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# Horse Nutrition I: Feeds



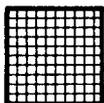
**Stephen Boyles**  
Extension Livestock Specialist

**LaDon Johnson**  
Extension Livestock Specialist

**Kurt Wohlgemuth**  
Extension Veterinarian

**Kris Ringwall**  
Extension Livestock Specialist

**Robert Johnson**  
North Dakota State University



## Water

### General:

Water should be available at all times. A mature horse will drink as much as 12 gallons of water a day and water consumption will vary depending on dry feed intake. Horses can consume water that is pure, regardless of its mineral content. Water should be tested if purity is suspect. Inadequate water consumption can result from having snow as the only water source, faulty water equipment or unpalatable water.

### Palatability:

Horses do not consume stale or dirty water as readily as fresh water. Change the water at least twice a day if it must be carried to the horse. Water troughs should be frequently cleaned. Clean the community water sources if a sick horse is detected in a group and provide the sick horse with a separate water source.

Traveling horses may have reduced water consumption from a new source. Gradually mix water from old and new sources. A small amount

of molasses in the old and new water sources will reduce taste differences in the water sources. Always observe new horses for signs of dehydration (loss of weight, drying of mucous membranes and eyes).

### Dehydration:

One way to check for dehydration is by the skin folds. Pull the fold out and hold a moment. Release and count the seconds till the fold disappears. On a dehydrated horse, the skin will stand for three seconds.

### Stress:

Reduced water consumption can be a sign of sickness or other stressors. Have water available during low activity times in the stable. Consumption of water and feed can be reduced when there is a lot of activity to divert the horses' attention.

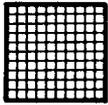
### Exercise:

Horses that are hot from strenuous exercise should not have free access to water. They should be allowed only a few sips every three to five minutes until they have cooled down.



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## Vitamins

### General:

Vitamins are essential for a healthy, active horse. Deficiencies or excesses of vitamins can be harmful.

### Vitamin A

#### General:

The precursor of vitamin A is carotene. The vitamin itself or the precursor can be used to meet the requirement. Green colored forages or roughages have higher levels of carotene than discolored grasses or hays. Hay stored over a year is practically devoid of vitamin A. Air, light and heat can destroy vitamin A activity in feeds. Any time feed quality has been comprised, vitamin supplementation may be needed.

#### Signs:

Night blindness, infertility, poor hoof growth, digestive disturbances, and respiratory problems are indications of a vitamin A deficiency. Vitamin A can be deficient in certain rations normally fed to horses. Supplementation should be considered when feeding low quality, weathered hay or when feeding year-old hay. Late season pasture may also require additional vitamin A. Feeding quality hay or allowing access to pasture can usually meet the vitamin A requirements of the horse. Home-made vitamin and mineral mixes should be made on a weekly basis. Commercial vitamin-mineral mixes that are over three months old may have reduced vitamin A activity.

#### Supplementation:

Supplement to approximately the minimum daily requirement. An injection of 3,000 IU of vitamin A per pound of body weight should provide adequate amounts of vitamin A for three to six months. Vitamin A requirements are increased by growth, reproduction and stress. The following table for supplemental amounts of vitamin A can be used:

Per Day	Vitamin A, IU	Carotene, mg
Mature Horse	20,000	35
Pregnant Mare	50,000	50-60
Lactating Mare	50,000	50-60
Young Horse	50,000	50-60

### Vitamin B

#### General:

Vitamin B is actually a number of different vitamins (vitamin B complex). Supplementation of vitamin B is not needed for the average horse. Supplementation should be considered for race horses, mares during gestation and lactation, and other horses under heavy work. Poor quality feeds

may need to be supplemented with B vitamins. Heat processing of feeds can reduce the available B vitamins. Feed sources of B vitamins are brewer's yeast, dried distiller's solubles, and fish oil meal. Green pasture also contains B vitamins.

#### Signs:

Poor appetite, slow growth, and nervousness are considered signs of a possible vitamin B deficiency. Diets which contain corn and little protein supplement may cause a vitamin B deficiency.

### Vitamin D

#### General:

Sun-cured hay and sunlight are two major sources of vitamin D. Over supplementation can result in bone growth problems. Vitamin D is closely associated with the function of calcium and phosphorus.

### Vitamin E

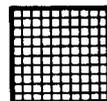
#### General:

Large doses of vitamin E (1000-2000 IU/day) have been reported to improve breeding and performance. The results, however, have been controversial. Good sources of vitamin E are cereal grain, wheat germ oil, quality hay and pasture.

### Vitamin K

#### General:

Therapeutic antibiotics and moldy feed may increase the need for vitamin K. Vitamin K is important for blood clotting. The signs of deficiency for vitamins D, E and K are vague. Supplementation should be on a prescription basis.



## Minerals

#### General:

The major mineral needs for the horse are calcium, phosphorus and salt. Occasionally copper, zinc, selenium and iodine are also considered. Deficiencies or toxicities of other minerals are rare if good quality feeds and trace mineral salt are available. Using a combination of feeds is better than relying on just one or two feeds. Feeds that have been stored over a year are more likely to need mineral and vitamin supplementation. Allowing access to hay, grain, pasture and trace mineral salt should meet most of the mineral requirements of the horse.

## Calcium and Phosphorus

### General:

Calcium and phosphorus are considered together because they work together and have an effect on one another's availability. The ratio and level of calcium and phosphorus must both be considered. Adequate vitamin D must be available for proper calcium and phosphorus utilization. Bone growth problems are a symptom of problems with the calcium, phosphorus and vitamin D complex.

### Ratios:

The following table illustrates the proper ratios of calcium:phosphorus for various classes of horses.

	Minimum Ca:P	Maximum Ca:P	Optimum Ca:P
Nursing Foal	1:1	1.5:1	1.2:1
Weanling	1:1	3:1	1.5:1
Yearling	1:1	3:1	2:1
Mature	1:1	5:1	2:1

Normally supplements with a 2:1 calcium to phosphorus ratio are fed to horses. When legumes such as alfalfa are being fed, a supplement containing 1:1 calcium and phosphorus should be considered. Pay close attention to the ratios when trying to feed an all legume ration to horses since legumes contain considerable amounts of calcium relative to phosphorus.

### Other:

Farms that have orthopedic diseases might evaluate their feeding programs and raise copper levels in the total diet to 25 to 30 ppm for growing foals and 20 to 25 ppm for yearlings and pregnant mares. Zinc levels could go to 70 to 80 ppm for growing horses, 60 to 70 ppm for yearlings, and 50 to 60 ppm for pregnant mares.

Overfeeding of selenium or iodine can be as large a problem as a deficiency. Selenium is one of the few mineral deficiencies that will show up in the blood. The best way to determine if your horse needs a supplement is to analyze the feed as well as blood levels over a span of time.

If deficiencies are present there are several ways to correct the problem. The least practical is to buy the individual mineral and vitamins and mix them into the feed yourself. Apart from bone meal, which provides calcium, the supplements are too hard to find. Another course of action is to buy a premixed supplement of some kind. Commercial feed mixes may have the trace minerals already added.

### Feeds:

Hay is normally a good source of calcium while grains are a source of phosphorus. Calcium and phosphorus can be supplemented by dicalcium

phosphate, limestone, steam bone meal or commercial mineral mixes. Some horses consider bone meal unpalatable, so add it to the ration gradually if it is to be used.

## Salt (Sodium and Chloride)

### General:

Horses should have salt available at all times. Use iodized salt in North Dakota. Loose salt is easier to consume but block salt should definitely be used with continually stalled horses to reduce boredom. Plain salt may have to be used because some horses find trace mineralized salt unpalatable. Consider feeding a mixture of plain salt and trace mineral salt. Excess salt conditions occur if horses are deprived of water or allowed access to unlimited salt after a long period of salt deprivation. It may be advisable to hand feed salt to newly arrived horses if they have been raised under less than ideal conditions.

## Special Cases With Other Minerals

### Magnesium:

Magnesium deficiencies may arise on low quality hay and lush spring pasture. Make sure your trace mineral supplement contains magnesium oxide. A three to one mixture of plain salt and magnesium oxide should meet the requirements and reduce palatability problems with magnesium oxide. Such mixtures can be of benefit in late spring and early fall.

### Potassium:

Potassium supplementation has been shown to be beneficial during times of stress. A diet containing at least 35 percent forage can be expected to provide adequate potassium.

### Fluoride:

Be sure your hay has a low fluoride content if the water source is high in fluoride. Fluoride intake should not exceed 50 ppm. Excessive fluoride intake can damage the teeth.

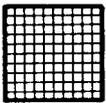
### Selenium:

Certain areas in North Dakota have deficient and some areas have toxic levels of selenium. Check with your county agent to see if you are in one of these areas. Selenium is closely associated with vitamin E function. Good growing pastures are an excellent source of vitamin E; however, its utilization by the horse depends on an effective level of selenium. Less than 0.1 ppm is considered deficient. The first signs of a selenium deficiency in the foal are stiff gait, vomiting through the mouth or nostrils and weight loss. A dark yellow to brownish urine may be noted. Selenium selenite or selenium selenate can be purchased and mixed into the daily ration. There is a very narrow range of safe limits between required and toxic levels of

selenium. Pregnant mares and those with nursing foals can be examined for selenium deficiency by whole blood testing. Mares that are low can be provided extra vitamin E/selenium via injection. Foals can likewise be administered injections at four to six week intervals if feed supplementation is not performed and diets are borderline-deficient.

#### **Electrolytes:**

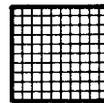
Electrolytes are minerals given to some horses after a hard exercise session. Electrolytes administered through the water may decrease water intake. Accustom the horses to the taste of electrolytes before they begin a strenuous exercise regime. The long, strenuous exercise of the endurance horse is suited to the supplementation of electrolytes.



## **Energy and Protein**

Energy and protein are the major factors in evaluating a horse ration. Underfeeding of either nutrient will cause a reduction in health and performance. Overfeeding can result in excessive fat deposition. Overfeeding of protein can be wasteful and sometimes causes stress. A depressed appetite can be an indication of a protein deficiency and then cause an energy deficiency.

Change the ration to meet the requirements of the horse at a particular time. The horse under heavy work requires added energy. The stallion during breeding and the mare during late gestation and lactation require increased energy and protein. The young horse requires higher levels of nutrients than the mature horse at the same level of work.

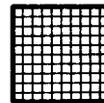


## **Feeds and Feeding**

#### **General:**

All feeds need to be free of dust and mold. Dust can cause respiratory problems. Feeds should have a fresh odor. Dust, musty odor or sour taste is an indication of age or possible mold presence. Molds can be toxic and at the very least unpalatable. Avoid feeds with signs of insect and rodent damage. Feeds should be protected from light, heat and moisture. Avoid cattle rations that contain ionophores.

Certain feeds may need to be processed. Grains may only require rolling or cracking. Ground grain can be used but avoid the temptation to make the particles too fine. Feeds that are too finely ground can lead to colic. Processed grains should be used within two to three weeks. Processed grains are required for the young foals. Horses with poor teeth, such as the very old, need their grains processed. Sick horses may also need to have their grains processed. Horses that tend to bolt their feed need to have their feed processed although it is also recommended to use additional management techniques to slow the rate of feed intake.



## **The Grains**

#### **Oats:**

Oats is usually the safest of all grains to feed. Oats should have a bright color (except for those varieties that have a natural dark color). The oats raised in North Dakota are likely to be superior to oats grown in southern regions. Oats that weighs 42 pounds per bushel are normally considered "Premium Race Horse Oats." It is fairly easy to find 38 pound oats in North Dakota. Oats weighing less than 35 pounds per bushel can be used but are slightly lower in energy. Oats can be fed whole, ground, rolled or steam processed. The cheapest method of feeding oats is whole. Don't feed seed oats because of the insecticides that are applied to seeds.

#### **Emmer and Spelt:**

Emmer and spelt (often called speltz) are relatively rare. They resemble oats in nutritive value. They may be used in the same manner as oats in feeding horses.

**Corn:**

Corn has a higher energy content than oats and should be fed in small amounts when starting the animals on feed during the first two to three weeks. Corn can be fed on the cob or shelled. Shelled corn can be fed whole, ground, or rolled although most corn undergoes some sort of processing.

**Barley:**

Barley ranks between corn and oats in energy content. Horses should be introduced to barley over two to three weeks. Mix barley with bulkier feeds to prevent colic. Barley needs to be processed for all classes of horses. Because of its tendency to become gummy when chewed, fine grinding should be discouraged.

**Wheat:**

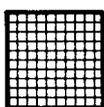
The feeding recommendations for wheat are similar to the recommendations for barley. Wheat is usually too expensive to feed.

**Rye:**

The feeding recommendations for rye are similar to the recommendations for barley. Rye is usually too expensive to feed. Rye tends to be unpalatable for livestock.

**Milo:**

Milo is not normally available in North Dakota, but if used must be processed for all classes of horses.



## Protein Sources

**Soybean Meal:**

Soybean meal is the standard by which other protein supplements are judged because of its protein quality characteristics.

**Linseed Meal:**

Some people don't use linseed meal for horses that are racing but include it when selling horses to add luster to the hair coat. Adequate protein, regardless of the source, will result in desirable coat condition. Linseed meal is not as palatable as soybean meal and is lower in lysine than soybean meal. The laxative effects of linseed meal can be beneficial.

**Distiller's Grains:**

Distiller's grains have not been used extensively in horses but would probably make a satisfactory

protein source. Distiller's grains are lower in lysine than soybean meal.

**Legumes:**

Alfalfa is an excellent protein source.

**Cottonseed Meal:**

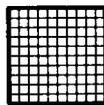
Cottonseed meal is not normally available in North Dakota.

**Urea:**

Low levels of urea have been fed without creating harmful effects but generally should be avoided.

**Other:**

Supplemental methionine and lysine may be needed in cases of hoof problems and feed intake problems. Avoid using feeds containing additives meant for other species of livestock.



## Hay

**Timothy:**

Timothy is highest in nutrient content when harvested during the pre-bloom stage. Timothy raised in the northern regions is considered superior to that grown in other regions.

**Crested Wheatgrass:**

Wheatgrass should be cut early, before it begins to bloom. This forage tends to become coarse and mature sooner than other grasses.

**Cereal Grass Hay:**

Cereal hay should be cut while still green. During the early dough stage of the kernel is a desirable stage at which to cut cereals.

**Sweet Clover:**

Sweet clover can be used but is not generally recommended. Mold can be a serious problem.

**Millet Hay:**

In general, millet hay should be avoided because it has caused lameness and kidney problems when fed as the only roughage for long periods of time.

**Sorghum-Sudan Hay:**

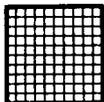
It may be fed, but must be cut early and properly cured. Choose varieties that resemble sudan more than forage sorghum. Sorghum-sudan hybrids with relatively smaller leaves and thinner stems and harvested at no more than 35 inches in height tend to make better hay.

### **Grass Hay:**

High quality hay normally smells fresh, has many leaves and fine stems. Grass hays are less likely to be moldy compared to legume hays. A grass-legume mix is an excellent combination. Commercial hay preservatives containing a mixture of acids will not hurt horses. Palatability tends to favor untreated hay, however. Don't allow horses to consume twine or chew on wires from bales.

### **Legumes:**

Switch from grass hay to legume hays gradually. Legume-grass mixtures are easier to cure. Legume-grass hay will reduce the incidence of gaseous colic compared to legume hays. Poor quality legume hays are not worth as much as good grass hay. Problems can arise in maintaining horses on an all alfalfa diet due to an imbalance in calcium and phosphorus. One method of correction is to feed a high phosphorus salt mix as the only source of salt. In the long term, it may be easier to feed a combination of grass hay and legume hay. Some alfalfa from southern regions may contain blister beetles which can be toxic to horses.



## **Other Feeds**

### **Molasses:**

Molasses is a good energy source. It is very palatable and can hide the taste of low quality feeds and can reduce dustiness in overprocessed feeds. Molasses can be included as 5 to 10 percent of the ration. Clumping of feed can be a problem during cold weather at higher rates of molasses. Molasses adds moisture to the ration and this added moisture will reduce storage time for the feed due to possible mold growth during warm weather. Feed these mixes within a couple of months.

### **Wheat Midds:**

Wheat midds are similar to oats in nutritive value. They have fine particle size so should only make up a portion of the ration.

### **Wheat Bran:**

Wheat bran is a good laxative feed. It should only make up a maximum of one-third of the ration because of the low energy content. Bran is relatively high in phosphorus so concern for calcium variability from the rest of the diet must be considered.

### **Mash:**

Mashes are made by pouring steaming hot water over feeds. Mashes may be beneficial for animals with poor teeth and sick horses. The water should remain in the rations to avoid any loss of nutrients. Mashes need to be mixed and consumed daily to prevent spoilage.

### **Corn Oil:**

It has been suggested that 2 or 3 ounces of corn oil improves hair coat although a properly balanced ration should have the same effect.

### **Treats:**

Carrots, apples, and lettuce are acceptable treats. They should be fed in pieces to prevent choking. Sugar is not recommended. Avoid ornamental flowers because certain species are toxic.

### **Pellets:**

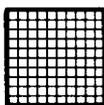
Pellets can be made from any combination of feeds. They are easy to store and have a long storage life. They are convenient and can be used with horses with very particular appetites. Horses with respiratory problems can be fed pelleted feeds as long as the pellets are not dusty.

Pellets are not recommended for horses that are stalled all of the time because they are consumed too rapidly. Rapid consumption of pelleted feeds can lead to overeating if they are not regulated.

Long hay should be fed along with pellets if horses are stalled. Pellets should be at least 1 inch long. Pelleting increases the cost of the ration.

### **Cubes:**

Cubes, which are normally made from alfalfa, are nutritionally similar to regular alfalfa. Foals and old horses may have difficulty eating hard cubes. Adjust horses to eating cubes over three to five days.



## **Pasture**

### **General:**

Pasturing can reduce stable vices caused by boredom or mineral deficiencies. Pasture rotation reduces the problem of parasites. Rotational grazing will also reduce patch grazing. Place mineral away from the water source to encourage more evenly distributed grazing. A horse requires 2 to 5 acres of pasture for maintenance. The

following figures can be used to determine stocking rate:

1,100 lb mature horse at rest (maintenance)	= 1.0 Animal Units
1,100 lb mature horse at light work (2 hr/day)	= 1.4 Animal Units
1,100 lb mature horse at medium work (2 hr/day)	= 1.8 Animal Units
1,100 lb mare, last 90 days of pregnancy	= 1.1 Animal Units
1,100 lb mare at peak lactation	= 1.8 Animal Units

\* 1000 lb Dairy Beef Cow = 1.0 Animal Unit

\* Extension Circular R-581 can be used to determine stocking rate

Fresh horse manure from the stables can infect horse pastures with parasites. Manure should be

composted if parasites are a problem. Use caution when pastures have a heavy parasite infestation, high selenium content or large populations of toxic weeds. Horses will not normally consume toxic weeds unless that is the only forage available.

Put horses out on spring pasture only for a limited time each day since grass founder can occur on lush pasture.

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