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The University of Tennessee
Agricultural Extension Service
TNH-1001

EQUIFACTS

Basic Broodmare Management

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Volumes of material have been written on broodmare management. However, much of the material is extremely detailed and is of little use to the average horse owner who wants to breed a mare. There is a need for a common sense approach to managing the broodmare. This common sense approach, combined with scientific management principles, will allow for a successful breeding program. This paper will address basic principles related to management of broodmares that include nutrition, condition scoring, herd health, lighting programs, the estrous cycle and receptivity to breeding.

Nutrition

Regardless of the stage of productivity (open, pregnant, or lactating) mares must be on a proper plane of nutrition. Many times horse owners tend to overfeed open or pregnant mares while leaving the lactating mare nutritionally deprived. Many horse owners feel that as soon as a mare becomes pregnant, her nutritional requirements skyrocket. However, this simply is not true. A pregnant mare does not need additional nutrients above maintenance during her first eight months of pregnancy. Feeding the mare to meet maintenance requirements will provide her nutritional requirements from early to mid-gestation.

However, during the last three months of pregnancy, the fetus grows rapidly, and the mare's nutrient requirements increase substantially. Approximately 18-22 pounds of feed per day will be required to meet the energy requirements of an 1100-pound broodmare. A broodmare in late gestation requires a ration of 9.5 percent crude protein, .41 percent calcium and .31 percent phosphorus. This can be obtained with the following dietary regimes shown in Table 1.

Table 1. Example Rations
Broodmare — 1100-Pound (Eleventh Month of Pregnancy)

Type of Hay Used	Forage (lbs.)	Grain Mixture (lbs.)
Legume	14	5[1]
Grass/Legume	14	7[2]
Grass	14	8[3]

[1]10% crude protein complete mixed ration
[2]12% crude protein complete mixed ration
[3]14% crude protein complete mixed ration

The period of time when a mare is nursing a foal is one of critical nutritional stress. The mare must provide milk for the new foal, maintain her own body needs, recover from foaling and rebreed. Failure to meet nutrient requirements will result in decreased milk production, excessive weight loss and interference with rebreeding. The lactating 1100-pound mare, during the first three months of lactation, requires about 25 pounds of total daily feed containing approximately 12 percent crude protein, .47 percent calcium

and .30 percent phosphorus. This represents about a 40 percent increase in energy and 25 percent increase in protein over the pregnant mare in late gestation (eleventh month).

Requirements can be met with the example rations shown in Table 2. These rations are for an 1100-pound mare in the first three months of lactation.

Table 2. Daily Ration

Type of Hay Used	Forage (lbs.)	Grain Mixture (lbs.)
Legume	14	10[1]
Grass/Legume	14	11[2]
Grass	14	12[3]

[1]12% crude protein complete mixed feed
[2]14% crude protein complete mixed feed
[3]16% crude protein complete mixed feed

Vitamins and minerals are important to brood mare health and efficient reproduction.

Generally, however, it is not difficult to meet the mineral and vitamin needs of mares with commercially blended free-choice supplements. Following is a simple checklist to assure your mineral program is efficient:

- The mineral should be available at all times.
- Consumption should be monitored to assure mares are eating enough to meet their needs.
- Mineral should be located in a dry location with convenient access.
- Phosphorus should typically be at 8-10 percent in the supplement.
- Calcium should be about 1.5 to 2.0 times higher than phosphorus.
- Other minerals to look for on the label of a broodmare mineral supplement would be zinc, copper, iron, iodine, selenium, chromium, cobalt, manganese and sulfur.
- Vitamins typically included would be vitamins A, Vitamin E, Vitamin C, Vitamin D and B-complex (including biotin).
- Many times supplemental concentrates are fortified with minerals and vitamins, making it unnecessary to provide additional supplementation.

Body Condition Score

One method used to evaluate the nutritional adequacy of a broodmare feeding program is the body condition scoring system (BCS). The most tested and universal scoring system for assessing body condition in horses was developed by Dr. D. R. Henneke of Texas A&M University in the early 1980s (Table 3). Since that time, nutritionists, breeding and farm managers, trainers of performance horses, veterinarians, those involved with evaluating animal welfare, and other equine professionals have utilized this scoring system.

This scoring system rates the body condition of horses on a scale of one to nine and provides descriptions, which are used to assess fat accumulation along the neck, withers, over the ribs, behind the shoulder, around the tailhead and the crease on the back. While the scoring system can be used on all horses, it was initially developed to determine the influence of body condition on the reproductive performance of mares.

Extensive research and field trials document that reproductive efficiency of mares is affected by body condition.

- Non-bred mares in a body condition of 4 or less will delay the time of their first ovulation. This delay can be three to four weeks as compared with mares in a body condition of 5 or greater, which is significant when breeding managers intend to settle open mares in the early part of the breeding season.
- Once cycling, mares in a condition score of 4 or less can be expected to require more cycles per conception. Research on one group of mares resulted in thin mares requiring an average of three cycles before settling as compared with one and one-half cycles per conception for similarly managed mares with condition scores of 5 or higher. More cycles per conception results in increased costs for the breeding manager and mare owner.
- Pregnancy rates are also affected by condition. Mares in body condition score of 4 or less have overall pregnancy rate reductions of as much as 20 percent when compared to mares in a 5 or

greater body condition score. Moreover, early pregnancy losses are significantly greater in mares with body condition scores of 4 or less.

To summarize, mares in body conditions of four or less will be poor breeders and more susceptible to pregnancy losses than mares maintained at body condition scores of 6 or greater. Frequently, the onset of cold weather, changes in housing, transportation, foaling and lactation reduce body condition. As such, recommendations are for mares to enter the foaling and breeding season in body condition score of 6.

One concern expressed by owners is that mares with a body condition greater than 5 or 6 will have more trouble foaling. These concerns are unwarranted, as significant research has shown body conditions of 7 or greater have no affect on gestation length, length of the foaling process, size of foal or placenta or measures of foal viability.

Table 3. Body Condition Scoring System for Horses

1. **Poor.** Animal is extremely emaciated. Spinous processes (portion of the vertebra of the backbone which project upward), ribs, tailhead and bony protrusions of the pelvic girdle (hooks and pins) are prominent. Bone structure of withers, shoulders and neck are easily noticeable. No fatty tissues can be felt.
2. **Very Thin.** Animal is emaciated. Slight fat covering over base of the spinous processes. Transverse processes (portion of vertebrae which project outward) of lumbar (loin area) vertebrae feel rounded. Spinous processes, ribs, shoulders and neck structures are faintly discernible.
3. **Thin.** Fat is built up about halfway on spinous processes. Transverse processes cannot be felt. Slight fat cover over ribs. Spinous processes and ribs are easily discernible. Tailhead is prominent, but individual vertebrae cannot be visually identified. Hook bones (protrusion of pelvis girdle appearing in upper, forward part of the hip) appear rounded but are easily discernible. Pin bones (bony projections of pelvic girdle located toward rear, mid-section of the hip) are not distinguishable. Withers, shoulders and neck are accentuated.
4. **Moderately Thin.** Negative crease along back (spinous processes of vertebrae protrude slightly above surrounding tissue). Faint outline of ribs is discernible. Fat can be felt around tailhead (prominence depends on conformation). Hook bones are not discernible. Withers, shoulders and neck are not obviously thin.
5. **Moderate.** Back is level. Ribs cannot be visually distinguished but can be easily felt. Fat around tailhead begins to feel spongy. Withers appear rounded over spinous processes. Shoulders and neck blend smoothly into body.
6. **Moderate to Fleshy.** May have slight crease down back. Fat over ribs feels spongy. Fat around tailhead feels soft. Fat begins to be deposited along the sides of the withers, behind shoulders and along neck.
7. **Fleshy.** May have crease down back. Individual ribs can be felt, but with noticeable filling of fat between ribs. Fat around tailhead is soft. Fat is deposited along withers, behind shoulders and along neck.
8. **Fat.** Crease down back. Difficult to feel ribs. Fat around tailhead is very soft. Area along withers is filled with fat. Area behind shoulder is filled in flush with rest of the body. Noticeable thickening of neck. Fat is deposited along inner buttocks.
9. **Extremely Fat.** Obvious crease down back. Patchy fat appears over ribs. Bulging fat around tailhead, along withers, behind shoulders and along neck. Fat along inner buttocks may rub together. Flank is filled in flush with rest of the body.

Herd Health

Diseases. Another essential management practice for broodmare management is the implementation of a herd health program. A health program can be tailor-made not only for each horse farm but also for each horse within the farm. The amount of contact that one horse has with other horses can greatly influence the need for appropriate disease control. Prevalence of a disease in a certain locality or an outbreak of a disease can affect vaccination programs from year to year. A local veterinarian can assist the horse owner in developing a comprehensive disease control program.

A basic vaccination schedule for broodmares is as follows:

- One month prior to foaling or prior to breeding
  Tetanus Toxoid
  Eastern and Western Equine Encephalomyelitis
  Influenza
- Additionally, the pregnant mare will need to be vaccinated against Rhinopneumonitis at the 5th, 7th and 9th month of pregnancy.

More information regarding disease control for horses is presented in TNH-4001 **Control of Infectious Diseases in Horses**,

an Agricultural Extension Service fact sheet available from your county Extension office.

Internal Parasites. A universal protocol to eliminate internal parasite infection in the horse does not exist. Each situation is different and is affected by many factors, including climate, season of the year, humidity, rainfall, age of the horse and concentration of horses on the land.

Management and medication are the primary methods that affect parasite concentration and influence productivity in the horse.

Any management consideration used to eliminate or reduce a certain phase of the parasite's life cycle can assist the horse owner in maintaining or improving efficiency. The key to a successful control program is the interruption of the parasite's life cycle. Pasture rotation, harrowing, regular manure removal, and "worm and move" programs can be of help in parasite control.

Many different commercial products are available to remove internal parasites from horses. These drugs are available in several different physical forms and are sold under various brand names. A chemical control program to reduce or eliminate internal parasites should be used in combination with a good management control program. Therefore, by utilizing proper management techniques and chemical control, the horse owner is able to reduce internal parasites for maximal health and subsequent performance of the broodmare. It is well documented that improved parasite control is a forerunner to reduced colic. Your veterinarians are the local authorities on internal parasite control for horses and can be contacted to help establish a tailor-made program to fit each situation. Additional information is available in another Extension fact sheet entitled, TNH-4002 **Control of Internal Parasites of the Horse**, Agricultural Extension Service, University of Tennessee.

Lighting Program

A mare is referred to as seasonally polyestrus. That means mares will have heat cycles many times during a particular season. Mares typically begin to cycle in early spring and continue to cycle through the early summer months. It is well documented that cycling starts as a response to increased photoperiod (light). Therefore, by altering the amount of light the mare is exposed to each day, horse owners are able to extend the length of breeding season. Extending the horse's perception of day length by extending the natural daylight with artificial sources is not a new management technique. It is a tool that both horse breeding farm managers and horse trainers have used for many years. Those involved with showing their horse will keep their horse's hair coats short by using extended lighting programs since hair coats are shorter during the long daylight times of year. Those involved with breeding will place open mares under lights to quicken the beginning of the breeding season.

Horses need at least 14.5 hours of total light to perceive long days. The tried and true program is to provide artificial light so the total light period (daylight and artificial) is 16 hours in length. Automatic timers that will turn on 30 minutes before sundown and stay on for five to six hours to achieve the 16 hours of total light and eight hours of dark are recommended. If sunrise is at 7:00 a.m., lights need to go off at 11:00 p.m. The light source can be incandescent, florescent or halogen. The intensity of light at the level of the mares head should be two to 10 foot candles using a light meter.

It takes a while for the lighting effect to work. Once started, it will be 60 to 90 days before mares cycle normally. It will take about 30 to 45 days for mares to make the transition and an additional 20 to 30 days to go through a heat cycle. Beginning a lighting program in late November or early December should allow for late February breeding. Mares will most likely show behavioral signs of heat before this time, even though they do not actually go through an ovulatory cycle. Early season cycles tend to be erratic. Therefore, the use of ultrasound and palpation increases the chance of determining if and when a mare has ovulated.

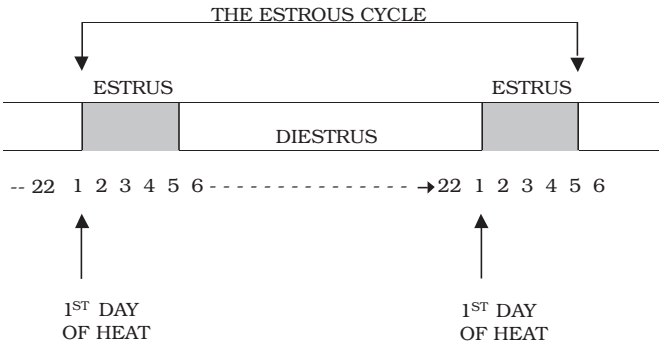
Routine is important, as lights need to come on everyday. Leaving the lights off for several days reduces the effect of a lighting program. Also, the mares need to stay under lights until they are bred or the natural daylight is lengthened with the changes of season. Therefore, do not stop the lighting programs too early in the breeding season. An added effect of a lighting program is that mares will start to shed hair, which may result in additional shelter needs.

It is very important to put the lights on an automatic timer. Do not depend on someone to turn the lights on and/or off at the correct time. The light program is used not only on open mares but also on pregnant mares and mares that have already foaled.

Estrous Cycle

Obviously, becoming a successful horse breeder requires fully understanding the mare's estrous cycle (Figure 1).

Figure 1



Most reproductive physiologists define the complete cycle as the amount of time (days) from the first day of heat until the first day of the next heat period. In an ideal world, this would be a 21-day cycle. The estrus (heat) portion of the total cycle is the period of receptivity to the stallion. During this time, typically about five days, a follicle (egg) is rapidly developing in the ovary and will be released (ovulation) during the latter stages of estrus (mid- to late-estrus). Therefore, the time to breed in the estrus cycle is mid- to late-estrus.

The primary reason for the variability of the estrous cycle is season of the year. Estrous cycle patterns are classified according to seasonal variation. Diestrus is that portion of the estrous cycle in which the mare is not in heat. The anestrous period is the time of sexual rest and cessation of most ovarian activity. This is during the late fall and winter months although location (Maine or California) will affect the length of anestrous period.

State of Receptivity

After the horse owner has a working knowledge of the estrous cycle, it is then necessary to determine the stage of receptivity the mare is in relative to the total estrous cycle. This can be done by rectal palpation, ultrasound and the use of a teaser stallion. Most breeding farms use a combination of these methods. Good records are a must in horse breeding, as they are necessary in managing mares so they will be bred in a timely manner. This objective is directly related to the ultimate success or failure of the business. The following heat intensity scoring system is used by several breeding operations.

Score of mare on Heat Intensity (1-5)

1. Rejection of stallion
2. Not receptive, but does not fight
3. Will accept stallion, but slow to tease
4. Accepts stallion willingly, increased vulva activity (winking), and urinates
5. Accepts stallion, even backs up to stallion; all items listed in 4 plus actual breaking down (squatting).

This system is very useful because it gives the horse breeder more precise information than can be gathered by simply observing whether or not the mare is showing signs of heat.

Depending on results of the teasing, a mare may or may not be palpated or examined by ultrasound. Mares can be teased by leading the stallion in front of stalls and paddocks or by placing the stallion in a small pen in the center of a paddock full of mares. In the latter situation, the mares will go over to the stallion, and the stallion manager can observe closely and make notes. Some mares, although they are in heat, will never challenge other mares for a place around the stallion's pen. This is due to their position in the dominance hierarchy of that group of mares.

Summary

Horse owners have begun to pay more attention to the horse breeding business. Many started with a pasture breeding program, advanced to hand mating and now in many instances are using artificial insemination and even embryo transfer. Horse owners realize that they do not have to accept poor conception and low foaling rates as a fact of life. Moreover, they are becoming more and more educated in the total field of equine science. Many universities have established horse curriculums to meet the demands of horse-oriented students.

Horse breeders have established controlled breeding programs. Using more sophisticated

record keeping systems and breeding methods, the breeders have a better understanding of mare reproductive physiology. For breeders, the governing factors for management decisions are knowing the cycle, knowing when ovulation occurs, and then to breed or artificially inseminate accordingly.

A healthy, frolicking foal is the result of a well-designed broodmare management program. Although many other factors are involved in the total breeding program, without basic broodmare care and management, conception is much more difficult. By following the discussed broodmare management practices, your chances of producing a live, healthy foal are significantly increased.

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