

Down on the Farm



Silicon Supplement Hits Market

by **BETTINA COHEN**

The equine feed market is always brimming with supplements of every sort. The newest adds an absorbable source of the trace mineral silicon.

EquiDur Brand EQUI-Si went on sale in Canada on Dec. 27, 2001, and was expected to go on sale in the United States by the end of January 2002. The distributor, MAC Inc., is marketing EQUI-Si to breeders and trainers as a supplement for building healthy bone, and decreasing bone-related injuries for horses in training.

Exercise and conformation are factors, other than nutrition, that affect the bone soundness of racehorses. Equine nutrition recognizes that the trace minerals calcium, phosphorus, zinc, copper and manganese, served in balanced proportions to one another and in adequate amounts, are required for proper bone growth. All that duly noted, research has demonstrated supplemented, absorbable silicon can benefit young racehorses, and holds promise that it might contribute to stronger bones during the growth and development phases.

Horses normally consume silicon in their diet. The mineral is found in grains and soil. The catch is, this silicon is not in a form horses can absorb and utilize. EQUI-Si is the brand name for SZA, a compound that goes interchangeably by the names sodium zeolite A, sodium aluminosilicate or sodium silico aluminate. SZA is broken down by stomach

acid into monosilicic acid, the absorbable form of silicon.

The stir over silicon as an equine bone-builder dates back to a 1993 study at Texas A&M University (TAMU), which found that adding SZA to the diet decreased the rate of bone-related injuries to young racing Quarter Horses. Brian Nielsen, Ph.D., was a student at TAMU while conducting that study. He has since joined the staff at Michigan State University, where he is overseeing graduate research into the affects of silicon on horses. This includes a pair of 1999 studies, conducted by MSU graduate student Kristine Lang, that were published in veterinary journals last fall.

The 1993 TAMU study involved 53 young racing Quarter Horses, placed into four groups. Those fed high and medium levels of SZA had fewer bone-related injuries, as well as delayed onset of initial injury, than those fed low levels or no SZA.

"Certainly, based on that '93 study, there would be benefits to racehorses," Nielsen said. "Where, we're only beginning to guess, it seems like for the growing horse, too, there will be benefits. What we're working on now is trying to figure out what exactly the mechanism is behind some of the beneficial results that we've seen."

Foundation

Bones gain and lose mineral density simultaneously, responding to loading, or stress from exercise, and to inactivity. Gain means there is growth in bone mass as minerals are deposited into bone tissue. Mineral loss is called resorption,

remodeling or turnover. Mineral gain and loss continues into adulthood, but slows with age—the younger the animal, the more rapid are the changes in bone growth and turnover.

Scientists are able to determine whether a compound affects growth and turnover by measuring levels of systemic markers (proteins, or enzymes) in blood. In one of the MSU studies, published in the November 2001 *Journal of Equine Veterinary Science*, 10 Arabian and 10 Quarter Horse yearlings were evenly divided into a control and a supplemented group. Blood samples for SZA-supplemented yearlings showed increased silicon plasma concentrations. There were no differences between treatment groups for OC (osteocalcin), the marker for bone growth, but the supplemented yearlings had lower concentrations of ICTP (carboxy-terminal pyridinoline cross-linked telopeptide region of type I collagen), a resorption marker.

“If you’re not changing the amount of bone formation, but decreasing the amount of bone resorption, it likely could result in an increase in bone mass,” Nielsen theorized. “More research needs to go into if there really is an increase in bone mass,” he added.

The other MSU study, published in the October 2001 *Journal of Animal Science*, indicated that SZA-supplemented mares pass silicon into their suckling foals through their milk. This 45-day study involved 12 Arabian mares and their foals, assigned to either a control or supplemented group. The supplemented mares showed increased silicon levels in their plasma by day 30, and in their milk by day 45. Foals of the supplemented mares began showing increased silicon plasma concentrations on day 45.

While foal plasma showed increased silicon on the study’s final day, no changes were recorded in the foals’ bone metabolism. Yet, the supplemented mares showed increased OC levels. Lactation draws calcium from the mare, so it is noteworthy that the supplemented mares showed an increase in new bone formation.

“If we were doing the study over again, we would definitely do it longer than 45 days,” Nielsen said. “If the study had been out to 90 days, you might have been able to make an argument for whether it was actually doing anything in the babies.”

Regarding SZA and bone formation in the lactating mares, healthier bones “might increase the longevity of the mare,” Nielsen said. This possible benefit alone would be of interest to breeders.

While the MSU studies confirm positive changes in bone metabolism for yearlings and lactating mares fed SZA, no studies have investigated the role of silicon in altering bone metabolism in horses—i.e., how silicon actually works. One school of thought, however, believes that silicon improves the body’s absorption of calcium. Technology such as computerized tomography (CAT scans), Dual Energy X-ray Absorptiometry (DEXA), radio labeling or scintigraphy, is needed for that research.

Nielsen reported that MSU was seeking funding from the American Quarter Horse Foundation for a two-part

project that would use CAT scans and radio labeling to investigate what tissues the silicon is affecting, whether it does modulate calcium or if bone formation or turnover comes directly from the silicon itself. For this and other future silicon research, the TAMU study stands as a beacon.

“There’s tons of factors that go into soundness of horses,” said Nielsen, a licensed trainer who exercised Quarter Horses and Thoroughbreds prior to his academic career. “Genetics has a huge role. It is going to be difficult to alleviate injuries in those horses that are predisposed to it. We also have conditioning, and how much speed work is put on these horses to stimulate the bones to grow stronger. However, silicon looks really promising to help prevent a significant amount of injuries.”

Final Points

As its various names suggest, SZA’s other mineral component is aluminum. This might be of concern to some readers, owing to a 1986 study, which showed that high levels of aluminum absorption in horses interferes with absorption of other minerals, particularly phosphorous, an essential for growing healthy bones.

As with silicon, aluminum absorption depends a lot on the source. A 1979 study demonstrated that aluminum from SZA is poorly absorbed. A 2001 study on the effect of an aluminum supplement on nutrient digestibility and mineral metabolism in Thoroughbred horses concluded that short-term consumption of a diet containing 930 ppm aluminum has negligible effect on nutrient and mineral metabolism.

Nielsen pointed out that the horses in the Texas study were started on SZA at six months of age, and maintained on it through the completion of their racing program. That minimized concerns over potential aluminum toxicity from SZA.

The aluminum in SZA is alleged to be one of the reasons why the compound is beneficial, Nielsen explained. When SZA is broken down in the stomach, the aluminum reportedly lowers the pH, which is necessary to keep it in the form of monosilicic acid.

Prior to the commercial release of EQUI-Si, Came Home, one of California’s leading 2-year-olds of last season, was fed SZA during his three-race win streak that included the Hollywood Juvenile Championship and Hopeful Stakes. Company president Al Basile, is a former racehorse owner and breeder, and serves on the commissioner on the British Columbia Racing Commission.

EQUI-Si is available in a powder, to be fed as a top dressing. Instructions are to feed two percent of the horse’s total daily ration. If the total daily ration for a 1,000-pound horse in speed training is two to 2.5 percent of the horse’s body weight, daily supplementation of EQUI-Si would be 6.4 ounces (two percent of two percent of 1,000 pounds) or 8 ounces (two percent of 2.5 percent of 1,000 pounds). At the manufacturers suggested retail price of four dollars per pound, supplementing EQUI-Si costs about two dollars per day. EQUI-Si has been introduced in 50 pound bags, but will soon be available in 15 and 30 pound buckets.