ASC-185

UNIVERSITY OF KENTUCKY College of Agriculture

Feeding the Broodmare: Four Easy Steps

Laurie Lawrence and Fernanda Camargo, Department of Animal and Food Sciences

The nutritional needs of broodmares change as they go through the stages of reproduction. This publication begins with nutritional strategies to enhance the likelihood a mare will become pregnant, then it discusses feeding management of the mare during pregnancy and lactation, and it ends with some nutritional considerations for the post-weaning period. Although nutrition is an important component of broodmare management, other factors also can affect reproductive efficiency and the ability of a mare to raise a foal. Clean, safe housing conditions as well as appropriate vaccination and deworming protocols are important components of all phases of broodmare management. In addition, effective heat detection, breeding, and foaling procedures are required for a successful breeding program.

Step 1: Getting Pregnant

Research suggests body condition is one of the most important nutritional variables affecting reproductive efficiency in normal, healthy broodmares. The most common system for evaluating body condition uses a nine-point scale where a body condition score (BCS) of 1 is an extremely thin horse and a BCS of 9 is an extremely fat horse (Figure 1). Mares with BCS below 5 (moderate) have lower conception rates, require more cycles per conception, and cycle later in the year than mares with condition scores of 5 or higher. Many mares with BCS below 5 will get pregnant, but it may require more work and happen later in the year than desired.

Any mare that will be bred in the spring should be condition scored the previous fall to determine whether the mare is in optimal body condition or if she is too fat or too thin. Several examples of mares with different body condition scores are shown in Figures 2-5.

Figure 1. Body Condition Scoring System for Horses.

Score 1 (Poor)—Extreme emaciation; spinous processes, ribs, tailhead, and hooks and pins are prominent; bone structure of withers, shoulder, and neck are easily noticeable; no fatty tissue can be felt

Score 2 (Very thin)—Emaciated; thin layer of fat over base of spinous processes; transverse processes of lumbar vertebrae feel rounded; spinous processes, ribs, tailhead, and hooks and pins are prominent; withers, shoulders, and neck structures are faintly discernible

Score 3 (Thin)—Fat about halfway up spinous processes; transverse processes cannot be felt; thin fat layer over ribs; spinous processes and ribs are easily discernible; tailhead prominent, but individual vertebrae cannot be visually identified; hook bones appear rounded but not easily discernible; pin bones not distinguishable; withers, shoulders, and neck are accentuated

Score 4 (Moderately thin)—Ridge along back; faint outline of ribs discernible; tailhead prominence depends on conformation, but fat can be felt around it; hook bones not discernible; withers, shoulders, and neck are not obviously thin

Score 5 (Moderate)—Back is level; ribs cannot be visually distinguished but can be easily felt; fat around tailhead beginning to feel spongy; withers appear rounded over spinous processes; shoulders and neck blend smoothly into body

Score 6 (Moderate to fleshy)—May have slight crease down back; fat over ribs feels soft and spongy; fat around tailhead feels soft; fat beginning to be deposited along sides of the withers, behind the shoulders, and along the sides of the neck

Score 7 (Fleshy)—May have crease down back; individual ribs can be felt, with noticeable filling between ribs with fat; fat around tailhead is soft; fat deposited along withers, behind shoulders, and along neck

Score 8 (Fat)—Crease down back; difficult to feel ribs; fat around tailhead very soft; area along withers filled with fat; area behind shoulder filled in flush; noticeable thickening of neck; fat deposited along inner buttocks

Score 9 (Extremely fat)—Obvious crease down back; patchy fat appearing over ribs; bulging fat around tailhead, along withers, behind shoulders, and along neck; fat along inner buttocks may rub together; flank filled in flush

Adapted from Henneke et al., 1983

If body condition is not optimal, the diet should be adjusted to allow for weight gain or loss. If a mare is too thin, then forage quality and/or quantity should be increased first. When a change in forage availability is not enough to produce the desired body condition, then concentrate intake should be increased. The term "concentrate" refers to a feed that provides a concentrated source of calories. The simplest concentrate is a plain cereal grain such as oats or corn. Plain cereal grains are good sources of calories, but they are deficient in calcium and other nutrients. In most cases, it is better to purchase a commercially manufactured fortified concentrate formulated specifically for broodmares. Commercially manufactured concentrates come in two main forms, a sweet feed (also

Figure 2. Horse has a BCS of 4: The ribs are faintly visible, and the back has a slight ridge along it. The neck is not noticeably thin, but the shoulder structure is becoming visible.

Figure 3. Horse has a BCS of 5: The ribs are not visible, neck is not thin or fat, withers and spine and hip structures are not visible.

Figure 4. Horse has a BSC of 6: Ribs are not visible, neck is slightly thick, some fat filling in behind shoulder, in flank, and over withers.

Figure 5. Horse has a BCS above 7: The neck is thick, fat is filling in behind shoulder and in flank, and the ribs are becoming hard to palpate. To determine whether this horse is a BCS 8 or 9, palpation of the tail head, ribs, and other areas would be necessary.

called a textured feed or an open mix) and pellets. Either physical form is acceptable if the nutrient composition of the feed is designed for broodmares.

The amount of extra concentrate needed to improve BCS for any mare will depend on the size of the mare, the initial and target BCS, and the diet she is getting. For some mares, simply increasing the quality and quantity of forage (pasture or hay) available will be sufficient to adjust body condition. For other mares, it will be necessary to feed additional concentrate. For example, if a thoroughbred-type mare is maintaining a BCS of 4 with unlimited access to good hay/pasture and 3 pounds of concentrate, it may be necessary to feed as much as 6 to 8 pounds of concentrate per day to increase her BCS to 6 in about two months. Any changes in feeding programs should be implemented gradually, so the amount of concentrate should be increased slowly. Once she reaches her target BCS, the amount of concentrate usually can be reduced.

It is difficult to get some mares to gain weight during the winter unless they receive large amounts of concentrate. Large concentrate intakes have been associated with an increased risk of colic. Therefore, if a mare is somewhat thin in October, it is important to start adjusting the diet right away to promote weight gain before mid-December and avoid the need for high concentrate intakes later in the winter.

There is no reproductive benefit to mares who are excessively fat. If a mare is condition scored in October and determined to be too fat, then the diet can be adjusted to reduce calorie intake. Nonpregnant mares with Quarter Horse, Arabian, or Morgan breeding will often be able to maintain adequate body condition during the fall and winter on good-quality forage and a minimal amount of concentrate. If mares are too fat, the first dietary change should be a reduction in concentrate intake.

Although there does not appear to be any reproductive advantage to a condition score above 7, it may be beneficial for mares to have a body condition score slightly above 5 before the coldest part of winter. If they have a condition score above 5 at the onset of winter, they will have a buffer of expendable body fat that can be used during severe cold. The goal is to make certain that mares do not have a BCS below 5 at the beginning of the breeding season.

Step 2: Meeting the Needs of Gestation

A foal has already attained about 60 percent of its mature height at birth. That means the dam has to provide adequate nutrition for the foal's skeleton during gestation. She can provide this nutrition by eating and processing additional nutrients in her diet, or by robbing nutrients from her body to meet the needs of the developing fetus. Optimal feeding programs will minimize the need for mares to use their own body stores.

Table 1 shows the effect of gestation on the nutrient requirements of 1,250-pound mares. The National Research Council publication "Nutrient Requirements of Horses" suggests that the nutrient requirements of pregnant mares start to increase above maintenance in the fifth month of gestation. This is a new recommendation; previously it was suggested that nutrient needs did not increase until the eighth month of gestation.

Many mares in Kentucky will be grazing good quality fall pasture during the middle months of gestation. Good quality pasture may provide enough energy to maintain a BCS above 5 without much concentrate supplementation. However, Kentucky pasture alone may not meet the mineral requirements of gestating mares. If pregnant mares are not receiving any concentrate, a mineral supplement should be given at least once a day. A convenient supplement source is a balancer pellet (Figure 6), also called a supplement pellet, which is sold by many feed companies. Feeding 1-2 pounds

Table 1. Nutrient Requirements of Gestating Mares (1,250 pounds).

Nutrient	Months							
	0-4	5	6	7	8	9	10	11
Digestible energy (Mcal/d)	18.9	19.4	19.8	20.3	21	21.9	23	24.3
Crude protein (g/d)	716	778	800	828	863	905	955	1014
Calcium (g/d)	23	23	23	32	32	41	41	41
Phosphorus (g/d)	16	16	16	23	23	30	30	30
Copper (mg/d)	114	114	114	114	114	142	142	142
Selenium (mg/d)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1

Source: National Research Council (2007).

of a typical balancer pellet during mid-gestation should ensure adequate daily mineral intakes of mares that are grazing pasture. A salt block should be available to provide sodium chloride for horses. Although trace mineral salt blocks and other mineral blocks are available for horses, most horses will use them inconsistently. Therefore, it is difficult to count on these blocks to meet the mineral needs of every mare.

Pregnant mares should be maintained at a BCS of at least 5. A slightly higher BCS will ensure that the mares have a buffer of body stores at foaling and in early lactation. When forage quality or quantity is not enough to maintain body condition, concentrate should be added to the diet. A commercially manufactured concentrate that is fortified to meet the needs of broodmares is an excellent choice when concentrate is needed in the diet. As mares approach the end of gestation, appetite may decline, so concentrate intake may have to be increased. A typical diet for a thoroughbred-type mare in the last month of gestation might be 20-25 pounds of good quality hay and 6-8 pounds of a concentrate. Some mares may require more or less concentrate to maintain body condition. If mares live outside during the winter, additional hay or concentrate often will be necessary.

Figure 6. What is a balancer pellet?

A balancer pellet is a concentrated source of minerals and vitamins. It is fed in small amounts each day (1-2 pounds). It is used when the diet provides adequate calories, but not trace nutrients. A balancer pellet is not needed if the diet already contains at least 3 pounds of a fortified commercial concentrate formulated for broodmares. The amount of protein in a balancer pellet can vary widely. When horses are receiving a high protein forage it is not necessary to use a high protein balancer pellet.

Typical composition of a balancer pellet:

Crude Protein	14-32%
Calcium	2-4.5%
Phosphorus	1.5-2.5%
Copper	150-200 mg/kg
Zinc	400-600 mg/kg
Selenium	1.5-2.5 ppm
Vitamin E	250-500 IU/lbs

Step 3: Meeting the Needs for Lactation and Rebreeding

A 1,200- to 1,300-pound mare will produce about 40 pounds of milk each day in early lactation. Milk contains energy, protein, calcium, phosphorus and an array of other nutrients. Mares can produce normal milk even when their diet is deficient in some nutrients because they will mobilize nutrients from their own body. Feeding programs for lactating mares should ensure the diet provides all of the nutrients needed for milk production, so mares don't have to rob their own body stores. A 1,250-pound mare in early lactation needs about 36 megacalories of digestible energy, 1,740 grams of crude protein, 67 grams of calcium, 43 grams of phosphorus, 142 milligrams of copper and 1.4 milligrams of selenium in the diet each day. When these nutrient needs are compared to the requirements in Table 1, it is easy to see that lactation is more nutritionally demanding than gestation.

Lactating mares have much greater appetites than late gestating mares so the first dietary change should be an increase in feed intake. Lactating mares may consume more than 30 pounds of hay per day. The use of good-quality hay reduces the amount of concentrate needed in the diet. Good-quality alfalfa or alfalfa-grass hays are suitable for lactating mares. Good-quality pasture is also an excellent forage source, and hay may not be necessary when pasture is abundant.

Broodmares should be fed a concentrate that is formulated for the needs of mares and foals. Depending on the size of the mare, concentrate intakes usually will range from 5 to 12 pounds per day in early lactation and then decrease as the mare approaches weaning. To maximize rebreeding efficiency, mares should foal with a BCS of at least 5 and then maintain that condition score. Loss of body condition during lactation indicates that nutrient intake is not sufficient and the diet should be changed.

Good-quality pasture can provide calories and protein, but a daily supplement, such as a balancer pellet, is usually necessary to ensure that the mineral needs of pregnant mares are being met.

In the winter, more hay and/or concentrate will be necessary to maintain body condition. In many situations it is desirable for mares to enter winter in a body condition of at least 6, to ensure adequate stores.

Table 2. Average Composition of Forages Used for Horses (100% dry basis).

Forage	DE (Mcal/lb)	Crude Protein (%)	Calcium (%)	Phosphorus (%)	Copper (mg/kg)	Zinc (mg/kg)
Mixed Pasture (Central Ky., spring)	0.9-1.1	15-20	0.4-0.6	0.2-0.4	6-8	25-40
Alfalfa-midbloom	0.9-1.1	16-18	1.0-1.5	0.2-0.4	6-8	25-40
Alfalfa-Timothy mix	0.8-1.0	12-16	0.7-1.2	0.2-0.4	6-8	25-40
Timothy- head	0.7-0.9	7-11	0.3-0.5	0.2-0.4	6-8	25-40

Source: NRC (1989) and L. Lawrence (unpublished data).

Step 4: Don't Forget the Mare after Weaning

If a mare has been rebred, she will be entering mid-gestation about the time her current foal is weaned. Our research suggests that all mares mobilize some body stores, especially bone mineral during lactation, so the post-weaning period is an opportunity to replenish those stores before the demands of fetal development are great. If a mare is in adequate body condition at weaning she can receive the balancer-pellet program described for gestating mares above. If she is in thin body condition at weaning, she will need to receive enough concentrate to increase her BCS to at least 5. Horse owners should identify mares that typically lose condition during gestation and consider a dietary plan that will give those mares a larger buffer of nutrient stores at the onset of lactation. For example, if a mare foaled at a BCS of 5 and ended lactation at a BCS of 4, the horse owner might consider feeding the mare enough during gestation so she will foal at a BCS of 6 the next year.

References

- Henneke, D., G. Potter, J. Kreider and B. Yates. 1983. *Relationship between Condition Core, Physical Measurements and Body Fat Percentage in Mares.* Equine Vet. J. 15:371-372.
- National Research Council. 1989. *Nutrient Requirements of Horses.* National Academy Press, Washington, D.C.
- National Research Council. 2007. *Nutrient Requirements of Horses.* National Academy Press, Washington, D.C.

Good quality pasture is an excellent source of nutrients for lactating mares. Most mares also will need supplemental concentrate. A concentrate formulated for broodmares should be used. When pasture availability declines, mares should be offered hay.

Figure 7. How do I Know if I am Meeting the Requirements?

It is relatively simple to calculate the amount of any nutrient you are feeding if you know the amount of feed that is consumed and the nutrient composition of the feed.

The first step is to weigh each feed the horse is getting (hay and concentrate). If horse is also getting pasture, you will have to guess at intake. A rule of thumb is two pounds of pasture dry matter for each 100 pounds of body weight if the horse is turned out in good quality pasture 24 hours per day.

The second step is to determine the nutrient content of each feed. The feed bag should have some information about the nutrient content of the concentrate. To get information about hay, you can either look in a feed table or you can get your hay analyzed. Analysis is more accurate but also more expensive.

Next you calculate nutrient intakes by multiplying amount by concentration. Finally, compare the intakes to the requirement.

Most requirements are expressed in grams, so if your feed amounts are in pounds you will have to convert them to kilograms.
1 pound = 0.454 kilograms = 454 grams

Example: A mare is eating 22 pounds of hay and 4.4 pounds of concentrate. So, the mare is eating 10 kilograms of hay and 2 kilograms of concentrate.

The hay contains 10% crude protein (or 100 grams of CP per 1000 grams of hay; or 100 grams of CP per kilogram of hay). The concentrate contains 12% crude protein (or 120 grams per 1000 grams of concentrate; or 120 grams per kilogram).

Her crude protein intake is:
10 kg hay x 100 g CP / Kg = 1000 grams CP in hay
2 kg concentrate x 120 g CP / Kg = 240 g CP in concentrate
Total grams of CP consumed = 1240 g CP per day

If you compare this value to the CP requirements for broodmares, you will see it meets the needs for 1,250-pound mares during gestation but not lactation. You would use this same process to calculate the intakes of all of the required nutrients.

Issued 8-2012