

New Developments in Stallion Nutrition

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Name a part of your horse you'd like to enhance--anything from his coat or hooves to his stamina--and there's likely a supplement for it. Marketed alongside the products that improve joint function and breathing ability, there are supplements advertised to help improve stallion breeding performance. According to Steven Brinsko, DVM, MS, PhD, Dipl. ACT, associate professor of theriogenology at Texas A&M University, early stallion supplements were considered ineffective by veterinarians, "but now it appears there are some products that have the potential to increase fertility," he said.

Brinsko described new developments in stallion nutrition at the Hagyard Bluegrass Equine Symposium 2006, which was held Oct. 18-21 in Lexington, Ky.

It's All About the Lipids

Central to sperm quality are lipids, which are highly concentrated in the sperm and sperm membranes. "These lipids dictate how the membrane is going to function, and how it reacts to different situations," Brinsko explained. "The cold shock susceptibility (of sperm to cooling or freezing) depends on the sperm's lipid composition. How these lipids interact with each other is altered with cooling and freezing."

Sperm lipids contain high levels of polyunsaturated fatty acids (PUFA, which are straight-chained fatty acids with multiple double bonds). The semen concentration of PUFAs varies among species: The distribution of PUFAs in stallion sperm is more similar to boars than to that of bulls and roosters. Bulls and roosters produce sperm that are very resistant to cold shock, and they freeze well because of their lipid content. Sperm from stallions and boars have a low tolerance to cold shock and generally freeze poorly.

Two compounds, docosahexaenoic acid (DHA, an Omega-3 fatty acid) and docosapentaenoic acid (DPA, an Omega-6 fatty acid) are major PUFAs in semen. Studies have shown that by increasing the ratio of DHA to DPA in boar semen, you can increase the fertility and quality of the sperm. "Conversely, higher levels of DPA relative

to DHA results in reduced fertility," noted Brinsko.

Corn and soybean oil contain high levels of linoleic acid, which is the parent compound of DPA. "Horse feeds tend to be high in linoleic acid," said Brinsko, "so the diets we're feeding horses are high in products that are not favorable for optimal semen quality or fertility."

To increase the DHA to DPA ratio and thus improve fertility, Brinsko and his colleagues examined a DHA supplement designed for boar diets to see how it would affect stallion sperm. They examined two groups of stallions receiving the treatment for 14 weeks and analyzed their sperm throughout the study. They administered normal diets to one group of horses, and they added the top-dressed supplement to the other group. The researchers allowed a 14-week washout period to ensure the supplement was eliminated completely from the horses' systems before switching the treatment groups.

"After 24 hours of cooling, we found that there was essentially no difference in sperm motility between the treated and untreated horses," said Brinsko. "However, we found in the treated horses that the sperm swam straighter and faster. At 48 hours, there were improvements in total motility, progressive motility, and rapid motility. So there were some enhancements occurring that just weren't dramatic enough to see at 24 hours.

"For the marginal coolers (stallions whose semen doesn't cool well), there was a significant increase in the progressive motility of these horses' sperm," said Brinsko, who believes that optimizing DHA levels and its precursors in the diets of these marginal coolers could improve their semen quality enough for cooling and freezing.

Another study on a reformulated recipe of the same DHA supplement with improved palatability (the boar supplement had a fishy odor and some of the horses were reluctant to eat it) showed similar results.

Other Supplements

Brinsko reviewed several other stallion supplement strategies.

Polyamines "The better the sperm quality, the higher levels of spermine and spermidine," said Brinsko about these important polyamines (organic compounds essential for cell replication, growth, and differentiation) that are found in the semen of most mammals. Brinsko said there are no published research studies on dietary

polyamine supplementation, but anecdotal information suggests that an herbal polyamine supplement called SpermAid might be helpful in improving libido in slow-breeding stallions.

Vitamins and Antioxidants Study results on the effects of vitamin and antioxidant supplementation on male reproduction are conflicting. This is likely due to the variety of species in which these products have been studied and the wide range of doses and combinations of supplements.

Vitamins C and E are touted for their antioxidant properties and scientists have investigated these two vitamins more extensively than others. "In some studies, there was an improvement in semen parameters," said Brinsko, including total sperm output, concentration, and motility in rabbits fed vitamins C and E; higher concentrations of sperm in human ejaculates using vitamin C; and improved sperm motility in humans using vitamin E.

"Supplementation has resulted in a reduction of DNA fragmentation," he said, meaning less sperm with abnormal chromatin were found in the ejaculates of humans receiving vitamin C and E supplements.

L-carnitine (levocarnitine) and L-acetyl-carnitine, antioxidants essential for mitochondrial energy metabolism, appear in high concentrations in the epididymis and the sperm. In combination, they were found to increase sperm motility in men.

Take-Home Message

"These things are showing some promise," said Brinsko, "but it looks like their effects likely will be stallion-dependent. Animals that have the poorest semen quality are going to show the most improvement."

The main concern with any supplementation should be maintaining balance in the stallion's diet. "We tend to feed our horses a heck of a lot more than they need to be fed, and I think that's throwing things out of whack," he said. "It would be interesting to look at grass-fed horses on pasture versus grain-fed horse diets in relation to the ratio of DHA and DPA.

"Generally, pastures are much higher in the pre-cursor for the Omega 3s (such as DHA, which seems to help fertility)," he continued. "I don't think we can rely on the supplementation alone. We need to change the way we feed horses, and make sure they have diets that favor DHA formation versus DPA formation. And we must make

sure we maintain a balance without affecting metabolism of other feed ingredients."

**Readers are cautioned to seek the advice of a qualified veterinarian
before proceeding with any diagnosis, treatment, or therapy.**



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