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Nutrition of the Broodmare

Equine Section, Department of Animal Sciences

Feeding horses has long been considered an art passed down from generation to generation. However, recent advances are rapidly making horse nutrition a more precise science. Research in horse nutrition has provided valuable information on the nutrient needs of all classes of horses.

In feeding broodmares, you must consider several important factors:

- nutrient requirements of the particular class of horse being fed,
- physiological events involved in pregnancy,
- nutrient content of the feed,
- physiological limitations to certain rations.

Feeding Maiden & Barren Mares

The biggest challenges in feeding mares are

- preventing them from getting fat,
- regulating their body condition to ensure optimum conception rates.

Managing Weight

Two to Three Year Olds—

Maiden mares from 2 to 3 years old require slightly higher levels of protein, calcium, phosphorus and vitamin A than do mature horses fed a maintenance ration. For a mare being bred as a 3 year-old, the ration should contain at least:

- 10% protein,
- .45% calcium,
- .35% phosphorus,
- 800 international units (I.U.) of Vitamin A.

In most cases a good quality pasture or high quality hay will meet the nutrient requirement of these horses. However, if mares eat a poor quality

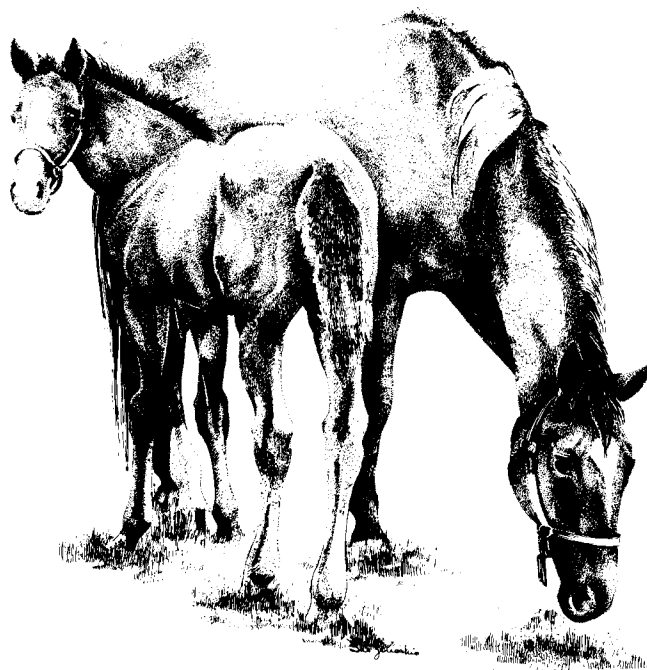
hay or graze on a dormant pasture, then you will need to supplement their diet with some concentrate. Be careful when you use a concentrate mixture not to let the mares get too fat.

When mares retire from strenuous performance careers, let them down gradually, slowly changing them from a high energy, high concentrate diet to a less energy dense feed. Gradual change will decrease stress and prevent digestive disorders. Eventually, you need to put these mares on a maintenance ration or on a ration to prepare them for breeding.

Mature mares which are not bred may be kept on a maintenance ration, since they are under very little nutritional stress and tend to gain weight easily. Minimum nutrient requirements for maintenance are:

- 8.0% crude protein (CP),
- .3% calcium,
- .2% phosphorus,
- 1.0 mcal of digestible energy per lb of feed

A good quality hay or improved pasture alone should be adequate to meet the nutrient requirements of barren mares or mares in the first 2 trimesters of pregnancy (see following section for more information about feeding during pregnancy).



However, during the winter, or where pasture availability is limited, mares grazing pasture may need grain supplementation in addition to high quality hay to maintain acceptable body condition. Remember that cold temperatures bring increased energy demand. Maintenance requirements may be met in several ways (Table 1).

Table 1. — Maintenance Diet^a

	conc. (lb)	roughage (lb)
Legume or excellent grass hay	0	16-18*
Average grass hay	2-3	13-16

*High quality pasture will substitute.

^aIn addition, a trace mineral salt block should be provided free choice.

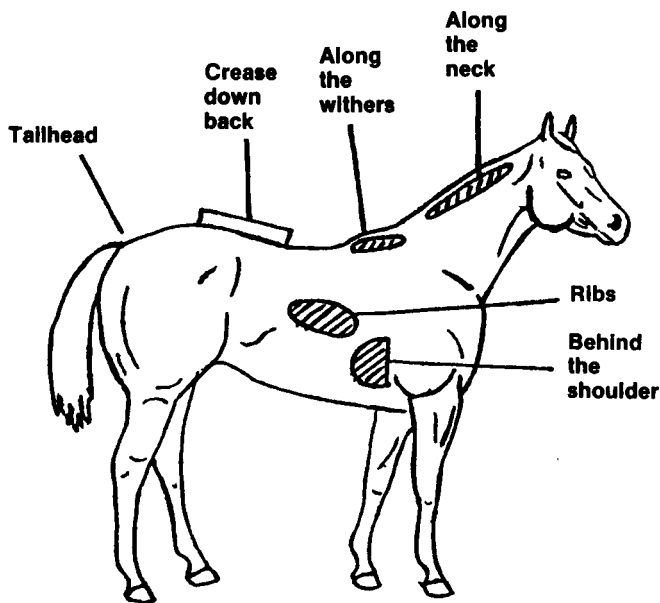


Figure 1. — Areas for determining body condition of mares. (Taken from Henneke, et. al., *The Quarter Racing Record*, 1982).

Maintaining Optimum Body Condition

Research has shown that if mares are in good condition before breeding, neither losing weight nor too fat, they have a better chance of conceiving. You can recognize mares in good condition if their ribs can not be seen but may be palpated. Figure 1 indicates where to examine a mare to assess condition. Mares whose condition is questionable should have their energy intake increased 10 to 15% one month before breeding.

Feeding the Bred Mare

Adequate nutrition during pregnancy is vital for the growing fetus' optimum development and for proper milk production during lactation. A common sense approach to feeding pregnant mares will help you maximize efficiency of production and not waste money in overfeeding. The most common error in feeding broodmares is to overfeed the pregnant mare and underfeed the lactating mare.

When you feed bred mares, consider at least 3 different stages:

1. first 2/3rd of pregnancy,
2. last 3 months of pregnancy, and
3. lactation.

During each of these periods, the mares' requirements for energy, protein, calcium and phosphorus increase (Table 2).

First 2/3 of Pregnancy

Because fetal size does not increase much during this time, the pregnant, non-lactating mare's nutrient needs are not different from those of the mature horse at maintenance (Table 2). Therefore, you can feed a pregnant mare a maintenance diet during early gestation.

Keep the pregnant mare's body condition fairly constant and do not let it fluctuate. If a mare loses condition before foaling she will be more difficult to re-breed. Also, the overfed, obese mare is more likely to have trouble foaling as a result of poor muscle tone and condition.

Generally, the 8% dietary protein requirement can readily be met by pasture or hay alone without any concentrate supplementation. However, most horsemen feed a small amount of grain. This concentrate should not exceed 20% of the daily feed intake. The best indicator of the mare's nutritional status is her condition. Obviously if the mare is losing condition, more concentrate is required.

The first 2/3rds of pregnancy is an ideal time to adjust mares' body condition, particularly the hard keeping

mare. In these cases feed mares to increase their energy stores while the nutrient demands of pregnancy are low.

Last 3 Months of Gestation

The fetus increases its weight by 1 lb/day during the last 3 months of gestation, accounting for 2/3 of fetal growth. Therefore, requirements for energy, protein, calcium and phosphorus increase greatly. Recent research suggests that mares fed to gain weight during pregnancy will do a better job of raising a foal and have enhanced rebreeding efficiency. This effect may be because post partum weight loss is minimized, which results in higher conception rates in lactating mares. However, if the mare is overweight, do not give her any additional feed beyond what she needs for maintenance during this period. Table 2 shows the mare's nutrient requirements in late pregnancy.

If you are feeding a good quality alfalfa or legume hay, you may not need grain supplementation to meet the mare's nutrient requirements. However, feeding concentrate during the last 90 days of pregnancy is common and is a good practice to ensure adequate nutrition. Table 3 shows how much grain is required with hay for broodmares.

Table 2. — Minimum Nutrient Concentrations Needed in Diets of Mares^{a,b}

	Crude Protein %	Digestible Energy Mcal/lb	Calcium %	Phosphorus %	Vit. A IU/lb
Barren Mares & 1st 7-8 mo. pregnancy	8.0	.9	.30	.20	650
Mares last 90 days of gestation	10	1.0	.45	.35	1,400
Lactating Mares 1st 3 months	12.5	1.2	.45	.35	1,150
Lactating Mares 3 mo. to weaning	11.0	1.1	.40	.30	1,000

^a90% dry matter or as fed basis

^bThese are concentrations needed in the total diet. If grass hay is fed then increase the amount of protein in the concentrate mix.

Table 3. — Approximate Amounts of Grain (Lb) Needed with Hay* for Broodmares

	D.E. Req. (per lb of feed) Mcal	1100 lb. mare		1300 lb. mare	
		Avg Hay lb	Good Hay lb	Avg Hay lb	Good Hay lb
Barren Mare & 1st 2/3 of pregnancy (maintenance)	1.00	3.0	—	4.0	—
Pregnancy (last 90 days)	1.10	7.0	5.0	8.0	5.0
Lactation (1st 3 months)	1.20	14.0	12.0	16.0	14.0
Lactation (3 months-weaning)	1.10	9.0	6.0	10.0	6.0

*Hay fed free-choice in addition to grain



Mare in last 3 months of gestation.

Table 4. — Composition of Mare's Milk

Protein %	Fat %	Gross Energy (Kcal/lb)	Ca (Mg/dl)	P (Mg/dl)
2-3	1-3	215	80-120	45-90
Mg (Mg/dl)	Cu (Mg/Kg)	Se (Mg/Kg)	Zn (Mg/Kg)	Fe (Mg/Kg)
6-12	0.15-0.4	0.01-0.03	2-4	0.5-0.9

Table 5. — Feeding Programs for the Lactating Mare

Type of Roughage fed	Amt of concentrate needed* (lb/100 lb/day)	Type of salt-mineral mix preferred
Alfalfa (or other legume)	.05	Balance calcium and phosphorus
Green grass pasture	0.75-1.0	Trace-mineralized salt
Mature grass pasture or grass hay	1.3-1.5	Trace-mineralized salt

*When concentrate mixes similar to those in Table 8 are fed

As her pregnancy continues and the foal's size increases, the pregnant mare may not be able to consume enough bulky, low energy feeds to meet her nutrient needs and maintain optimum body condition. Therefore, give her concentrated sources of energy, protein, vitamins and minerals. Feed a concentrate mixture at 0.5 to 1.0 lb/100 lb BW/day with good quality grass hay or mixed legume-grass hay (Table 7). A good thumb rule for mares of light horse breeds is 5-8 lb of grain/day in addition to hay.

When you feed a legume hay, the mare may not get enough phosphorus. You can provide it by allowing free access to a salt-mineral block containing phosphorus. Be careful to ensure a proper Ca:P ratio. This salt-mineral block should be the only available salt, because if other salt is available, the mare may not consume enough phosphorus. If grass pasture is available, or grass hay is being fed, the mare will generally need more calcium, phosphorus and protein than provided by the forage.

Feeding the Lactating Mare

Lactation is a period of substantial physiological stress. The lactating mare's nutrient needs are greater than those of any other class of horse with the possible exception of the horse in intense training. During this time the mare must recover from the stress of parturition, produce milk and re-breed. The lactating mare has an increased requirement for water, protein, energy, calcium and phosphorus. A normal, healthy mare will produce about 3% of her body weight in milk per day, during the first 3 months of lactation and 2% in late lactation. This means a 1000 lb mare will produce roughly 30 lb of milk per day during early lactation and roughly 20 lb per day during late lactation. Failure to meet the mares' nutrient needs during lactation will have more effect on her body condition than on milk production. However if the nutrient deficiency is ex-

treme, milk production and re-breeding efficiency will both decrease. Most recent research indicates that the composition of the milk produced will not change with dietary change. Table 4 shows the composition of mares' milk.

The 1100 lb lactating mare will consume 2.75% of her body weight in total feed/day, (concentrate and forage). Therefore she will need 30 lb of total daily feed containing 12.5% CP, .45% calcium and .30% phosphorus in the total ration. Energy needs during lactation increase approximately two-fold over maintenance. During lactation, some grain supplementation will be necessary to let the mare produce milk to ensure the foal's optimum growth. If a good quality legume hay is fed, the protein requirement will most likely be met, but energy will be deficient. Sample concentrate mixes for milking mares are shown in Table 8. Table 5 shows approximate amounts of grain required to meet the broodmare's needs when different roughage sources are used.

As the mare's milk production decreases, decrease her feed intake to maintain proper body weight. At weaning, reduce feed further. Gradual feed reduction will enable the mare to "dry up" quicker and prevent her from getting too fat.

Fescue and the Broodmare

Broodmares grazing or being fed endophyte infested rescue pasture and/or hay are subject to reproductive abnormalities such as abortions, prolonged gestations, still births, thickened and tough placentas and agalactia (lack of milk). Fescue is also thought to be associated with low conception rates and early gestation problems. All mares may not be affected by toxic fescue and the response may vary annually.

The toxic factor in fescue has not been definitely identified, but the presence of an endophytic fungus, *Acremonium coenophialum*, has been linked with the toxicosis. The fungus is seed borne only and thus is not transmitted from plant to plant. Fescue plants free of the fungus apparently never have become in-

fectured. Unfortunately, a vast majority of established fescue pastures are infested with the endophyte. Some fungus-free fescue varieties have been developed. Another possible way of diluting the effects of toxic fescue is to overseed with legumes or other grasses. (For more information see Cooperative Extension publications AGR-119, Alternatives for Fungus-Infected Tall Fescue and AGR-126, Replacement of an Endophyte-Infected Tall Fescue Stand.)

Fescue alone will not meet the nutrient requirements of the pregnant mare during the last 90 days of gestation or lactation. Therefore, some of the fescue problems encountered by pregnant mares may be associated with an inadequate plane of nutrition.

In light of these facts, it is recommended that pregnant mares not be allowed access to fescue. Remove pregnant mares from fescue pastures and put them in fescue free pastures or pastures overseeded with legumes or other grasses.

What if you are forced to continue using fescue pastures? Here are some recommendations:

- Supplement grain and minerals as needed to meet the mares' nutritional requirements. Group horses according to their needs.
- Provide a good quality hay (preferably legume) during the last 90 days of gestation.

- If within 14 days of the expected foaling date no mammary development has taken place, immediately remove the mare from the fescue pasture to a drylot or stall. Feed liberal quantities of high quality hay and concentrate as the condition of the mare allows.
- Closely monitor mares foaling under these high risk conditions. Have an experienced foaling attendant present. Have a good supply of colostrum readily available. Be prepared to handle cases of agalactia.

Table 6. — Grain Mixture^a for Maintenance of Barren Mares and Mares in Early to Mid-Gestations

	%	lb/Ton
Rolled Oats	55.7	1114
Cracked Corn	25.0	500
Soybean Meal	—	—
Wheat Bran	10.0	200
Molasses	7.5	150
Dicalcium Phosphate	—	—
Ground Limestone	1.5	30
T.M. Salt ^b	.5	10
Vitamin Premix ^c	.05	.5
	100.0	2000
CP, %	11.0	
Calcium, %	.60	
Phosphorus, %	.40	

^aFed with hay or pasture. Remember if good quality hay is fed no grain supplementation is needed.

^bSee Table 10.

^cSee Table 11.

Table 7. — Sample Grain Mixtures^a for Mares in Late Gestation

	Mixture No.			
	1		2	
	%	lb/Ton	%	lb/Ton
Rolled Oats	55.0	1100	39.3	787.5
Cracked Corn	23.0	460	34.0	680
Soybean Meal	2.2	44	—	—
Wheat Bran	12.0	240	10.0	200
Molasses	5.0	100	7.0	140
Ground Limestone	1.5	30	1.5	30
T.M. Salt ^b	.5	10	.5	10
Vitamin Premix ^c	.5	10	.5	10
	100.0	2000	100.0	2000
CP, %	12.0		13.0	
Calcium, %	.66		.70	
Phosphorus, %	.41		.40	

^aFed with hay or pasture.

^bSee Table 10.

^cSee Table 11.

Table 8. — Sample Grain Mixtures^a for Lactating Mares

	Mixture No.			
	1st 3 months		> 3 months	
	1		2	
	%	lb/Ton	%	lb/Ton
Rolled Oats	44.5	890	48.0	960
Cracked Corn	25.0	500	25.0	500
Wheat Bran	10.0	200	10.0	200
Soybean Meal	10.0	200	7.0	140
Molasses	7.0	140	7.0	140
Dicalcium Phosphate	1.0	20	.5	10
Ground Limestone	1.5	30	1.5	30
T.M. Salt ^b	.5	10	.5	10
Vitamin Premix ^c	.5	10	.5	10
	100.0	2000	100.0	2000
CP, %	14.5		13.5	
Calcium, %	.90		.80	
Phosphorus, %	.60		.50	

a Fed with hay or pasture.

b See Table 10.

c See Table 11.

Table 9. — Two Sample Grain Mixtures^a that can be Used on the Farm for Several Classes of Horses

	Young Horses Lactating Mares		3 yr. olds & up Broodmares & working Horses	
	%	lb/Ton	%	lb/Ton
	Rolled Oats	41.5	830	55.0
Cracked Corn	25.0	500	23.0	460
Soybean Meal	12.5	250	2.2	44
Wheat Bran	10.0	200	12.0	240
Molasses	7.0	140	5.0	100
Dicalcium Phosphate	2.0	40	—	—
Ground Limestone	1.0	20	1.5	30
T.M. Salt ^b	1.0	20	1.0	12
Vitamin Premix ^c	+	+	.5	10
	100.0	2000	100.0	2000
CP, %	15.5		12.0	
Calcium, %	.90		.66	
Phosphorus, %	.80		.41	

^aFed with hay or pasture.

^bSee Table 10.

^cSee Table 11.

Table 10. — Trace Mineralized Salt

Mineral	Trace Mineral Content	
	TM Salt	Amt. of Grain Mixture
Iodine	0.007%	318 mcg
Iron	0.80%	36 mg
Copper	0.16%	7 mg
Zinc	1.00%	45 mg
Manganese	0.40%	18 mg
Selenium	.002%	.09 mg

Table 11. — Vitamin Premix for Horses

Vitamin	Per lb Premix	Amt per lb feed when premix added at:	
		2 lb/Ton	1 lb/Ton
Vitamin A	1,000,000 I.U.	1000 I.U.	500 I.U.
Vitamin D	100,000 I.U.	100 I.U.	50 I.U.
Vitamin E	5,000 I.U.	5 I.U.	2.5 I.U.
Thiamine	1.2 g	1.2 mg	0.6 mg
Riboflavin	800 mg	0.8 mg	0.4 mg
Pantothenic Acid	800 mg	0.8 mg	0.4 mg
Vitamin B12	5 mg	5.0 mcg	2.5 mcg

Table 12. — Suggested Feeding Schedule-Example Grain Mixture

Type of Ration	Rate Feeding*	Remarks
Broodmare	Bred mares- ½ - 1 lb per 100 lb body wt.	For feeding with good quality grass hay or light mixed grass-legume hay.
	Lactating mares 1 ½ -2 lb per 100 lb body wt.	
Maintenance and Working	Mature, idle horses - ½ - ¾ lb per 100 lb body wt. Working horses - ¾ to 1¾ lb per 100 lb body wt.	For feeding with good quality grass hay or light mixed grass-legume hay.

*Amounts of grain mixture may be varied as indicated to provide for more economical rations if good quality pasture is available or if liberal amounts of good quality hay is fed.