

# AGRI-FACTS

Practical Information for Alberta's Agriculture Industry

August 2002

Agdex 460/50-6

## Feeding the Broodmare

**M**ares are expected to grow a healthy foal inside them for 11 months and produce enough milk for that foal for up to 6 months. Furthermore, many mares are expected to raise healthy foals year after year, requiring successful rebreeding while the previous year's foal is still by her side.

Because nutrition influences each stage of the broodmare's production cycle, nutritional management may, in many ways, determine the success of the breeding program.

### Ideal body condition for broodmares

Several studies have found that the mare's body condition will influence her reproductive performance. Mares that are moderately fleshy or fat can be expected to:

- cycle earlier in the year
- have fewer cycles per conception
- have a higher pregnancy rate
- maintain pregnancy more easily than thin mares

Mares in fleshy condition will have a slight crease down the back and will have fat covering the outlines of the ribs. Noticeable amounts of fat can also be seen along the sides of the neck and withers, and the fat deposited around the tail head feels soft.

Mares with poor body condition have little to no fat cover along the sides of the neck or withers, behind the shoulder or around the tail head. Also, the backbone and a faint outline of the ribs can be seen.

Correct nutritional management will ensure that mares enter the breeding season in optimal body condition. For more information on body condition scoring your mares, see the Alberta Agriculture factsheet "Body Condition Scoring Your Horse" (Agdex 460/20-1).

### Feeds for broodmares

No matter what stage of reproduction the mare is in, the major nutrients of concern are energy, protein, calcium and phosphorus. The trace minerals, iodine, copper, zinc and manganese, are also important for the pregnant and lactating mare, as are the vitamins A, D and E.

**Quality forages should be the basis of feeding programs for all horses.** Feeding high quality hays will provide most of the nutrients needed by broodmares. Good quality pasture may be able to replace some or all of the hay fed. However, during winter or where pasture availability is limited, mares will need to be supplemented with hay.

*For maximum reproductive efficiency, the mare should be moderately fleshy or heavier before breeding and should be fed to maintain this condition*

Grain supplementation can be incorporated into the feeding program when energy needs increase (during late gestation and lactation) or if hay quality is questionable.

Additional calcium, phosphorus, trace mineral and vitamin needs can be met by providing a suitable mineral/vitamin supplement (such as a livestock mineral with a 1:1 ratio of calcium and phosphorus containing 18 per cent calcium and 18 per cent phosphorus). In addition, trace mineralized salt should be provided "free choice" at all times.

Most commercial grain mixes are fortified with minerals and vitamins (if in doubt, check the label or ask the feed store representative). If you are feeding a mineral-fortified commercial grain mix at levels recommended on the package (usually at least 4 to 5 pounds (2 kg) per horse per day), you may only need a trace-mineralized salt. If you are feeding less than the recommended level, or plain oats, you will need additional mineral supplementation.

Table 1 shows the average nutrient composition of common horse feeds grown in Alberta. Ideally, you should have your feeds analyzed by a laboratory to obtain more accurate nutrient values for balancing your rations.

**From breeding to weaning, a mare goes through three periods of differing nutritional needs:**

- 1. Early to mid-gestation (months 1 to 8)**
- 2. Late gestation (months 9 to 11)**
- 3. Lactation**

## Feeding mares in early- to mid-gestation

Early to mid-gestation includes the early part of gestation (after breeding in an open mare or after weaning in a lactating mare) up to the end of the eighth month of pregnancy.

During this stage, the nutrient demands of the developing fetus are minimal. Growth of the foal ranges from 0.2 to 0.5 pounds (90 to 220 g) per day (Figure 1). Therefore, the mare's nutrient requirements in early to mid-gestation are similar to a mature, idle horse at maintenance (Table 2).

**Table 1. Average nutrient composition of feeds grown in Alberta\***

	<b>Digestible Energy Mcal/lb (Mcal/kg)</b>	<b>Protein %</b>	<b>Fibre (ADF) %</b>	<b>Calcium %</b>	<b>Phosphorus %</b>
Alfalfa hay	1.25 (2.75)	18.1	31.9	1.76	0.22
Mix alfalfa/grass hay	1.22 (2.68)	14.8	30.7	1.58	0.18
Brome grass hay	1.21 (2.66)	9.6	36.0	0.52	0.16
Timothy hay	1.19 (2.62)	8.3	38.0	0.48	0.14
Native grass hay	1.18 (2.60)	8.2	38.3	0.46	0.13
Green feed	1.22 (2.69)	9.4	34.8	0.37	0.21
Oats	1.60 (3.53)	11.5	14.0	0.09	0.35
Barley	1.69 (3.73)	12.3	7.0	0.07	0.38
Wheat	1.77 (3.90)	15.8	3.9	0.06	0.39

\* Values are presented on a 100% dry matter basis.

**Table 2. Minimum nutrient concentrations needed in diets of mares\***

	<b>Digestible Energy Mcal/lb (Mcal/kg)</b>	<b>Crude Protein %</b>	<b>Calcium %</b>	<b>Phosphorus %</b>	<b>Vitamin A IU/lb</b>
Idle horse at maintenance	0.90 (2.00)	8.0	0.30	0.20	850
Early to mid-gestation	0.90 (2.00)	8.0	0.30	0.20	850
Late gestation	1.10 (2.40)	11.0	0.45	0.35	1,700
Early lactation (month 1, 2 & 3)	1.20 (2.60)	13.5	0.55	0.35	1,700
Late lactation (month 4, 5 & 6)	1.15 (2.45)	11.0	0.40	0.25	1,400

\* Values are presented on a 100% dry matter basis; table values are concentrations needed in the total diet.

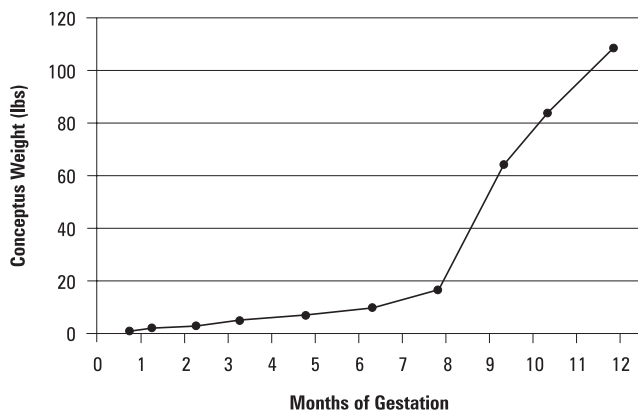


Figure 1. Growth rate of the equine fetus

Feeding a high quality grass hay or alfalfa/grass mix hay may be sufficient to meet the energy and protein requirements of a mare in early gestation (Table 3). On average, mares will require from 1.5 to 2 per cent of their body weight in high quality hay (1.5 to 2.0 pounds per 100 pounds of body weight or 1.5 to 2 kg/100 kg body weight).

Table 3. Examples of feeding programs for 1,100 lb (500 kg) broodmares in early to mid-gestation			
Feed	Ration 1	Ration 2	Ration 3
Alfalfa/grass hay	20 lbs (9 kg)	16 lbs (7.25 kg)	–
Grass hay	–	–	22 lbs (10 kg)
Oats	–	3 lbs (1.4 kg)	–
18:18 mineral <sup>a</sup>	1 oz (28 g)	1 oz (28 g)	1 oz (28 g)
TM salt <sup>b</sup>	free choice	free choice	free choice

<sup>a</sup> 1:1 livestock mineral (18% calcium, 18% phosphorus).

<sup>b</sup> Trace-mineralized salt (with iodine).

Free-choice grazing of high quality pasture can also be excellent for maintaining mares in early pregnancy. Mares will typically consume 2 to 3 per cent of their body weight in pasture forage (2 to 3 pounds per 100 pounds of body weight or 2 to 3 kg/100 kg body weight).

Although a high quality forage will usually maintain a mare already in acceptable body condition, it will not put weight on a mare in marginal or thin condition. Grain may be necessary (0.5 to 0.75 per cent of body weight) if the mare needs to improve body condition or if the quality of hay is poor.

To help meet vitamin and mineral needs, a 1:1 livestock mineral (or other suitable mineral supplement) and a trace-mineralized salt should be available “free choice.”

## Feeding mares in late gestation

Late gestation includes the ninth, tenth and eleventh months of pregnancy. At this time, the developing foal is growing at an accelerated rate (0.75 to 1.0 pounds (350 to 450 g) per day – Figure 1). In fact, during the last 90 days of gestation, the foal will gain 60 per cent of its weight at birth.

To support this growth, the mare’s energy and protein requirements increase (Table 2). In addition, fetal uptake of minerals is greatest during the last three months of gestation, so the mare’s calcium and phosphorus needs increase substantially (Table 2).

The elevated energy and protein requirements of a mare in late gestation can be met by increasing the amount of alfalfa/grass mix hay fed (Table 4). While the energy and protein requirements may be met with a high quality forage diet, it is important that adequate intakes of minerals are also provided with an appropriate mineral supplement and “free choice” access to a trace mineralized salt (Table 4).

Table 4. Examples of feeding programs for 1,100 lb (500 kg) broodmares in late gestation			
Feed	Ration 1	Ration 2	Ration 3
Alfalfa/grass hay	24 lbs (11 kg)	18 lbs (8.2 kg)	–
Grass hay	–	–	18 lbs (8.2 kg)
Oats	–	4 lbs (1.8 kg)	–
16% grain mix <sup>a</sup>	–	–	4 lbs (1.8 kg)
18:18 mineral <sup>b</sup>	2 oz (56 g)	2 oz (56 g)	–
TM salt <sup>c</sup>	free choice	free choice	free choice

<sup>a</sup> Commercial grain mix with 16% protein, assumed to be fortified with appropriate minerals and vitamins.

<sup>b</sup> 1:1 livestock mineral (18% calcium, 18% phosphorus).

<sup>c</sup> Trace-mineralized salt (with iodine).

While the mare's requirements during late gestation can be met by feeding hay alone, there are several advantages to including a small amount of grain:

1. Growth of the foal during late gestation can compress the mare's digestive tract, reducing her digestive capacity. Including grain in her diet will supply the additional energy she needs while reducing the amount of hay she has to consume.
2. Adding livestock mineral to a small amount of grain will ensure adequate mineral intake.
3. Grain may help meet the mare's nutrient requirements when the quality of forage is questionable.
4. Mares will likely be receiving grain during lactation. Feeding some grain during late gestation will help adapt the mare to a larger amount of grain fed during lactation.

## Feeding mares during lactation

Mares should enter lactation in fleshy body condition. Underfeeding mares during lactation can lower milk production, ultimately affecting the growth of her foal. A thin body condition will also decrease the mare's ability to be rebred.

Once the mare foals, her requirements increase dramatically (Table 2). In addition to her body's own needs, the mare has to produce 2 to 3 per cent of her body weight per day as milk (Figure 2). Furthermore, the mare is often expected to be rebred after foaling. As a result, her energy and protein needs increase 75 to 100 per cent. In addition, the lactating mare needs three times as much calcium and two and a half times as much phosphorus as she needed in early gestation.

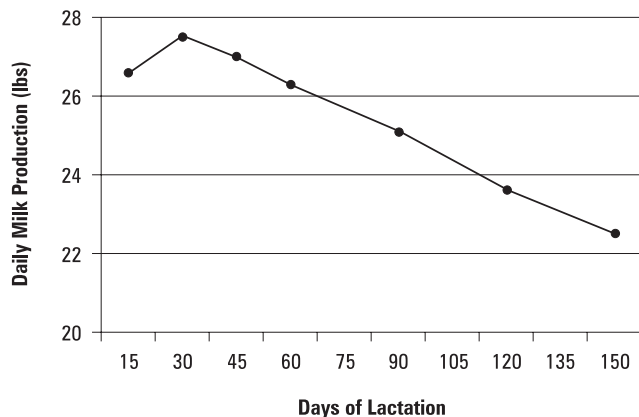


Figure 2. Daily milk production

Meeting the high energy needs of lactation requires grain feeding (Table 5). The increase in grain should take place over 7 to 10 days to avoid digestive upsets, especially if the mare did not receive grain during gestation. Never feed more than 5 pounds (2.2 kg) of grain at a single feeding.

**Table 5. Examples of feeding programs for 1,100 lb (500 kg) broodmares during early lactation**

Feed	Ration 1	Ration 2	Ration 3
Alfalfa/grass hay	20 lbs (9 kg)	–	–
Grass hay	–	20 lbs (9 kg)	20 lbs (9 kg)
Oats	8 - 9 lbs (3.5 - 4 kg)	7 lbs (3.2 kg)	–
16% grain mix <sup>a</sup>	–	–	8 lbs (3.5 kg)
30% protein supplement <sup>b</sup>	–	2.5 lbs (1.1 kg)	–
18:18 mineral <sup>c</sup>	2.25 oz (64 g)	–	–
TM salt <sup>d</sup>	free choice	free choice	free choice

<sup>a</sup> Commercial grain mix with 16% protein, assumed to be fortified with appropriate minerals and vitamins.

<sup>b</sup> Commercial protein supplement (30% protein) with added minerals and vitamins.

<sup>c</sup> 1:1 livestock mineral (18% calcium, 18% phosphorus).

<sup>d</sup> Trace-mineralized salt (with iodine).

High quality alfalfa hay or alfalfa/grass mix hay can supply a large percentage of the protein requirement, whereas a grass hay cannot (Table 5). Therefore, when grass hay is fed, a protein supplement or commercial grain mix should be used. Increased mineral needs can be met by providing a 1:1 livestock mineral, along with "free choice" access to trace-mineralized salt.

The mare's nutrient requirements begin to decline in the fourth, fifth and sixth months of lactation, as milk production declines (Figure 2), and the milk becomes more dilute. As a result, mares will require less supplemental grain during late lactation compared to the first three months of lactation. During the fourth month of lactation, the mare's grain ration can gradually be reduced by half. Once the foal is weaned, the dry, pregnant mare can be managed as an early gestating mare once again.

## Improving body condition

Not all mares enter the breeding season in optimum body condition. They may have had a harsh winter or have lost a lot of weight during lactation. Or maybe it's an older mare that is a hard keeper.

Because the mare's body condition can affect her reproductive performance, as well as her ability to raise a healthy foal, mares in poor condition should be fed to gain weight. Once mares achieve that optimal fleshy condition, they should be fed to maintain that condition year-round.

Within the 1 to 9 body condition scoring system, 45 pounds (20 kg) of gain are needed for each incremental increase in body condition score. Weight gain involves increasing the number of calories, or the digestible energy, in the diet. An extra 10 Mcal (10,000 calories) of digestible energy are needed for the mare to gain 1 pound (0.5 kg).

If the goal is to improve body condition by one score level (say from a 4 to a 5), the mare would need an extra 450 Mcal on top of what she already receives in her diet. This is equivalent to over 280 pounds (127 kg) of oats! If she needed to improve two scores (say from a 4 to a 6), she would need twice as much.

Obviously, the mare cannot eat this all at one time, so we have to increase her ration over a period of two or more months. This example illustrates that it takes **time** to safely put weight on a mare. Table 6 shows some examples of how many days and how much additional grain is needed to improve body condition score one or two levels.

The best time to improve a mare's body condition is during early to mid-gestation. Studies have shown that mares will gain weight efficiently and easily during this time if given adequate feed. Simply adding an extra 3 pounds (1.4 kg) of grain to any of the diets in Table 3 will help the mare gain 45 pounds (20 kg) and improve one body condition score in three months.

Ideally, we want the mare to enter late gestation in fleshy condition, so she will be equipped to handle the accelerated foal growth at this time. However, if she is still in poor condition, we still have time to help her gain weight. Again, increasing her grain ration by 4 to 6 pounds (1.8 to 2.8 kg) above what is recommended in Table 4 will improve her body condition one score by foaling.

In contrast to gestation, the demands of milk production make it almost impossible to greatly improve the mare's body condition during lactation. Thin mares tend to put dietary nutrients into milk production, rather than store them as fat, making weight gain difficult and costly. The grain portion of her ration may have to be doubled over that presented in Table 5 in order to see any increase in body condition. Such high levels of grain have the potential to cause colic or founder if not fed properly. Therefore, it is best if the mare is in optimum body condition at the time of foaling.

**Table 6. Time and additional grain required to improve body condition score by 1 or 2 levels**

Improving ONE Condition Score			Improving TWO Condition Scores		
Days Needed	Daily Gain	Additional Grain Needed	Days Needed	Daily Gain	Additional Grain Needed
60	0.75 lbs/day (0.35 kg/day)	4.5 lbs/day (2.0 kg/day)	90	1.00 lbs/day (0.45 kg/day)	6.0 lbs/day (2.8 kg/day)
90	0.50 lbs/day (0.22 kg/day)	3.0 lbs/day (1.4 kg/day)	120	0.75 lbs/day (0.35 kg/day)	4.5 lbs/day (2.0 kg/day)
120	0.40 lbs/day (0.2 kg/day)	2.3 lbs/day (1 kg/day)	150	0.60 lbs/day (0.30 kg/day)	3.5 lbs/day (1.6 kg/day)

# General feeding guidelines

In summary, here are a few things to remember when designing a feeding program for your broodmares:

1. When feeding broodmares, take into consideration:
  - Mare's body condition
  - Mare's stage of production
  - Quality of feeds available
2. Good quality forage is the basis for all feeding programs.
  - In early to mid-gestation, good quality forage supplemented with salt and minerals may be all that is needed to meet the mare's nutrient requirements.
  - During lactation, grain supplementation will help meet the increased demands of milk production.
3. The amount fed should be varied as needed.
  - The mare's body weight and condition are the best indicators of the amount of feed needed.
  - The mare should be moderately fleshy at foaling and should be fed as much as needed to maintain this weight, at least until weaning.
4. Observe grouped mares individually.

Those in poor body condition may need to be removed from the herd and fed supplemental grain.
5. To reduce the risk of colic and founder:
  - Changes to the diet should be made gradually over one to two weeks.
  - Never feed more than 5 pounds (2.2 kg) of grain at a single feeding.
6. Cold temperatures and exercise increase the mare's energy requirement. Increase the amount of hay you feed or provide extra grain during the cold winter months or if your mare is being ridden.

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