Horse Feed: Broodmare Nutrition

Nutritional Requirements of Broodmares Ramped Up

Mares represent the mainstay of any commercial or private breeding enterprise. In addition to their all important genetic contributions, mares provide a protective and nourishing environment in which to raise their foals, both before and after birth. Without a doubt, the nutritional status of mares is a critical component in foal health from the moment of conception and continues through weaning.

The publication of the National Research Council’s latest revision of *Nutrient Requirements of Horses* offered up several new thoughts on broodmare nutrition in the two most important phases of production, gestation and lactation.

**Gestation** Prior to the publication of the most recent version of *Nutrient Requirements of Horses*, industry professionals divided a mare’s gestation into two distinct nutritional periods: 1) from the time a mare was pronounced in foal to about eight months (early gestation; first and second trimesters), and 2) nine months to approximately eleven months or birth (late gestation; third trimester).

In previous editions of *Nutrient Requirements of Horses*, dietary requirements for mares in the first and second trimesters were similar to any mature horse at maintenance. Moreover, because it is a well-known fact that fetal growth is most rapid during the last trimester, an increase in certain nutrients such as energy and protein was recommended during the last three months of pregnancy.

Recent research has indicated, however, that the provision of certain vital nutrients should be increased long before the nine-month mark. As previously, mares should be nourished the same as any horse at maintenance for the first four months of gestation, but recommendations now suggest that every subsequent month represents a separate period, leading to eight distinct periods.

The research that brought about these changes takes into account not only maintenance of the mare’s body weight and fetal growth, but also the nutritional expenditures involved in the creation and maintenance of less obvious gestational tissues such as the placenta and mammary glands. Collectively, these are called nonfetal tissues. With no changes
made to nutritional requirements in early gestation (0-4 months) or late gestation (9-11 months), *Nutrient Requirements of Horses* suggests nutritional changes primarily for mares during mid gestation, the period between the fifth and eighth months of pregnancy.

**What nutrients are affected?** To support development and maintenance of nonfetal tissues, *Nutrient Requirements of Horses* recommends that protein and energy requirements be raised 5 to 8 percent above maintenance during mid gestation for an average (500-kg) mare. Unlike protein and energy, the requirement for additional minerals seems to appear later in the gestation, at approximately seven months. This can be attributed to the fact that nonfetal tissues require mostly protein and energy and very few minerals for accretion and subsequent maintenance.

**Lactation** Nutritional requirements for lactation have historically been based on the combination of two specific values: the requirements necessary to keep the mare in optimal body condition and the nutrients required for high quality milk production (volume and nutritional composition).

Traditionally, nutrient requirements were thought to be much greater in early lactation (one to three months after foaling) than in late lactation (four to six months after foaling). So great are the energy demands during early lactation that most equine nutritionists believe that few horses require more energy, not even the majority of high-performance horses.

Researchers involved in revising *Nutrient Requirements of Horses* increased the energy, protein, and mineral requirements for lactating mares during both early and late lactation. The increase in energy was partially due to a shift in the maintenance requirement of lactating mares.

Before this revision, the maintenance requirement for a lactating mare was assumed to be similar to other mature horses. This has changed. Now researchers believe that mares actually require more energy for maintenance of body condition than previously thought. Two reasons include the increased movement associated with protecting and tending to a foal and the increased energy needed by the gastrointestinal tract to digest the larger meals required to support lactation.

**Feeding the Mare during Gestation and Lactation**

The mare’s feeding program should be adjusted to accommodate the differences in requirements throughout gestation and lactation. An increasingly popular method is based around a two-step feeding concept that includes the use of both a balancer and a fully fortified feed (textured or pelleted). A balancer is a low-intake, concentrated source of essential protein, vitamins, and minerals, which is designed for all classes of horses when additional calories are not required. Balancers can be fed alone to mature horses that are maintained on all-forage diets, or can be added to mixes when extra nutritional fortification is required. Balancers can also be fed with unfortified grains to provide the correct balance of nutrients. Barren mares and those out on grass that tend towards the heavier side benefit from being fed a balancer, which when fed at the recommended daily intake (usually approximately 1 kg per day depending on the specific product) provides a base nutrient package during all phases of the breeding cycle.

When additional energy is needed, a fully fortified feed can be used. These feeds contain not only the protein, vitamins, and minerals required for the animal, but also the energy.

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The modifications and increased nutrient requirements for broodmares during gestation and lactation that appear in the revised National Research Council recommendations do not necessarily change the foundation of a broodmare’s feeding program, especially when using the two-step system and ensuring the mare is maintained on an appropriate base nutrient package throughout all phases of reproduction. As it is predominantly energy requirements that have been revised by the National Research Council for gestation and lactation, it is now, more than ever, imperative to feed each mare as an individual. It is vital to regularly assess body condition score throughout all phases of reproduction and modify caloric intake as necessary.

**Fescue Facts**

Problems associated with fescue are recognized among nutritionists and breeders alike. Mares allowed to graze fescue during late pregnancy may encounter one or more signs of a syndrome called “fescue toxicosis.” Signs include prolonged gestation, sometimes up to 13 or 14 months, and foaling difficulties that may include thickened placenta and a “red bag” emergency that typically requires human intervention if the foal is to survive. Another significant problem associated with fescue toxicosis is low milk production or a complete lack of milk.

Fescue found in fresh pasture, especially in early and late spring, usually harbors the endophyte (or fungus) Acremonium coenophialum. It is this endophyte that causes the problems in pregnant mares. Aside from fresh pasture, mares may come into contact with the endophyte by less well-known means: hay and bedding.

Grass hay is rarely pure. With the exception of popular forage types such as timothy or orchard grass, which may approach a higher level of purity, grass hay is more often than not described as “mixed.” If it is purchased from an unknown buyer, a mixed grass hay may include fescue, and that fescue might be infected with fungus.

Some forage that is unsuitable for consumption by horses ends up being

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**Nutritionist Q&A: Group Feeding for Different Needs**

Q: My broodmare band consists of Thoroughbreds and Hanoverians, young and old. It won’t surprise you then when I mention that some of the mares are easy keepers (generally the Warmbloods), and some of them (a few of the Thoroughbreds) are difficult to keep in good body weight. I feed them as a group until the pregnant mares must be separated from the open mares. What is the optimal body condition score for a barren mare as breeding season approaches?

A: For optimal reproductive efficiency, mares should be maintained at a body condition score of at least 5 but preferably 5.5 or 6. According to Henneke’s nine-point body condition scale in which 1 is emaciated and 9 is obese, a 5 represents moderate body weight. The back is level with no crease or ridge, ribs cannot be seen but can be felt, tailhead is surrounded by a layer of fat, withers are well-rounded, and neck blends smoothly into the shoulder.

Research has shown that barren mares kept at a body condition score of 5 begin ovulating sooner than mares with body condition scores less than 5. These mares require fewer estrus cycles to achieve pregnancy and generally have higher conception rates. Mares that enter the breeding season thin, regardless of whether or not they are being fed enough energy to gain weight, are less reproductively efficient than those in moderate body condition.

On the opposite end of the weight spectrum, moderately fat or obese mares were just as reproductively efficient as their average-sized peers. Interestingly, some overweight open mares, maintained at body condition scores between 6.5 and 8, continue to cycle throughout the winter months, usually a period of ovarian inactivity. Mare owners should take note that obesity can take its toll in other facets of broodmare management.

Mares retired to the broodmare band for chronic unsoundness might fare better when they are kept in slimmer condition, especially during the last months of pregnancy when the burden of the fetus is greatest. Obesity-related metabolic problems plague broodmares as often as they affect other horses, so weight management is important to the health of mares. Group-feeding situations sometimes preclude timid mares from getting their fair share from the feed bunk. Observation of the herd will reveal if there is peace or upheaval among your mares during feedings.

If you notice one or more mares are determined bullies, it might be best to separate the less aggressive mares from the others. This will ensure thin mares are getting sufficient feed to increase body condition. If a thin mare does not gain weight despite being fed apart from her herdmates, you might look into other causes such as parasitism, dental problems, or pain issues. An experienced equine nutritionist and your veterinarian should be consulted if a thin mare fails to gain weight.

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used as bedding. This is a common practice on large farms where many mares are given fresh bedding each night or when straw is in short supply. Because of its poor nutritional quality, fescue is sometimes chosen as such bedding.

In some circumstances, mares may consume the bedding, putting themselves at risk for fescue toxicosis. While horses will generally gravitate toward high-quality forage, it is not unusual for some to chomp through a fair amount of bedding. In fact, more than a few horses cannot be bedded on straw because of their penchant for consuming this seemingly bland-tasting forage. As a precaution, an experienced agronomist or other specialist should inspect inferior forage before it is used to bed down the stalls of mares in late gestation.

Further, used bedding that has been stripped from stalls should not be strewn on fields grazed by mares. Seed may fall from dried plants and germinate in the field, thus contaminating the fields and giving cause for complete renovation of pasture areas, if they’re to be used for grazing mares.

The endophyte that causes problems in late gestating mares has been identified in fresh fescue, fescue hay, and poor-quality dried fescue used as bedding. Be sure to keep mares away from fescue if its source is unknown.

**Nutritional Management of the Mare and Foal**

In his study, “Review of “Calcium requirements of pregnant mares,”” Harold F. Hintz says that the NRC Subcommittee on Horse Nutrition has consistently raised its recommendations for calcium levels in broodmare diets. In fact, the recommendation has been doubled between 1949 (16.5 grams per day) and 1989 (35 to 37 grams per day) for a 500-kilogram mare in late gestation.

Estimates by French and German equine nutritionists are similar to current NRC recommendations. The author mentions a recent study by Martin et al. that looked at serum concentrations of calcium and parathyroid hormones when mares were fed diets containing lower or higher calcium concentrations. The study showed less disruption of serum calcium and parathyroid hormone in the mares fed higher concentrations of calcium.

Hintz concludes that the increases in NRC calcium recommendations are supported by data from a number of independent sources.

**Protein** The author relates the results of a South African study in which nonpregnant mares were fed one of four diets. The basal diet contained pellets made of cottonseed meal and sunflower meal, neither of which offers high-quality protein, and tef hay, a common regional hay. In treatment two, tef hay was replaced with alfalfa hay to increase the concentration of protein and essential amino acids. Treatments three and four included the addition of fish meal to the tef and alfalfa diets, respectively, to increase methionine and lysine availability. Mares on the fish meal diets had larger ovarian size and greater follicular development, and ovulated two to three weeks earlier than mares on the other diets.

Pregnant mares on the four diets produced foals with similar birth
weights. Mares on pellets and hay lost weight during lactation, while those supplemented with 200 grams of fish meal gained weight. The author concluded that this fairly small increase in high-quality protein in the diet of pregnant and lactating mares significantly influenced foal growth. He recommended that broodmare diets should contain sufficient high-quality protein to prevent embryonic loss, maintain body reserves, and support milk production.

**Nutritional secondary hyperparathyroidism** Nutritional secondary hyperparathyroidism (NSH) is caused by feeding a diet low in calcium and high in phosphorus. The result of such an imbalance is a rise in parathyroid hormone which causes the removal of calcium from the bones to maintain the necessary blood level of calcium. Fibrous connective tissue then develops, causing a noticeable enlargement of the facial bones. Lameness is an accompanying sign in some horses. NSH is rare today, but is still occasionally encountered. It may be related to equine diets containing too much grain and too little hay, feeding high levels of wheat bran without supplemental calcium, or grazing tropical pastures which may be high in calcium-binding oxalates. NSH can be prevented by educating horse owners about the importance of adequate dietary calcium and balanced calcium/phosphorus ratios.

**Feeding the broodmare** In his study, Dr. Joe Pagan stated that broodmare nutrition must match the mare’s needs at each stage: barren/early pregnancy, late pregnancy, and lactation.

Barren mares and those in the first seven months of pregnancy may not need high levels of supplementation, especially if they have access to good-quality pasture. Because the equine fetus develops very slowly during this period, demands on the mare are increased only minimally over maintenance. Overfeeding can easily lead to obesity and difficulties at foaling.

After the seventh month of pregnancy the fetus develops much more rapidly, and the mare needs increased energy, calcium, phosphorus, and high-quality protein. Trace mineral supplementation must be adequate to allow the fetus to store iron, zinc, copper, and manganese to sustain growth during the first few months when the mare’s milk does not provide these nutrients. Feeding to the point where the mare becomes fat is still not a good idea, and mares that tend to become obese can be switched to a low-energy supplement that provides adequate vitamin and mineral levels.

Lactating mares use energy, calcium, and phosphorus at a greatly increased rate. Trace minerals are of less importance. Ten to fourteen pounds of grain per day may be necessary to meet the demands of milk production. Ideally the mare’s grain ration should be slowly increased to this level during the last few weeks of pregnancy, avoiding a significant change in diet just after foaling. The mare’s needs decrease as milk production slows after the first three months, and grain amounts should begin to taper off at this point.

The full texts of these papers can be found in “Comprehensive Preventative Medicine for the Mare and Foal Highlighting Nutritional Management and Developmental Orthopedic Disease” produced by Hilltop Farm, Inc., 1089 Nesbitt Road, Colora, MD 21917.
Broodmares on diets high in omega-3 and omega-6 fatty acids may produce richer colostrum, which could jumpstart the health of their foals. These foals may be less likely to develop gastric ulcers as omega-3 supplementation has helped alleviate ulcers in other species. Male reproduction has been enhanced with omega-3 rich additives. When fed to boars, tuna oil, a polyunsaturated fat high in both EPA and DHA, had positive effects on sperm viability and motility.

**Yeast and Broodmares**

Absorption of minerals, particularly calcium and phosphorus, increases with yeast culture supplementation. Scientists at Kentucky Equine Research (KER) revealed the importance of yeast culture supplementation to foals and lactating mares, two classes of horses that require the minerals in abundance for proper growth, in the case of foals, and quality milk production, in the case of broodmares.

Broodmares in late gestation might profit from yeast culture supplementation, noted Kathleen Crandell, PhD (equine nutrition). The improved digestibility of energy and protein will encourage normal development of the foal and maintenance of body condition during the final months of pregnancy. Continuing supplementation through lactation could improve milk production and foal growth.

What is the best way to supply yeast culture to your horses, on a continual basis or occasionally, only on an as-needed basis? “The studies done on yeast supplementation suggest that continual feeding will supply better results than sporadic feeding,” said Crandell.

**Check Broodmare Hay for Fescue**

Fescue … what’s not to love? Land owners throughout North America and in other parts of the world such as New Zealand and Australia enjoy its numerous benefits. The perennial’s hardiness allows it to thrive despite heavy hoof traffic, intense grazing, and adverse growing conditions.

Are you asking yourself about that slight problem of endophyte contamination? Slight, it’s not; in fact, it has been estimated that 75% of all fescue is infected with the specific endophyte Acremonium coenophialum.

An endophyte is a fungus that grows inside another plant without detriment to the host plant. In some instances, the fungus actually provides benefit to the host plant. Such is the case with Acremonium coenophialum. The fungus produces alkaloids, and these alkaloids protect the plant against certain natural insults such as insects and nematodes. Because of their increased durability, the plants become more tolerant to marginal soils and suboptimal growing conditions.

Most mare owners know the dangers of grazing late-pregnant mares on endophyte-infected tall fescue. The grass causes legions of problems, collectively called fescue toxicosis, in broodmares: prolonged gestation (as long as 13 to 14 months), foaling difficulties, thickened placentas (including “red bag” emergencies), and a decrease or complete absence of milk upon delivery. The ill effects of tall fescue consumption can continue beyond foaling frustrations, as affected mares may be hard to get back in foal, leaving breeders with a smaller foal crop the following year.

Removing mares from endophyte-infected tall fescue 90 days before foaling has been an effective management technique, and newer varieties of tall fescue are endophyte-free, giving breeders peace of mind. These newer varieties, however, do not possess the resiliency of their forebears. Not only are they more susceptible to adverse conditions, these varieties seem to be more difficult to maintain.

While horsemen are usually most concerned with guaranteeing that pastures contain no fescue or endophyte free fescue, the problem-causing fungus can get into a mare’s diet unintentionally. This is likely to happen in one of two ways, as hay or as bedding.

Providing hay is often a staple of broodmare management in winter months. With pasture plants dormant, forage requirements are usually met by baled hay. High-quality grass hay is usually a suitable choice for broodmares, as it satisfies nutrient requirements without the extra calories and cost of alfalfa hay.

Grass hay is rarely pure, however. With the exception of popular forage types such as timothy or orchardgrass, which may approach a higher level of purity, grass hay is more often than not described as “mixed.” If it is purchased from an unknown buyer, a mixed grass hay may include fescue, and that fescue might be infected with endophyte. While fescue is easy to identify in pastures and hayfields, it tends to blend with other grasses as it dries. Like other grasses such as bluegrass and orchardgrass, tall fescue leaves roll into a tight cylinder during the curing process, making a positive identification problematic. Though commercial tests are
available to detect the fungus in living plants, there is no such test for the presence of the endophyte in hay.

Fescue is rarely raised exclusively as hay intended for horses. Even when it is, it is usually harvested at a late stage of maturity when palatability and nutrient value are low. Because of palatability issues, horses often waste it, preferring to lie in it than eat it.

Therefore, when purchasing hay for pregnant mares, be sure it is free of fescue. If fescue is discovered, double-check that the plants were harvested from an endophyte-free stand. If this cannot be ascertained definitively, the hay should be fed to other horses or livestock. Endophyte-infected fescue causes few side effects in non-pregnant mares.

Some forage that is unsuitable for consumption by horses ends up being used as bedding. This is a common practice on large farms where many horses are given fresh bedding each night or when straw is in short supply.

Because of its poor nutritional quality, fescue is sometimes chosen as such a bedding.

In some circumstances, mares may consume the bedding, putting themselves at risk for fescue toxicosis. While horses will generally gravitate toward high-quality forage, it is not unusual for some to chomp through a fair amount of bedding. In fact, more than a few horses cannot be bedded on straw because of their penchant for consuming this seemingly bland-tasting forage. As a precaution, an experienced agronomist or other specialist should inspect discarded or inferior forage before it is used to bed down the stalls of mares in late gestation.

Further, used bedding that has been stripped from stalls should not be strewn on fields grazed by mares. Seed may fall from the dried plants and germinate in the field, thus contaminating the fields and giving cause for complete renovation of pasture areas, if they’re to be used for grazing mares. In summary, remember these key points when fine-tuning a management program for broodmares.

Scrutinize hay for fescue just as carefully as you would analyze pasture. This is especially true for farms that purchase hay from multiple suppliers. The endophyte that causes fescue toxicosis is just as detrimental in hay as it is in fresh forage.

Choose bedding wisely While baled pasture clippings may be an economical bedding choice, be sure no fescue plants are intermixed with the other grasses. Even though fescue is not a particularly enticing forage for horses, some mares might stray from their heaps of high-quality hay to add variety to their diets.

Do not spread soiled bedding that includes fescue waste on pastures that may one day be grazed by mares. The plants may contain seeds that could germinate and grow.

Golden Matron: Tips for Maintaining Her Figure in the Later Years

Stop! If you own an aged broodmare that maintains her body condition beautifully through all stages of motherhood, this article is not for you. If, however, you care for one that is dragged down physically from the rigors of pregnancy and lactation, read on! Despite some misguided lore, it is possible for those grizzled, sunken backed doyennes of the broodmare band to be fleshy and in fine fettle during all phases of production. If you’re up to the task, you might be rewarded with a robust foal.

Consult knowledgeable professionals An aged mare sometimes requires an extra dash of diligence by caretakers and health-care professionals. For instance, instead of an annual dental examination, an older horse may need a checkup every six months by a dentist well-versed in maintaining the mouths of aged horses. Likewise, a veterinarian can determine if the mare is suffering from age-related conditions such as Cushing’s syndrome that might affect her fertility. Because horses are living longer than ever before, many veterinarians are becoming increasingly knowledgeable of geriatric medicine.
Monitor condition frequently Some producers take note of a mare’s body condition only during critical times of her breeding cycle: during breeding season, during the late-night vigils at foaling time, and through the beginning of lactation. Hands-on contact with the mare is more frequent at these times. At other times during the production cycle, such as when she is pronounced in foal and left to graze in late summer and fall, there might be less contact. Make a point to eyeball the aged mare regularly.

Observe behavior at feeding times As a mare ages, her place in the social hierarchy may shift dramatically. If younger mares are added to the herd, she might end up at the bottom of the pecking order. Therefore, it is important that she doesn’t have to fight her way to gain access to hay or grain. In large herds, she may need to be removed at feeding times and allowed to eat in a safe and comfortable area away from the nuisance of her herdmates.

Keep heat in Environmental conditions may sap a mare of vital energy stores. Shivering and other metabolic processes designed to keep a mare warm may divert valuable calories from maintenance of body weight. It is important to have a place in which a mare can seek refuge from the wind and chilling or freezing rain. A three-sided shed is all that may be needed. Be sure there’s plenty of room for all of the field’s occupants. If space is limited, the old mare may be the one driven away from the shelter.

Maximize coverage Being maintained in a stall for long periods may be too hard on an old mare’s arthritic joints, so allowing her as much turnout time as possible is advisable. When the weather is particularly frigid, you may consider covering her with a turnout blanket specifically designed to withstand the elements. If a mare is especially bony, rubbed areas may develop around the shoulders, withers, and hips. Be sure the blanket fits her well, and check for hairless areas daily. Modify the blanket as necessary to make certain of proper fit; some owners sew sheepskin pieces where rubbing occurs.

Choose specific concentrates An aged mare might perform extremely well when fed high-quality hay (perhaps straight alfalfa or an alfalfa-mix) and a concentrate formulated specifically for older horses. Such concentrates are labeled “senior feeds.” These formulations typically include several sources of energy such as fermentable fiber and fat in the form of soy hulls, beet pulp, and vegetable oils.

Oftentimes the digestive tract of an aged mare is less efficient than that of a younger mare. By supplying a concentrate that contains easily digestible forms of energy, you can ensure that she is receiving optimal calories.

Evaluate her ration If an aged mare has been placed in your care, and you’re unsure of how to feed her properly, go to your feed supplier and ask for help. There is usually a professional available who will be able to answer all of your questions.