



Some recent studies shine light on promoting good health in foals

From the Start

FINDING RIGHT DIET FOR FOALS, PREGNANT MARES

By AMANDA DUCKWORTH / Photos by ANNE M. EBERHARDT

A MARE'S MILK helps new foals avoid illness and properly grow, and, as foals begin to mature, some more hands-on human intervention might be required to achieve continued good health and desired growth rates.

Some recent studies have shed light on the best way to accomplish these goals, or, at the least, have found areas that could use more examination.

One non-negotiable baseline for foal nutrition is ensuring a newborn receives colostrum as the mare's first milk provides the new arrival with everything it needs. Standing and nurs-

ing are imperative because the mare's colostrum helps protect the foal from disease.

Because a foal born into a normal situation is dependent solely on its mother's milk at the beginning stages of its life, researchers are well aware of colostrum's importance. With the goal of helping mares produce the best milk, analysts have explored the impact of a mare's diet on her resulting offspring.

In December 2018, *Translation Animal Science* published "Effect of maternal diet on select fecal bacteria of foals."

"Adult horses depend on the microbial community in the hindgut to digest fiber and produce short-chain fatty acids that are used for energy," researchers explained. "Colonization of the foal gastrointestinal tract is essential to develop this symbiosis. However, factors affecting colonization are not well understood. The objectives of this study were to evaluate the age-related changes and effects of maternal diet on select fecal bacterial groups in foals from 1-28 days of age."

For the study, 18 Thoroughbred foals nursed from mares that were fed forage and received one of two concentrates. One group received an oat-based concentrate while the other was given a corn and wheat middlings-based concentrate. The mares in both groups had access to their assigned concentrate, as well as hay and pasture grass for 28 days before and 28 days after parturition.

Prior to foaling, the pregnant mares were kept in groups of two to four. Afterward, they remained in stalls with their foals for one to three days before being turned out in round pens and then gradually progressing to paddocks. Fecal samples were collected following the foals' birth and tested at one, four, 14, and 28 days after the foal's arrival.

Foals then were continuously monitored in box stalls or outdoor paddocks and their fecal matter was collected in a consistent manner and then studied. Researchers did note that due to the irregularity of defecation in newborn foals, fecal samples were not collected from all foals on all sampling days. From study of the collected samples, the scientists noted the appearance and amounts of various bacteria important to the foals' digestive health.

"Cellulolytic bacteria first appeared in foal feces between four and 14 days of age and increased with age," researchers concluded. "Amylolytic

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Foal Health

bacteria and lactobacilli were abundant at one day and then increased with age. There was an interaction between maternal diet and time for *Lactobacillus spp.* with foals (given the oatmeal concentrate) having more lactobacilli than (corn/wheat) foals at one and four days. However, there were no differences observed at 14 days. Maternal diet did not influence amylolytic or cellulolytic bacteria.

“It is evident from our results that colonization of the hindgut is a sequential process, beginning early in the foal’s life. There appears to be an abundance of amylolytic bacteria in the GIT of the foal soon after birth whereas cellulolytic bacteria are slower to colonize. Maternal diet had transient effects on foal fecal bacteria; however, further re-



SUCH DIETS CAN PREDISPOSE GASTRIC ULCERATION AND DEVELOPMENTAL ORTHOPEDIC DISEASES, IMPACTING NEGATIVELY ON FUTURE CAREERS.”

—STUDY FINDINGS ON HIGH CEREAL DIETS PUBLISHED IN THE *JOURNAL OF EQUINE VETERINARY SCIENCE*

search is required to fully understand the influence of maternal diet on the process of microbial colonization of the GIT of the foal. Understanding the GIT colonization process in the foal may enable researchers to develop strategies to improve nutrient utilization and minimize gastrointestinal disease.”

While mare’s milk is the primary source of nutrition for foals, it does not take long for them to sample food beyond it. As the American Association of Equine Practitioners explains, it is common for foals to become curious about other sources of nutrition as early as 10 days old.

Nibbling at food helps the digestive system adapt to dietary changes, and by the time a foal is two months old, milk alone might no longer be meeting its nutritional needs. This largely depends on the individual foal, as well as the desired growth rate an owner is expecting. Keeping a careful watch on how foals are progressing is a key part of good management.

When and how much a foal’s nutrition should be supplemented as it grows are affected both by the growth rate of the foal itself and the breeding program it is in. Researchers recently examined a specific type of supplement in “The effects of a nutritional supplement containing salacinol in neonatal Thoroughbred foals,” which was published by the *Journal of Equine Science* in March 2020.

“Horses use volatile fatty acid products as energy sources; these products are generated by the fermentation of cellulose by protozoa and microorganisms that reside in the hindgut, including the cecum and colon,” explained researchers. “When the intestinal flora becomes unbalanced, the environment deteriorates, which may lead to intestinal diseases, such as diarrhea and constipation. Neonatal foals may develop fever caused by viral or bacterial infection, and growth may be delayed because of poor feeding. Therefore, maintaining a normal intestinal environment is extremely important for raising healthy horses.”

For the study, starting at three weeks old, 49 foals were given a nutritional supplement containing salacinol. This occurred at a farm in Hokkaido, Japan, where the foals spent approximately 13 hours a day outside.

“The experimental feed was independently fed together with 0.25 kg of oats mixed with supplements and grass, and the foals were not allowed to eat the feed for the mother horse,” explained researchers. “The amount of oats was increased with growth until the foals were given 0.75 kg at the

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Because a mare's colostrum helps protect a foal from disease, standing and nursing are imperative

age of three months.”

The study showed that the number of days a foal exhibited a fever was reduced by approximately one-third in the salacinol group compared to the control group. Additionally, improved weight gain was observed.

“We observed a marked decrease in the number of days with fever in foals receiving (the supplement),” the researchers found. “The ratios of foals suspected of being infected were similar in the salacinol treatment group and the control group. These results suggest that salacinol is effective in suppressing some factor(s) that induces fever. It has been reported that the main causes of fever of unknown origin in horses are infection, neoplasia, and immune-mediated diseases. It is possible that salacinol administration results in enhanced immune function and increased resistance to infection.

“Several foals in the control group were well below the average body weight curve whereas steady weight



A FOAL SHOULD BE EATING ABOUT 2%-3% OF ITS BODY WEIGHT IN FEED AND FORAGE A DAY BY THE TIME IT IS WEANED.”

—SUMMATION FROM
AMERICAN ASSOCIATION
OF EQUINE PRACTITIONERS

gain was observed in the foals of the treatment group. Previous studies demonstrated that approximately 60% of foals experience diarrhea in their first six months of life. When diarrhea persists, the nutritional absorption from the intestines becomes inadequate, and foals do not gain sufficient weight. A previous study showed that when the intestinal environment was improved immediately after birth,

diarrhea was prevented and foals gained weight adequately.”

The inner workings of the equine intestinal tract are complex, leading researchers to want to explore further the possibilities of supplements in preventing or limiting such kinds of distress.

“The present study suggests that salacinol changed a certain bacterial group in the intestinal microbiota and reduced the number of days with fever, which might affect the growth of foals,” researchers concluded. “Furthermore, salacinol may have contributed to the reliable weight gain of foals. Further studies are needed to clarify these mechanisms of salacinol.”

Making sure a supplement is safe to give to a horse in the first place also remains critical. The same research team previously explored the safety of salacinol in “Assessment of the effect and safety of salacinol in horses,” which was published by the *Journal of Equine Science* in December 2019.

“We administered *Salacia reticulata* extract to healthy horses and evaluated their intestinal microbiota before and after the test period for changes in composition,” explained researchers. “Horses that received the (extract) showed notable differences in intestinal microbiota composition between, before, and after administration, with a substantial increase in bacteria of the order *Lactobacillales* at the end of the test period. Moreover, the Firmicutes-to-Bacteroidetes ratio was elevated. Salacinol was administered as a supplement for 28 days. Physiological and blood tests were conducted in the presence of a veterinarian, and a safety assessment was performed. These evaluations revealed no detrimental findings.”

Deciding what a growing foal needs becomes more complex as it ages. The AAEP advises that the management of proper nutrition gains importance as a foal becomes less dependent on its

dam's milk. There are a number of accepted guidelines to follow, including providing free choice high-quality roughage (hay and pasture) and supplementing with a high-quality, properly balanced grain concentrate at weaning or even earlier if more rapid rates of gain are desired.

Monitoring how a foal is reacting to its supplemented diet is key. It is important not to overfeed as overweight foals are more prone to developing orthopedic disease. In October 2020, the *Journal of Equine Veteri-*



Further study of maternal diet might help researchers develop strategies to minimize gastrointestinal disease

nary Science published "Growth Rates of Thoroughbred Foals and In Vitro Gut Health Parameters When Fed a Cereal or an All-Fiber Creep Feed."

aimed to determine if an all-fiber creep feed (total mixed fiber ration) would sustain equal growth rates in Thoroughbred foals versus a ce-

"Traditions and the economic advantage when producing big athletic Thoroughbred yearlings for sale encourage owners to feed high levels of cereals," explained researchers. "Such diets can predispose gastric ulceration and developmental orthopedic diseases, impacting negatively on future careers. This study

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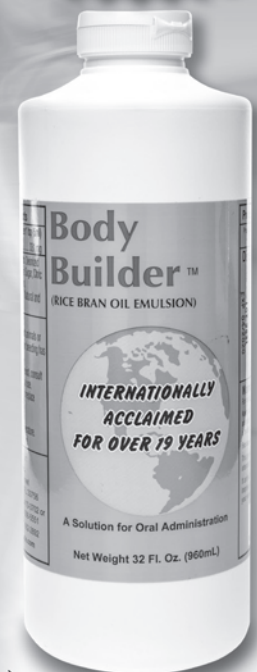
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In terms of proper nutrition, deciding what a growing foal needs becomes more complex as it ages

real-based stud cube and compare pH and lactate produced by (each group) in in vitro foregut and hindgut conditions.”

For the study, researchers monitored weight gain, height at withers and hip, heart girth, and body length for eight Thoroughbred foals fed either a total mixed fiber ration (TMFR) or cereal-based stud cube (SC) for 18 weeks.

“The average daily weight gain of TMFR and SC were 1 and 1.1 kg per head per day, respectively,” researchers concluded. “In vitro foregut incubation of SC and TMFR at 37°C in pepsin HCl solution for six hours produced higher pH 5.84 (TMFR) compared with 5.33 (SC). Gas production mea-

sured fermentation rate, acidity, and lactate from TMFR and SC, incubated with fecal inoculum from the foals on the same diet. Fermentation rates and lag times were equal for both feeds; total gas produced at t50 and y50 were greater for SC. Lactate and pH levels were lower and higher, respectively, for the TMFR.

“This study showed that similar growth in Thoroughbred foals was achieved on the TMFR feed and that potentially better gut health, denoted by higher pH and lower lactate levels, could be maintained by fiber compared with cereal feed.”

Although farms tend to wean foals between four and six months of age,

it is important to realize that around the third month, a mare’s milk supply begins decreasing on its own as part of natural weaning. The AAEP advises that in order to prepare a foal for complete weaning, its ration should be increased over a two or three week period to make up for the mare’s reduced milk supply. A foal should be eating about 2%-3% of its body weight in feed and forage a day by the time it is weaned.

Broodmares can and do provide everything a newborn foal nutritionally requires, but careful observation and maintenance as the foal begins to grow can help put it on a path to success for later in life. **BH**