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Feeding Horses During Drought

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- The use of alternative forage sources becomes increasingly important during a drought. Alternative feedstuffs that are very high in digestible fiber are readily broken down by microbes located in the cecum or hindgut of the horse. Examples include small grain hays harvested at a soft dough stage, and immature grass and legume forages, wheat middlings, soy hulls, peanut hulls and beet pulp. These feedstuffs are low in indigestible fiber which is measured in feed analysis as acid detergent fiber (ADF). Feedstuffs with ADF values less than 32% can be easily digested by the horses. Feedstuffs with ADF values ranging from 33 to 39% and from 40% and higher are respectfully moderately and poorly digested by the horse. An ideal alternative forage source for the horse should have ADF values below 39%.
- Soybean and peanut hays have been successfully fed to horses in the Carolinas. Although peanut hay is listed as a suitable forage for horses in the 6th *Revised Edition of Nutrient Requirements of Horses*, soybean hay does not appear. Both hays must be properly used and fed at an immature growth stage. Consumption of course, stemmy, mature soybean and peanut hays increase the risk of gas colic and reduced performance due to mycotoxin. The soybeans in the hay contain a trypsin inhibitor which inhibits protein digestive enzymes. Although protein digestibility in the horse is lowered when feeding raw soybeans to mature horses. The protein content of the concentrate mix should be increased to 14%. Growing horses, including foals, yearlings, and two-year olds should not be fed raw soybeans due to an increased incidence of cartilage related growth diseases. When processing soybean meal, heating the soybeans destroys the trypsin inhibitor.
- Byproduct feeds for horses include hulls (the outer covering); grains; pulps; straw and stover; and bran. In general, hulls and pulp are inexpensive and are the safest byproduct form for horses that could replace all or a portion of the forage requirement. Ground hulls should be mixed or pelleted with molasses to reduce dustiness and increase palatability. Oat, cottonseed (must be glossypol free), soybean, rice, peanut and sunflower hulls could replace all forage in the mature equine diet. Total replacement of forage with hulls is not recommended for growing horses two years of age or younger.

Mature horses with total replacement of forage with hulls should receive a 12 to 14% protein; 1.50 mcal/lb of DE concentrate mix to compensate for the low energy content in the hulls.

Straw and stover should be avoided as a feed for horses. The low digestibility in straw increases the incidence of impaction colic at the ileo-cecal junction. High levels of mycotoxins typically found in poor quality corn stover create serious health issues for all equine.

Sugar beet pulp may be fed alone or blended with other feeds to increase energy content. It may replace a portion or all of the forage component in the diet. Palatability is increased if fed as a mash or mixed with molasses. The digestible energy and fiber content is similar to good quality grass hay and grain. Phosphorus, B-vitamins, vitamin-A and vitamin-D supplementation will be needed to compensate for the low levels in beet pulp. A high quality, vitamin/mineral supplement fortified for grazing horses should be provided free choice.

Citrus or fruit pulps (apple, orange or grape) can replace up to 15% of the forage requirement for horses if fed dried or ensiled. Higher levels are not palatable.

Wheat and rice bran are too expensive and not recommended as forage substitutes.

| Feed | Mcal DE/lb (kg) DM | Crude Protein | Fat | Crude Fiber | Calcium | Phosphorus |
|---|-----------------------|------------------|-------|----------------|---------|------------|
| Non By-product Feeds and Horses' Maintenance Requirements for Comparison | | | | | | |
| Maintenance Need | | 8 | 1-1.5 | <36 | 0.25 | 0.18 |
| Grass Hay, Good | 1.0 (2.2) | 8-12 | 3 | 30 | 0.5 | 0.3 |
| Poor | 0.75 (1.65) | 5-7 | 3 | 36 | 0.3 | 0.1 |
| Oats, Regular | 1.45 (3.2) | 13 | 5 | 12 | 0.09 | 0.35 |
| By-Product Feeds | | | | | | |
| Bran, wheat | 1.5 (3.3) | 16-17 | 4.3 | 10-12 | 0.14 | 1.27 |
| Bran, Rice | 1.3 (2.9) | 14 | 1.6 | 10-12 | 0.1 | 1.5-1.7 |
| Hulls, oats | 0.6 (1.3) | 4-6 | 1.5 | 33-36 | 0.15 | 0.1 |
| Hulls, cottonseed | 0.6 (1.3) | 4 | 2 | 47 | 0.15 | 0.09 |
| Hulls, soybean | 0.8 (1.8) | 11-13 | 1-2 | 36-45 | 0.4-0.7 | 0.15 |
| Hulls, rice | 0.24 (0.5) | 3 | 1 | 43 | 0.1 | 0.07 |
| Hulls, peanuts | 0.45 (1.0) | 7-8 | 1-2 | 59-63 | 0.26 | 0.07 |
| Hulls, sunflower | 0.9 (2.0) | 4-6 | 3-4 | 43-51 | 0.38 | 0.13 |
| Beet pulp, sugar | 1.2 (2.6) | 9-10 | 0.6 | 20 | 0.7 | 0.1 |
| Citrus pulp | 1.3 (2.8) | 9-10 | 2-4 | 10-16 | 0.7-2 | 0.18 |

¹. Adapted from L. Lewis. 1995. Equine Clinical Nutrition: Feeding and Care. Dry matter basis.

Complete feeds

Complete feeds are an excellent alternative to traditional feeding practices during times of drought if cost effective. A complete feed, as the term implies, provides all of the nutrients required by the horse with the exception of water. In addition to the concentrate portion of the horse's diet, complete feeds generally include a form of forage which increases the crude fiber content of the feed. The fiber will have a dilution effect, providing nutrients but serving as a filler and causing the feed to move through the horse's digestive tract more quickly. Thus, when feeding a complete feed, no hay is needed in the horse's diet. When contemplating complete feeds, the cost of the complete feed should be compared to the cost of feeding quality hay, as well as your normal concentrate and supplements.

Small Grain Hays

Cereal grains that are harvested while still green, preferably in the soft dough stage, can make excellent forage for horses. More grain in the heads means more nutritional value for the horse. Without the grain in the heads, cereal grains are similar in nutritional value to grass hay. Rye grain hay is not commonly recommended because it may contain ergot which is highly toxic to horses.

Nitrates

Drought stressed plants may contain high levels of nitrates. Forages with less than 0.5 percent nitrate may be fed alone, however, as the percent nitrate in the forage increases, grain will need to be added to the diet to dilute the nitrate concentration. Forages containing nitrate levels in excess of 1.5 percent may not be diluted sufficiently, thus should not be fed to horses. Table 1 provides information for adjusting the nitrate content of rations when feeding forages that are high in nitrates^a. Table 2 and Box A may be used to calculate the pounds of grain required to dilute nitrate concentrations for different sized horses.

Table 2. Expected Feed Consumption by Horses¹.

| | Forage | Concentrate | Total |
|-------------------------------|------------|-----------------|------------|
| | | (% body weight) | |
| Mature Horses | | | |
| Maintenance | 1.5 - 2.0 | 0 - 0.5 | 1.5 - 2.0 |
| Mares, late gestation | 1.0 - 1.5 | 0.5 - 1.0 | 1.5 - 2.0 |
| Mares, early lactation | 1.0 - 2.0 | 1.0 - 2.0 | 2.0 - 3.0 |
| Mares, late lactation | 1.0 - 2.0 | 0.5 - 1.5 | 2.0 - 2.5 |
| Working Horses | | | |
| Light work | 1.0 - 2.0 | 0.5 - 1.0 | 1.5 - 2.5 |
| Moderate work | 1.0 - 2.0 | 0.75 - 1.5 | 1.75 - 2.5 |
| Intense work | 0.75 - 1.5 | 1.0 - 2.0 | 2.0 - 2.5 |
| Young Horses | | | |
| Nursing foal (0-3 months) | 0 | 1.0 - 2.0 | 2.5 - 3.5 |
| Weanling foal (4-11 months) | 0.5 - 1.0 | 1.5 - 3.0 | 2.0 - 3.5 |
| Short yearling (12-17 months) | 1.0 - 1.5 | 1.0 - 2.0 | 2.0 - 3.0 |
| Long yearling (18-23 months) | 1.0 - 1.5 | 1.0 - 1.5 | 2.0 - 2.5 |
| Two year old (24-36 months) | 1.0 - 1.5 | 1.0 - 1.5 | 2.0 - 2.5 |

¹. Air dry feed (about 90 percent dry matter). Adapted from the National Research Council's *Nutrient Requirements of Horses* (1989).

Box 1. Determining the grain required to dilute the effect of high-nitrate forage

Example: A 1,000 pound mature horse at maintenance consuming a forage containing .75 percent nitrate.

Step 1: Consult Table 2 and observe that a 1,000 pound horse consumes about 1.5 percent of its body weight in forage: $1.5 \times 1,000 = 15$ pounds of feed.

Step 2: Consult Table 3 and observe that forages with a nitrate level of .75 percent should not account for more than 67 percent of the total ration.

Step 3: Multiply the amount of forage the horse consumes (Step 1) by the maximum allowable percentage (Step 2): $15 \times .67 = 10$ pounds of forage. You can also multiply the corresponding grain percentage in Table 3 to check the amount of grain you should add: $15 \times .33 = 5$ pounds of grain.

Results: Feeding 5 pounds of a grain mix containing no nitrates and 10 pounds of a forage containing .75 percent nitrates would reduce the nitrate level of the ration to an acceptable level of .5 percent nitrate. Similar dilutions can be achieved by blending forage with not nitrates with nitrate-containing forages.

Table 3. Methods of adjusting the nitrate content of rations when feeding forage high in nitrates^A

| Nitrate % | Forage Maximum % of total ration | Grain Minimum % of total ration |
|-----------|---|------------------------------------|
| 0.5 | 100 | 0 |
| 0.75 | $(0.5 \div 0.75) = 67$ | $(100 - 67) = 33$ |
| 1.0 | $(0.5 \div 1.0) = 50$ | $(100 - 50) = 50$ |
| 1.25 | $(0.5 \div 1.25) = 40$ | $(100 - 40) = 60$ |
| 1.5 | Don't feed: it would require too much grain | |

^A Adapted from L.D. Lewis (1995).

Poisonous Plants

During periods of extended drought and the resulting decline in desirable forages horses may be forced to consume less palatable plants and even browse. Managing horses during this time should include minimizing access to these plants since some may be toxic to the horse. Consuming toxic plants in amounts equal to 5 to 10 percent of the horse's body weight, over a couple of weeks or months, is sufficient to poison a horse. Since different toxins affect horses in different ways, horses should be observed more frequently. Some of the symptoms associated with different toxins include photodermatitis, neurologic abnormalities, excessive salivation, colic, diarrhea, anemia, lameness, and sudden death. Since these symptoms may also represent other diseases, diagnosis is not often easy.

As we enter the fall of the year, the drought conditions may cause trees to shed their leaves earlier and, due to the limited moisture, the leaves may contain more highly concentrated toxins. Therefore, horses should be maintained in areas where they will not have access to the wilting leaves or those trees that are known to be toxic to the horse. Black walnut, red maple,

Remember that even horses that are being fed hay often prefer to eat green palatable plants, so access to toxic weeds should be avoided even when feeding supplemental hay. Eliminating the horse's access to weeds during times of drought and overgrazing will provide an immediate solution however weeds should ultimately be eliminated from the pasture through a combination of timely mowing, herbicide application, and controlled grazing.

Blister Beetles

Some of you have reported seeing grasshoppers this summer, especially with the dry conditions. Remember that Blister beetle larvae feed on grasshopper eggs and Blister beetles have been found throughout the United States. While Blister beetles may be present in grass hay, toxicosis from the ingestion of Blister beetles has only been reported in connection with the feeding of alfalfa hay.