



Foals' interactions with their mares in relation to nutrition is a current topic of interest for researchers

Importance of Early Attention to Diet

FOALS NEED NECESSARY NUTRIENTS TO THRIVE

By AMANDA DUCKWORTH

THROUGHOUT A HORSE'S lifecycle, specific nutritional needs can vary greatly depending on what the expectations are for each equine. In addition to intended use, a horse's age, breed, body type, and weight directly affect what his or her requirements are.

It should come as little surprise that nutrition continues to be a highly researched area in terms of horse health. Even when it comes to some

of the staples of equine care, there is always more to learn. From a foal's first colostrum to the hay a horse eats daily, it is important to stay up to date on the latest information.

Having a healthy and happy broodmare is important for several reasons, not the least of which is that one of the cornerstones of proper horse care is that a foal must receive colostrum, which is the first milk a mare produces after giving birth.

It is so crucial because foals are born without antibodies in their blood, and colostrum is rich in the antibodies that help keep foals from infection until their immune systems can develop.

Typically, Mother Nature provides what the foal needs, but not always. In January 2025, the *Equine Veterinary Journal* published "Mare colostrum quality and relationship with foal serum immunoglobulin G concentrations and average daily weight gains."

"Foals are said to have suffered from total failure to transfer passive immunity (TFTPI) when serum IgG concentrations are less than 4g/L and partial failure to transfer passive immunity (PFTPI) when serum concentrations are between 4 and 8g/L," explained researchers. "Foals with serum IgG concentrations <4g/L are at risk of increased morbidity and mortality. In other species, FTPI has also been associated with daily liveweight gains, but this is not well published in horses."

Researchers conducted a retrospective observational study to explore risk factors for poor serum IgG concentration. For the study, the data from 535 Thoroughbred foals born to 177 mares were analyzed and included foal sex, birthweight, month and year of birth, and colostrum Brix %. Associations between dam age and colostrum Brix (%) and between foal serum IgG and liveweight gains were also measured.

All of the mares in the study were foaling on one of two stud farms, and no foals were excluded. This included whether they were healthy and stood and nursed.

"Several risk factors were significantly associated with foal serum IgG and mare colostrum Brix (%) in the current work," researchers concluded. "Foal serum IgG concentration was associated with colostrum Brix %, year of birth, and foal birthweight. Later month foaled and older dams were associated with lower colostrum Brix % in the current work, and mares that produced low quality colostrum were more likely to do so in the future. Mare colostrum IgG

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concentration was significantly associated with foal serum IgG concentration. Foals born later in the season had lower average daily gains; however, there is no significant association between foal serum IgG and ADG.

“In the current study, of the 112 colostrum samples with low Brix (<20%), 56 of these resulted in foals with serum IgG concentrations ≤ 8 g/L (indicating partial or complete FTPI), which suggests that further high-quality colostrum supplementation for these foals needs to happen more promptly in practice. Clinicians should be diligent in testing serum IgG levels in all foals and ensure that foals with higher birthweights receive adequate colostrum since there has been an upward trend in Thoroughbred foal birthweights.”

Once a foal has successfully entered the world, keeping them fed and healthy is a dedicated line of work for many. According to the Association of Equine Practitioners (AAEP), from birth to becoming a 2-year-old, a young horse can achieve 90% or more of its full adult size and sometimes puts on as many as three pounds per day. With that in mind, the AAEP published “Help Your Foal Grow with Proper Nutrition.”

“A healthy foal will grow rapidly, gaining in height, weight, and strength almost before your eyes,” explained the AAEP. “Feeding young horses is a balancing act, as the nutritional start a foal gets can have a profound effect on its health and soundness for the rest of its life.”

“At eight to 10 weeks of age, mare’s milk alone may not adequately meet the

foal’s nutritional needs, depending on the desired growth rate and owner wants for a foal. As the foal’s dietary requirements shift from milk to feed and forage, your role in providing the proper nutrition gains in importance.”

The number one item on the AAEP’s list is “provide high quality roughage (hay and pasture) free choice.” This need for roughage always will be important, not just in a horse’s younger years.

To have a healthy digestive system, horses need hay throughout their lives. While there is no one size fits all nutritional plan for equines, it is generally accepted that a horse should consume about 2–2.5% of its body weight in hay every day. In September 2024, Animal published “What the hay: predicting equine voluntary forage intake using a

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Oats and foraging are essential elements in a foal's diet, especially after eight to 10 weeks of nursing

meta-analysis approach.”

“To properly formulate diets, the ability to accurately estimate feed intake is critical as the amount of feed consumed will influence the amount of nutrients delivered to the animal,” explained researchers. “Inaccurate intake estimates may lead to under- or over-feeding of nutrients to the animal. Individual differences in equine forage intake are well-known, but predictive equations based on animal and nutritional factors are not comprehensive.”

Researchers aimed to consolidate the current body of knowledge in the published literature on voluntary forage DM intake (VFDMI) in equines and conduct a meta-analysis to identify driving factors, sources of heterogeneity, and develop predictive equations. In all, they identified 61 publications for inclusion, and from each study they examined outcomes of interest (e.g., forage intake), diet composition (e.g., forage information, nutrient composition), and animal factors (e.g., sex, age, breed, body weight, exercise level).

“As anticipated, forage intake increased when higher quality forages were fed, potentially due to improved digestibility,” concluded researchers.



“Additionally, VFDMI increased as body weight increased, but ponies increased their VFDMI more per every kg increase in body weight compared to horses. Lastly, pasture access (i.e., grazing) may influence VFDMI such that pastured animals consume less than stalled animals, possibly due to the time it takes to graze forage.

“In conclusion, equations to predict equine VFDMI with high accuracy and precision were developed which could be applied in practice by equine nutritionists or owners and managers. The results of this meta-analysis confirm that animal traits and forage quality have a significant impact on the VFDMI of equines and should be accounted for when formulating diets to ensure

nutritional requirements are met.”

Of course, many horses are given more than hay, and how that is done can also have an impact on their overall health. In January 2025, the *Journal of Animal Science* published “The effect of feeding order of forage and oats on metabolic and digestive responses related to gastric emptying in horses.”

“Feeding order of forage and concentrate might affect gastric emptying and subsequently digestion in horses,” explained researchers. “The objective of this study was to measure gastric emptying in combination with metabolic and digestive responses in the plasma and cecum, respectively, when changing the feeding order of oats (O) and hay (H) (oats first, then hay: O-H vs. hay first, then oats: H-O).

“This study demonstrated that including different techniques can be very useful when evaluating the digestive and metabolic responses of different diets. Basic information regarding the effect of diet on gastric emptying, passage rate of digesta, and digestion is relevant for broadening our understanding of how different feedstuffs are digested and interact with one another. Furthermore, it is relevant for understanding the link between diet, health, and diseases. Gastric ulcers are related to diet and feeding management, and understanding normal gastric function is relevant for implementing appropriate feeding advice to horses with gastric ulcers.”

For the study, hay was fed at 6 a.m., 2 p.m., and 8 p.m., while oats were fed in the morning either 15 minutes before or 1 hour after feeding hay. Researchers then analyzed the responses from gastric emptying measurements, metabolic responses in plasma, and responses derived from the continuously measured pH.

Additionally, according to the researchers, measurements from hourly cecal samples were analyzed as repeated measurements, where the model comprised the fixed effect of feeding order (O-H or H-O) and time (time after feeding: 0-9 h)



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and interactions (feeding order and time) and the random effect of horse.

“The present study indicates that feeding order of hay and oats affected gastric emptying, and the digestive and metabolic responses were more clearly reflected in cecum pH than in plasma glucose and insulin,” concluded researchers. “Feeding oats before hay decreased the Tmax reflecting a faster gastric emptying than when feeding the opposite feeding order.”

“Furthermore, feeding oats before hay resulted in a faster drop to minimum cecal pH than when feeding the opposite feeding order. It is recommended that feeding order should be considered in practical feeding situations, and starch-rich concentrate should not be fed before forage.”

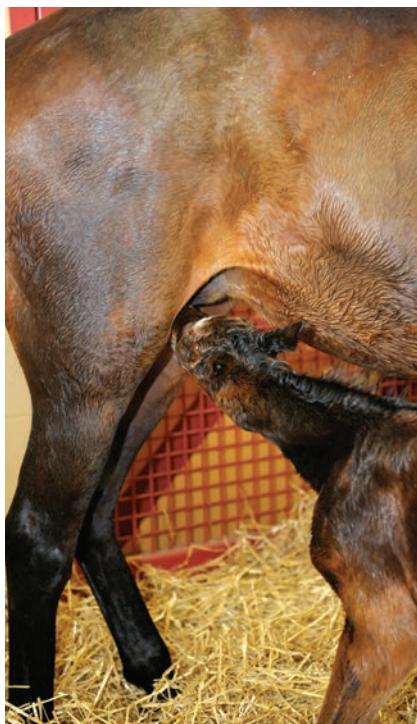
When it comes to picky eaters, there has also been research into what might inspire them to consume their feed. In July 2024, the *Journal of Equine Veterinary Science* published “Impacts of olfactory cues on equine feeding behavior.”

“Anise has demonstrated equine palatability, but its olfactory effect is underexplored,” explained researchers. “The objective was to investigate the effect of the aroma of anise on consumptive behavior.”

Anise, which is sometimes used to flavor feed and supplements, is an herb that tastes like licorice and can improve digestion, support the respiratory system, and increase appetite in horses.

For the study, eight stock horses were offered two bowls containing oats that were situated on plates holding gauze soaked with anise or corn oil. Corn oil served as the control, and while the feed pans had small air holes to allow the aromas through, the horses could not reach the gauze.

Variables researchers were interested in included first diet sniffed (FS), first consumed (FC), first action (FA), and amount consumed (AC). Each trial was video recorded and behavior data was analyzed. The study-related feedings



The colostrum, the first milk produced by a mare after birth, is laden with antibodies which keep foals healthy from infection until their immune systems kick into action

took place twice a week for three weeks.

On average, researchers found that the horses ate twice as many oats near the anise gauze compared to the corn oil, and that the frequency with which horses sniffed or ate from the anise pan first before the corn oil was nearly double.

“For first action, sniffing was more frequent versus consuming,” concluded researchers. “Amount consumed for anise was twice the daily average of the control. Data represents an important relationship between olfactory stimuli and feeding in horses. To determine thresholds, more work is needed.”

Pregnant mares are going to have different nutritional needs than other horses and keeping them interested in eating is especially important as they prepare to bring the next generation into the world. In November 2022, the *Journal of Equine Veterinary Science* published “Influences of Oil-Based Palatants on Eating Behavior in

Gestating Mares.”

“Gustatory and olfactory changes have been reported during gestation in multiple species,” explained researchers. “However, few data are available regarding feeding preferences in gestating mares. The objective of this research was to evaluate the effect of oil-based palatants on feeding behavior in late-term gestating mares.”

For the study, both late-term gestating mares and reproductively sound but open mares were evaluated via paired preference testing. This took place during the final 120 days of gestation for the pregnant mares. Oil-based flavors (corn oil, anise, and apple) were topically applied to a basal pelleted diet.

Researchers noted that a number of behaviors were assessed included: sniffing, hovering, checking, chewing, chewing with the head lifted, uninterested, ingestion, pawing, flipping of feed pan, moving of feed platform, and defecation. The variables of interest to the study included first diet sniffed, consumed, and finished; time to finish first diet; time to finish all diets, and number of olfactory and consumption engagements for each diet.

“Data analysis revealed a faster rate of consumption for first diet finished of gestating mares when compared to open mares,” researchers concluded. “Additionally, gestating mares had a greater frequency of olfactory interactions across all diets, but less consumption interactions across all diets. These novel data suggest a previously unreported increase in olfactory investigation for gestating mares as well as new insights into gestational feeding behaviors of horses.”

At every stage of horses' lives, it is important to understand what steps can be taken to ensure they reach their nutritional requirements. Working with veterinarians and nutritionists, while staying up to date on the latest research, can help achieve maximum returns and lead to happier, healthier horses. **BH**