PREDICTION OF FOALING

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Clinical signs of impending foaling begin subtly a month or so prior to the expected due date. Changes become more dramatic and occur more rapidly as day of foaling approaches. The first noticeable change is in the mammary gland, which begins to enlarge 2 to 6 weeks prior to term. Some mares may develop a large amount of edema around the udder before the gland itself becomes enlarged. Mammary gland development will be much more pronounced in mares that have previously had foals than in maiden mares. The teats or nipples will remain relatively flat until the last few days prior to foaling, at which time they will fill with milk. The secretion by the mammary gland changes from a clear straw-colored fluid to a more turbid milk-like substance as the due date draws near. The mammary secretion becomes thick and honey-like as colostrum develops within the last day or two prior to foaling. A thick, waxy exudate is often observed to accumlulate at the ends of the teats 24 to 48 hours prior to foaling. 'Waxing' of the teat ends is a classic sign that foaling is imminent. The extent of waxing can range from tiny droplets to elongated candlewax-like formations that project an inch or more from the teat ends. However, not all mares will wax up and the duration from onset of waxing to foaling can be quite variable. In addition, some mares will transiently develop wax at the teat ends 1 to 2 weeks prior to foaling.

In the last 2 to 3 weeks of pregnancy, the abdominal muscles relax causing a pronounced 'dropping' of the abdomen, which is especially noticeable in older mares. During the last week prior to foaling, the ligaments, muscles and other structures surrounding the mare's pelvis and perineum soften in preparation for birth. The vulva becomes relaxed, elongated and edematous in the hours immediately prior to foaling. The behavior of the mare often changes during the last few days or hours preceding foaling. Mares near term may tend to isolate themselves, go off feed and pass small amounts of manure or urine frequently.

There are several tests that may be used to predict the onset of labor in addition to close observations. Body temperature measurement has been described as a means of predicting onset of labor in mares. A decrease in body temperature may begin about 4 hours prior to foaling. Changes in body temperature can be missed if temperature readings are not taken frequently or may not occur if the mare becomes stressed during handling. In addition, some mares do not exhibit any changes in body temperature prior to foaling. As a consequence, evaluation of body temperature is not commonly utilized as an indicator of impending foaling.

Prediction of foaling based on changes in calcium concentrations in mammary secretions has been used successfully for many years. Calcium concentration in milk increases sharply as the mare approaches the time of foaling. Calcium levels above 40 mg/dl or 200 ppm indicate that the mare has a high probability of foaling within the next 48 hours. Conversely, mares with a milk calcium level of less than 40 mg/dl are unlikely to foal in the next 24 hours. It is recommended that testing be initiated several days prior to the expected due date. Testing in mares with an unknown breeding date should begin when significant udder development is noted and a small amount of secretion can be obtained. One commercial kit (Predict-a-Foal) uses a test strip that measures both calcium and magnesium. The strip is dipped into a specific dilution of milk and distilled water and observed for color change in any of the 5 test squares. The chance of foaling that night increases as the number of squares changing color increases. A second test kit (FoalWatch) is based on a quantitative chemical reaction measuring calcium carbonate. A milk sample is obtained and mixed with distilled water. An indicator dye is added and small amounts of the test sample are aspirated into a calibrated titration chamber until the color in the chamber turns from orange-pink to blue. Level of calcium carbonate is determined using a scale provided on the glass chamber. Again, high calcium levels suggest a high probability of foaling, while low calcium levels suggest that the mare is less likely to foal in the next 12 to 24 hours.

The last few days prior to foaling can be especially tedious for the owner, farm manager or foaling staff. Late-term pregnant mares should be monitored closely to optimize services of farm or veterinary personnel, maximize use of foaling space, and to assist with the safe delivery of the foal if needed. Milk calcium tests may be beneficial to predict impending foaling on farms with limited foal-watch personnel.

Waxing of teat ends

Table 1. Clinical signs of impending foaling

Sign	**Time frame relative to foaling**
Mammary gland development	Begins 2-6 weeks prior to foaling
Perineal relaxation	1-3 weeks prior to foaling
Engorgement of teat ends with colostrum	7-10 days prior to foaling
Waxing of teat ends	48-72 hours prior to foaling
Elongation and swelling of the vulva	0-24 hours prior to foaling
Dripping milk from udder	12-24 hours prior to foaling