Middle California Region
C3, HB, H/HA Nutrition Block

Understanding Feed Labels
Buying Hay
Pasture Maintenance

Understanding Feed Labels

What is included on a Feed Label:

- ***Product Name and Purpose Statement:*** Includes the Brand Name e.g.: Omolene and the manufacturer e.g.: Purina. The product name must accurately reflect the intended use of the feed. For example, a feed designed for mature horses in light work would be labeled "maintenance feed," to imply it is not appropriate for growing foals.
- ***Commercial Feed Class:*** Commercial manufacturers divide equine feeds into four categories: 1) textured concentrates (sweet feed); 2) processed concentrates (pelleted or extruded); 3) complete feeds; and 4) 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. Pros of sweet feeds: More palatable to horse, ingredients partly recognizable, easier to add medications too, manufacturer less likely to change ingredients. Cons of Sweet feed: shorter shelf life, more vulnerable to heat and cold, horse can sort feed.
    - 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. Pros of pellets: Usually less expensive, longer shelf life, horse can't sort feed to eat only what prefers makes possible hay ration with grain in single pellet. Cons of pellets: less palatable, ingredients unrecognizable, manufacturer more likely to change ingredients depending on availability and cost to manufacturer.
    - **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 concentrations of specific nutrients. By law, feed companies are required to list ingredients contained in the feed, as well as the standard nutrient content. 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.

- **Minimum Percentage Crude Protein**: 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 pounds of a commercial feed that is 10 percent crude protein supplies one pound of protein (10 pounds x 10 % crude protein = 10 x 0.1 = 1 pound of crude protein).Crude protein ranges from 8 percent to 16 percent in most commercially prepared horse feeds. The National Research Council (NRC, 1989) recommends horse rations be balanced on percent crude protein and percent lysine, an essential amino acid. Soybean meal, milk protein and alfalfa are feed ingredients high in lysine. Grains and grasses generally are low in lysine. The tag guarantee simply gives information about the total amount of protein but does not account for the digestibility of amino acid composition. As an example, corn gluten meal has low digestibility for horses as well as a poor assortment of amino acids, indicating this source of protein would not be good for young, growing horses. Linseed meal has been widely used by the horse industry, but it is usually quite high in indigestible fiber, and the protein is of relatively low quality. The best source of protein in digestibility and quality is generally considered to be soybean meal. Thus it is important to understand that it is not just how much protein is in the feed, but what source of protein is being used. Assume with a reputable manufacturer that at least 75% of the crude protein is digestible. E.g.: label states 15% crude protein then 11.2% digestible
- **Minimum Percentage Crude Fat**: 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. Natural occurring fat levels in grains range between 2 ½ - 3%. Anything over this would be considered added fat.
- **Maximum Percentage of Crude Fiber**: The crude fiber level on a feed tag is the best indicator of energy content. As fiber increases, energy content decreases. Most grains are relatively low in fiber; hays and forages are high in fiber; in 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. *Concentrate mixes containing 6 - 7 percent fibers are dense in energy and can be fed in smaller quantities. Concentrates with 8 – 11 percent fiber are moderate in energy; while concentrates with greater than 12 percent fiber are low in energy and larger quantities would need to be fed to meet the energy needs.*
- **Minimum and Maximum Percentage of Calcium, Minimum Percentage of Phosphorus**: Calcium and phosphorus probably are the two most crucial mineral levels to note on a feed tag. 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.

- **Minimum Copper, Zinc and Selenium in Parts Per Million (ppm)**: These minerals are required in small amounts. 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.

- ***Ingredient List*** The ingredient list indicates all ingredients in the commercial feed. The ingredient listed first is in the greatest amount and the last is in the least amount in the feed bag. 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 that have received 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.
- ***Other Information Found on Feed Tags.*** Many feed tags will supply some additional information to ensure its proper use. Feed tags 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 on the net weight of the feed contained in the bag.

Table I.

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

Crude fiber	*Digestible energy*
%	Mcal/Lb.
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. pg 262-266.

Nutrena®

DAYVILLE 12% HORSE TEXTURED (BW)

This feed is designed to be fed to maintenance horses over 400 LB bodyweight on grass or oat hay.

GUARANTEED ANALYSIS

Crude Protein	Min. 12.0 %
Crude Fat	Min. 2.5 %
Crude Fiber	Max. 8.0 %
Calcium	Min. 0.3 % Max. 0.6 %
Phosphorus	Min. 0.3 %
Potassium	Min. 0.5 %
Copper	Min. 10 PPM
Selenium	Min. 0.2 PPM
Zinc	Min. 40 PPM

INGREDIENTS: Grain Products, Plant Protein Products, Processed Grain By-Products, Molasses Products, Calcium Carbonate, Sodium Selenite.

[illegible] DIRECTIONS:

Maintenance Horses: Feed at the rate of 0.25 to 0.5 LB per 100 LB bodyweight depending on the body condition of the horse. Feed good, clean hay at the rate of 1 to 1.5 LB per 100 LB bodyweight daily. Provide plenty of fresh, clean water at all times, except to hot, tired horses.

IMPORTANT: Feed hay along with this ration as per directions.

NET WT ON BAG OR BULK

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TAKE TIME
OBSERVE LABEL DIRECTIONS

CARGILL®
NUTRENA FEEDS
GENERAL OFFICE
MINNEAPOLIS, MN 55440

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, 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*. AA & P. 38th Proceedings. P. 669-679.

Why buy a Commercial Feed over mixing your own grains and vitamin and mineral supplements?

Pros: Save time and space. You don't have to measure supplements. If you are gone and someone else feeds for you, the proportions in the diet stay the same. Machinery mixes evenly. Vitamins and minerals are uniformly distributed throughout the feed. They don't fall to the bottom of the feed sack or bin. Even though paying for the manufacturer's overhead (advertising, packaging etc.), commercial feed does not necessarily cost more than home mixed grain because: the manufacturer can buy ingredients more cheaply than can you; can obtain ingredients unavailable to you e.g. soybean meal, brewer's dried grain; can buy low cost ingredients with increased nutritional value that would be unpalatable unless pelleted or mixed with molasses.

Buying Hay Right:

Hay makes up a significant portion (50 -100%) of the equine diet. It is a source of energy, protein, vitamins, minerals and, most importantly, fiber that is necessary for normal gastrointestinal function in the horse. The quality of hay, and therefore its nutritional value, varies considerably between different lots of hay. Understanding the factors responsible for variability in hay quality will increase the chances of getting the best value when buying hay.

Quality of hay can be measured in terms of qualitative and quantitative characteristics. Qualitative characteristics are most often visual appraisals. Quantitative characteristics are actual chemical measures of various nutrients and other components influencing nutrient amount and digestibility.

- Don’t buy hay that has been cut and baled less than 6 weeks, newly made hay must cure. Improperly cured hay will mold.
- Don’t buy hay stored in contact with a damp surface, next to cement, on a dirt floor or against a concrete or stone wall.
- Hay must be fresh, clean smelling and free from dust or mold. Mold is a fatal flaw. Always reject any hay with even a little mold. Check the center of the bale as dries last. Open and watch for dust; check color; surefire way to check is by smelling hay.
- Hay must be free of weeds, dirt or other contamination. Clumps of weeds tend to hold moisture and cause mold. Weeds may be toxic or have less nutritional value than the hay. If alfalfa is being inspected, it must be free of blister beetles, a potentially toxic insect. The blister beetle is not commonly found in the northern part of the Midwest, but can be a problem with hay shipped from further south. Not a problem in the West.
- Hay should have a high leaf to stem ratio and fine texture. A higher percentage of digestible nutrients are contained in the leaf portion of both grass hay and legume hay. As the plants mature, the indigestible fiber portion in the stem increases, reducing the energy and nutrient content per pound. Small diameter stems = less mature plants. Few seed head or blooms = less mature plants. The seed should not come free when rub the head between your fingers. Grass hay only seeds out before the first cutting, after that you have to judge age by stemminess alone.
- Check the weight of the bale. Could be baled extra tight which is okay. But if moisture is making it heavy don’t buy it as it will mold. If it is light that is okay may have been baled loosely to dry, but don’t pay by the bale –pay by weight in this case.
- A uniform green color indicates the hay was not bleached from exposure to sun and rain. If hay has been stored where direct sunlight can hit it, the end or outside of bales may be bleached, but the interior should be leafy and green. Round bales stored outside may be bleached on the outside, but hay found a few inches inside the bale should be high quality.

Green hay is nutritious and tasty. Alfalfa is generally a brighter shade than grass hay, such as timothy, but all best-quality hay has a definite greenish cast. If your hay is leafy green—and your horse is acclimated to that particular type—you can feed it without fret.

Light gold hay is usually sun-bleached, and often only the material on the outside of the windrow or on the sides of the bale exposed to direct sunlight is affected. If the rest of the bale is green, the hay is still suitable and safe for feeding, if it is clean and fresh smelling. Its vitamin content has been reduced somewhat, however.

Yellow, coarse hay throughout a bale indicates that the plants were overly mature when cut. All nutrient values are reduced, but if the otherwise clean hay is fed primarily to give the horse something to chew on in a well-balanced diet, it is a safe, useful feed.

Brown hay has heated and fermented, the result of being baled and stored with too-high a moisture content. A distinctive musty odor accompanies a caked and matted texture. Brown hay most probably contains mold, which can wreak havoc on your horse's respiratory and digestive systems. It should bypass your horse’s feed trough and go directly to the compost heap.

Dark brown or **black hay** has usually been exposed to rain, heavy fog or dew, and a great deal of its nutrient value has leached out. When dry, it becomes very brittle. Even though black hay may not have a musty smell, mold is probably present, so it is best left unfed.

- **Forage testing** is a valuable tool for determining the value of hay as well as providing information for selecting commercial feed and doing a complete diet evaluation. In forage testing, a representative sample is taken from several bales and sent to a laboratory to be analyzed for protein, fiber, calcium, phosphorus, copper, zinc and energy (TDN/Horse Digestible Energy). Samples should be taken with a hay probe, (a tool which has a tube with a cutting end for "drilling" into hay bales), then sent to a forage laboratory. County Extension staff or the local feed dealer can assist with directions and the available laboratory.

Pasture Maintenance

- **Pasture:** Is only as good as the grass that is in it!
- **Before Planting consider:**
    1. Climate (wet or dry)
    2. Use (traffic) and livestock density (# animals/acre)
    3. Type of livestock e.g.: horses, sheep, cows
    4. Palatability
    5. Rotation of Pastures
    6. Soil type – fertilizer or mineral additions that may be needed
    7. Fencing
    8. Manure removal and mowing
    9. Reseeding
- In making your selections, then, your first consideration is to seed your fields with species that will survive in your area and under your pasturing conditions. Your second concern is tending the perennials to maintain healthy turf year after year of productive use. Unless you already have some crop-growing experience, you're wise to involve some knowledgeable advisors and/or custom planters in a major pasture renovation or establishment project. But to gain a working knowledge of pasture options, familiarize yourself with four essential forage characteristics listed below, then check out the various grass and legume species that will grow in your area.
    1. **It's right for the region.** Forage species are adapted to different growing environments by their tolerance of seasonal temperature extremes and moisture levels. For example, perennial grasses are divided into two primary classes, according to their temperature tolerances. Warm-season grasses usually have a tropical origin, making them happiest in temperatures above 75 degrees (Fahrenheit), and generally they do not survive in locations with freezing winters. Cool-season grasses thrive in temperate climates, particularly when the thermometer sits at 68 to 72 degrees, but they can also serve well in warmer environments by making the majority of their growth in the early spring and late fall when temperatures are cooler. Even if species are adapted to your region of the country, local variations within these large areas or uncharacteristic weather patterns may prove to be incompatible with their needs for growth. For instance, an unusually cold winter may cause the sudden disappearance of a pasture plant that had produced faithfully year after year until then.
    2. **It's compatible with soil moisture levels.** After narrowing your forage choices to grasses and/or legumes that are generally happy with the growing conditions in your locale, the next step is to focus on the individual pasture or pastures you want to improve. All the pastures on your farm won't necessarily share precisely the same characteristics and thus shouldn't be seeded with the same forage species. Soil-moisture levels are important factors in plant survival, with different species showing distinct preferences for wetter or drier conditions and different degrees of tolerance for deviations from their ideal. Soil-drainage characteristics as well as rainfall amounts affect the success or failure of pasture seedings and subsequent

persistence.
You could improve soil drainage in chronically wetter areas of pasture by installing a tile-drainage system to carry away the excess water and improve moisture retention in the impervious soils higher up to reduce runoff, but this is expensive. The cheaper approach to growing good pasture on the acreage is to seed it in a forage species that's tolerant of wet soil conditions. (However, if a pasture is very wet, a tile system should be considered because of the potential for pollution from excess nutrients in manure.) At the other extreme, drought is a major deterrent to pasture productivity. If you live in a location that receives little rainfall during the summer, be sure to use species that can tolerate dry soil conditions. Forage species with very shallow root systems are the first to succumb to drought, while perennials with deep roots can tap into moisture retained well below the soil surface.

3. **It's tough enough for the rate of grazing.** If you pasture a few too many horses for your acreage or if your pastures don't get any rotational rest periods, you need to plant forage species that tolerate frequent feeding. Pasture grasses and legumes have differing abilities to recover from grazing. Those species whose regrowth always originates underground tolerate frequent grazing better than those with aboveground regrowth sites. For example, Kentucky bluegrass always initiates regrowth from its root system, while timothy and smooth brome grass have regrowth sites that are above ground at certain growth stages. If these latter species are grazed while their regrowth sites are exposed, the damage inflicted by close-grazing animals will eventually kill them. (Horses pull up grasses by their root which is more destructive to pastures than other grazing animals such as cows and they also trample pastures to a greater extent with their hooves than other grazing animals, therefore, they require sturdier grasses). Kentucky bluegrass, perennial ryegrass, tall wheat grass, bird's-foot trefoil are the grasses that grow in our region and tolerate the most grazing. The general rule for grazing of paddocks/pastures is this: Graze down to 2 inches in 6 days or so; rotate to another paddock/pasture; allow the grazed paddock/pasture to regrow to 6-8 inches. If part of the paddock/pasture is not grazed evenly, then mow so all will be the same. Reseed as needed.
4. **It's quick to root and eager to grow.** Ease of establishment is another important consideration when choosing forage species. Red clover establishes quite effectively by broadcasting seed on the soil surface while other species do not. Perennial ryegrass can germinate in three days, while Kentucky bluegrass usually requires 14 to 21 days. After germination, the rule of thumb is to leave new seedings or renovated pastures ungrazed if the plants can easily be pulled out of the ground; wait until the plants have established strong, well-anchored root systems so grazing horses won't pull them out of the ground. And, again, some species reach this stage of maturity quicker than others.

Mix and match: Horses prefer to graze multiple forage types, and mixing several species of grasses and legumes in a field can extend the forage availability through a greater part of the year. For instance, when cool-season Kentucky bluegrass goes dormant under the stress of a hot, dry summer, drought-tolerant smooth brome grass produces good grazing, then the roles reverse in the cool, wetter fall weather. Mixing of grass and legume species provides a better level of nutrition (more calcium from legume) for the grazers and also benefits the soil, with the legume "fixing" nitrogen in the soil, thus reducing the amount of supplemental fertilization needed for the grass plants. Growing multiple species reduces the impact on forage production if disease should affect one plant type. Finally, planting a really tough species, such as tall fescue, in high traffic areas and more palatable species in less trampled areas may produce more consistent ground cover. The one thing about mixing species is that plants are competitive creatures, and the most aggressive species in the mix may eventually crowd out the others. Horses will eat what they prefer first.

Legumes contribute significantly to pasture productivity even though they usually make up the smaller portion of the forage mix. The most popular legumes for horse pastures are common white clover and ladino white clover because of their comparative hardiness and safety. Alfalfa requires more careful management than clovers and may be too "high powered" for free-choice intake. Red clover that's infected by an alkaloid-producing fungal disease called black spot can cause excessive salivation, commonly called "slobbers," in horses that graze it. Bird's-foot trefoil is another legume recommended in our region, the Northeast, Midwest, and upper South, but it is seldom actually found in pasture mixes.

Our Region: Kentucky bluegrass, orchard grass, reed canary grass, smooth brome grass, timothy, tall fescue, perennial rye grass, alfalfa, bird's-foot trefoil.

- **Rotate Pastures**: Moving grazers every week through a series (often 3) pasture lots will give each lot several weeks to rest, to limit plant damage and allow for regrowth. Can fertilize when remove horses from pasture, so that in a 3 week time the fertilizer will be absorbed and pose no problem to a grazing horse.
- **Soil type and additives**: Have soil tested at local agricultural county extension office- or a feed/fertilizer supplier to identify deficiencies in the soil. Legumes require more phosphorus and potash (potassium) while grasses generally require more nitrogen. Lime may be needed to bring acid soils to a more neutral pH (6.4-6.8). Generally lime no more than once a year but fertilize frequently. Sample soil content every 3-4 years.
- **Manure Removal and Mowing**: Remove manure weekly or if parasites well controlled drag the field. Mowing before a pasture goes to seed will increase the palatability of the grass and promote regrowth.
- **Fencing:**
    1. Make fence as visible as possible (white or light colors)
    2. Build curved instead of square if possible (give horse and escape route)
    3. Set fence on highest point of the landscape (horses focus on the horizon, may not notice a fence in the hollows).
    4. Space board or wires far enough apart to prevent head or leg entrapment of the biggest horse, but close enough to keep the smallest from escaping
    5. Height appropriate fencing: highest for stallions
    6. Secure boards and wire to the inside of a fence line – so when horse leans can't pop board out
    7. Bottom rail or wire 12 inches above the ground to allow for mowing under the fence to prevent weeds.
    8. Electric fencing easiest way to make temporary paddocks in a larger field. (single strand @ 33 inches, double strand @ 20 and 36 inches and triple strand @ 16,28, and 40 inches)
    9. See if your area, has local ordinances for horse fencing
    10. If Paint wooden boards – use non-toxic paint and do not paint the underside edge of the rail to allow moisture to flux in and out.
    11. Cap metal posts to prevent injury if a horse should land on it. Slant wooden post tops to prevent moisture accumulation.
    12. Round posts stronger than square posts but harder to nail boards onto.
    13. Do not use standard stock woven wire fencing (squares), use horse fencing with smaller spaces usually triangular as the horse can catch feet in the larger squares.