the most balanced diet that uses the most digestible ingredients and costs the least per unit of nutrient. Then, follow the feeding directions.

Do not attempt to reduce overhead costs by diluting a balanced concentrate mix or supplement with cheaper feedstuff or product. Such practices will dilute 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.

UNL Extension publications are available online at <http://extension.unl.edu/publications>.

Index: Horses
Feeding & Nutrition
2000, Revised December 2007

Extension is a Division of the Institute of Agriculture and Natural Resources at the University of Nebraska–Lincoln cooperating with the Counties and the United States Department of Agriculture.

University of Nebraska–Lincoln Extension educational programs abide with the nondiscrimination policies of the University of Nebraska–Lincoln and the United States Department of Agriculture.

© 2000-2007, The Board of Regents of the University of Nebraska on behalf of the University of Nebraska–Lincoln Extension. All rights reserved.