

Understanding Foal Development and Its Relevance to Raising Orphaned Foals

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About This Column

Behavior problems in horses are often not given proper attention. While most veterinary practices are necessarily geared toward the medical aspect of care, there are many opportunities in which behavior awareness can benefit the horse, the owner, and ourselves. This column acknowledges the importance of behavior as part of veterinary medicine and speaks practically about using it effectively in daily practice.

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At this time of year, broodmares are becoming heavy with foals that will be born in the winter and spring, and it is time to start preparing for the birth and care of young foals. Whether a clinician is raising a single foal or is responsible for a large herd of broodmares and their progeny, understanding normal foal development is essential to knowing what to expect as foals mature (Table 1^{1,2}). It is also important to raise orphaned foals to be both physically and behaviorally normal.

DEPENDENCE

The first month of a foal's life is called the period of *dependence*, during which the foal is most dependent on the mare for nourishment and protection and has the least contact with other members of the herd. During the first week of life, the foal remains within 16 feet (5 meters) of its mother more than 99% of the time. Play is infrequent, consisting mainly of short bucks and runs while close to the mother. In addition, foals of this age are particularly likely to play with the mare's tail, ears, mane, and halter. The mare is generally tolerant of this behavior. While foals rarely graze during this time, foals only 1 day old may nibble a little grass.

Ungulates are classified into two groups: followers and hidiers.³ When followers are young, they follow and remain with the mother and, in herd species, the herd. Thus, followers rely on the presence of adults for protection from predators. Followers nurse frequently. In contrast, when hidiers are young, their mothers take them to areas of tall grass or brush where they hide, remaining still for many hours. Nursing bouts are infrequent but long among hidiers. Horses are classified as followers. Nursing is very frequent, occurring about four to five times per hour during the daytime in the first week and gradually decreasing in frequency over subsequent weeks and months; at the end of the first month, however, the foal still nurses two to three times per hour. Nursing bouts are typically short, lasting approximately 1 to 1.5 minutes. This is an important consideration in rearing orphaned foals (i.e., they should be fed small amounts frequently to closely match their natural nursing schedule).

Coprophagy of maternal feces peaks and is considered normal during the first few weeks of a foal's life. At this age, foals can differentiate the feces of their mother from that of a nonlactating, nonpregnant mare and selectively eat only their mother's feces, even when they do not see the source of the feces. Research in other species suggests that maternal feces during early lactation is a source of important nutrients, including deoxycholic acid, which is necessary for normal deposition of myelin in the developing nervous system and for protection from infantile enteritis. Therefore, normal development of orphaned foals may be facilitated by ensuring that they have access to the feces of healthy females in early lactation (see the box on page 320).^{1,2,4-6}

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Table 1. Major Periods of Foal Development^{1,2}

Period	Age (Months)	Main Characteristics of Foal Behavior
Dependence	1	<ul style="list-style-type: none"> • Stays close to mother • Nurses frequently • Spends substantial time in recumbency • Coprophagy peaks • Flehmen peaks in colts
Socialization	2–3	<ul style="list-style-type: none"> • Social interactions peak • Play peaks • Snapping peaks • Allogrooming peaks
Stabilization and developing independence	≥4	Time budgeting progressively becomes more like that of an adult

Flehmen, in which the foal's head and upper lip are raised and air is inhaled deeply, driving molecules from the environment into the vomeronasal organ, peaks during this time, especially in colts. During the first month of life, colts perform flehmen almost once per hour, while fillies do it approximately once every 5 hours. Almost one-third of the incidents in which colts perform flehmen are in response to urination by a nearby herd member. Research in other species indicates that exposure to urinary pheromones is essential for normal growth and sexual development. As this may also be the case in horses,⁶ it is advisable to soak rags in the urine of other horses and hang the rags in the stall or paddock of orphaned foals. Urine of mares in estrus may be particularly important, although this idea is only hypothetical at this point.^{1,2,5}

During the first week of life, foals spend almost one-third of the daylight hours in recumbency, lying on their sternum or side. The amount of time spent in this state steadily declines with maturity and is gradually replaced with increasing periods of upright rest, in which a horse engages its stay apparatus to rest and enter slow-wave sleep while standing. While foals do engage in some (3% to 4% of the daylight hours) upright rest during the first week of life, their amount of upright rest does not match that of adults in the same environment until the fifth month of life.

SOCIALIZATION

The second and third months of a foal's life are the primary period of socialization. The foal begins leaving its mother's side more frequently, often to interact with other members of the herd, if it is part of one. While adults

often ignore the foal—perhaps after a brief investigation—or even drive it away, foals do interact with each other in this period, leading to the formation of play groups. The amount of time spent in play peaks during this period and is the same for colts and fillies. However, fillies engage in more running, jumping, and bucking play, while colts engage in more play that mimics combat. This is logical, as colts must begin to master combat skills at a young age. In play groups, foals learn the boundaries of how roughly they can behave toward their peers. For example, a

colt that bites a filly too hard is likely to be kicked and subsequently not played with by that filly for a time.

During this period, rates of coprophagy are high in colts and fillies, and rates of flehmen are high in colts but decline from the earlier peak. Therefore, if it is impossible to raise a foal with or close to other horses, continued provision of urine-soaked rags may be beneficial. Also, continued access to the feces of mares in early lactation may be important for optimal health and development.

Mutual grooming, also called *allogrooming*, peaks at this time. Equids allogroom by using their incisors to scratch and gently bite the skin of the withers, neck, and crest of their grooming partner. Horses have difficulty

Special Care for Orphaned Foals in Addition to Providing Milk

- Do not keep the foal socially isolated from its species. Ideally, provide a nurse mare that accepts foals that are not her own. If this is impossible, the presence of friendly geldings, nonlactating mares, or older foals will at least provide the orphan with the opportunity to learn essential social skills.
- In the foal's first 3 months of life, allow the foal access to the feces of healthy mares in the first month of lactation.
- In the foal's first 3 months of life, soak rags in the urine of various mares, including those in estrus, and hang the rags where the foal has access to them. This is especially important when raising orphaned colts.
- When the foal is 2 to 3 months of age, opportunities to interact with peers are important in learning normal social behavior, particularly inhibition of aggression.

grooming these areas on their own, so there is a direct benefit of allogrooming. At this age, fillies allogroom approximately twice as often as do colts. If colts and fillies are in a herd, fillies allogroom with both genders approximately equally or at least in the same proportion as the gender composition of the herd. However, colts allogroom almost exclusively with fillies; same-sex allogrooming is uncommon among males, unless few or no fillies are present. The differences in filly and colt allogrooming are consistent with the lifelong social experiences of the two sexes. In the wild, females remain in multifemale groups in which social bonds between the herd members are important; males live in all-male bachelor groups only until they are strong enough to successfully compete for access to groups of mares. A stallion's relationship with other stallions is primarily combative, not affiliative. However, the ability of a stallion to establish and maintain affiliative relationships with mares may be important to its success with a band of mares.

Snapping, in which the foal retracts the commissure of the lips and makes rapid up-and-down movements of the mandible, peaks during socialization. The foal may also turn its pinnae so that the concave surface is directed laterally and ventrally and/or flex its carpus while it is snapping. Snapping is commonly interpreted as a submissive behavior. However, submissive behaviors function to inhibit aggression by more dominant animals. Snapping does not do this and may, in fact, trigger aggression. Snapping most frequently occurs when a 2- to 3-month-old foal encounters another herd member because the other member approaches or walks past the foal or when the foal approaches an unfamiliar herd member. Snapping occurs mainly in response to the proximity of adults and may be a displacement behavior resulting from a foal's conflicting motivation to interact with or run away from a stranger. The head and mouth movements of nursing foals and snapping foals are very similar.^{1,2,7}

STABILIZATION AND DEVELOPING INDEPENDENCE

Four months of age and older is the period of stabilization and developing independence. During this period, adult maintenance behaviors such as grazing steadily increase in duration and frequency, and foal-typical behaviors steadily decrease. The growing foal's daily activities become more like those of adults. The foal models its grazing after the mother's grazing, at least in

terms of time spent. For example, a 21-week-old foal grazes approximately 60% of the time that its mother is grazing but only 9% of the time that its mother is not grazing. By the fifth month of life, foals spend approximately half of the daylight hours grazing; adults spend approximately 70% of that time grazing. While nursing becomes less frequent, it still occurs one to two times per hour at 6 months of age and is probably an important form of social interaction with the mother, although the percentage of total nutrients provided by the mother is small at this point. In the wild, foals nurse until their mother gives birth to a new foal, at which point the mare typically does not allow the older foal to continue nursing. In the domestic situation, foals are often weaned from their mother at a relatively young age, usually because of human convenience or tradition. However, as long as the mare is in good health and can maintain an acceptable weight, weaning should be delayed to allow continued social development.

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