



Repro Tracks

► by **Bill Beal**, beef cattle reproductive physiologist, Virginia Tech

Selenium makes a difference

Selenium (Se) is a “micromineral” required in very small quantities in the diet of beef cattle. However, if the diet of a beef cow is deficient in selenium, symptoms such as nutritional muscular dystrophy in calves (white muscle disease), infertility, abortions, stillbirths or retained placenta can occur. The proper level of supplementation of selenium depends on the geographical location of the herd, the amount of selenium provided in the feedstuffs, the selenium concentration of the mineral supplement and the daily intake of mineral.

Breeder question No. 1

I am an Angus breeder with about 75 cows on a farm in south-central West Virginia. I feed my cows a trace-mineral mix free-choice, year-round. The tag on the trace-mineral salt I feed to my cow herd indicates that it contains 15 (parts per million) ppm of selenium. Is that enough to avoid a selenium deficiency?

Response: I feel like a politician, but this question requires a long-winded answer, beginning with “it depends.”

Regardless of where you live, beef cattle require a minimum of 0.1 ppm of selenium in their daily diet [National Research Council (NRC) recommendation]. For a mature cow [1,400 pound (lb.)], that is an intake of about 1 milligram (mg) of selenium per day.

The amount of supplemental selenium that needs to be provided by a trace-mineral salt mix depends on the amount of selenium in the feed(s) your cows are consuming. In turn, the amount of selenium in the feed is dependent on the selenium in the soil where the feed was grown. If you live in a county where the soil is deficient in selenium (soil level <0.5 ppm), then it is possible that the forage or crops grown there take up less selenium from the soil, and your homegrown feed is low in selenium (<0.1 ppm).

There is a web site where you can check the selenium level in the soil of your county as reported by the U.S. Geological Survey (<http://tin.er.usgs.gov/geochem/doc/averages/se/usa.html>).

You live in Fayette County, W.Va., and the reported selenium level in the soil for your county (0.22 ppm) is considered low. This is not surprising. Concentrations of selenium in the soil depend on the rocks from which the soil was derived. The Northwest, Northeast, Southeast and Great Lakes states

generally have lower (<0.05 ppm) soil selenium concentrations because the soils in those areas were derived from volcanic deposits or well-washed coastal deposits. Soils originating from cretaceous shale, such as those found in South Dakota, Montana, Wyoming, Nebraska, Kansas, Utah, Colorado and New Mexico, tend to have higher soil selenium concentrations.

Because you live in a selenium-deficient area, it is recommended that you feed a trace-mineral mix containing added selenium. The Food and Drug Administration (FDA) allows the sale of free-choice mineral mixes with up to 120 ppm selenium. However, the legal limit for selenium intake is 3 mg of selenium per day.

The mineral mix you use is relatively low in selenium, 15 ppm. However, if your cows consume the recommended 2 ounces (oz.) per day, they should be receiving approximately 0.85 mg of selenium each day from the salt mix. With the selenium supplied in their feed (even if the feed is low in selenium), the daily intake of selenium by cows in your herd should be ≥1 mg, the minimum recommended and well below the 3-mg legal limit set by the FDA. In other words, based on the NRC recommendations, you should not have a selenium deficiency if your cows are consuming the appropriate amount of mineral each day.

Lower-than-expected mineral intake and antagonists to selenium absorption (e.g., high-sulfur/sulphate feeds) can reduce the amount of selenium available to the animal. Symptoms of selenium deficiency (late-term abortion, retained placenta) on some Virginia farms have persisted even after feeding free-choice mineral containing 15 to 26 ppm of selenium. When those producers began using a “high-selenium” mineral mix

(60 to 80 ppm), the symptoms of selenium deficiency disappeared.

Let me close with the reminder that you and your veterinarian can check the selenium status of your herd by collecting blood samples from the cows. By collecting whole blood samples from five randomly selected cows in your herd and having them analyzed by the state diagnostic lab for selenium concentration (\$15-\$30 per sample), you should be able to determine if your selenium supplementation program is adequate. Whole blood levels of selenium can be used to classify cows as deficient (<0.08 ppm); marginal (0.08-0.2 ppm); adequate (0.2-1.2 ppm); or high (>1.2 ppm).

Breeder question No. 2

Last year I switched my breeding/calving season from spring calving (February-April) to fall calving (September-November). I had several cows and heifers give birth 30 days prior to full term (stillborn calves). I also had a high rate of retained placenta (18%). My vet said it was a selenium deficiency, and we injected all the cows with a vitamin E/selenium supplement. We have been on the same free-choice mineral supplement (26 ppm selenium) for years. Why did we have this problem this fall, but never before?

Response: Your selenium supplementation program is based on a common company recommendation that assumes cattle consume up to 4 oz. of mineral per day. By supplying a free-choice mineral with 26 ppm selenium (equivalent to 0.73 mg per oz.), if your cows consumed the full 4 oz. per day they would get just less than the 3 mg per day of selenium allowed by the FDA. That amount of selenium, in addition to the selenium in the feed, should prevent symptoms of selenium deficiency.

However, seasonal variation in the amount of selenium in forage and variation in the intake of mineral by cows in your herd may have placed cows in your herd in a deficiency status prior to the fall calving season. Unknown to you, your herd may have always been marginally deficient for selenium at that time of year, but the extra metabolic demands of late gestation and lactation occurring in the fall for the first

time may have pushed your cows into a selenium-deficient status.

The injection of a vitamin E/selenium supplement (Mu-Se[®] Schering-Plough Animal Health Corp., Union, N.J.) was effective short-term therapy in your herd. However, injectable products are expensive and only provide adequate supplementation for 28 to 45 days. Devising a long-term strategy for adequate selenium supplementation through a dietary mineral source prior to your next breeding season will be important for your herd. This may involve increasing the selenium added to your salt mineral mix above the 26 ppm you

have been using. You can ask your mineral supplier to go up to the 120 ppm legal limit allowed by FDA (see previous).

CAUTION: Selenium can be toxic if fed in amounts greater than 5 mg per day. In regions of the country where soil concentrations of selenium are high (>0.8 ppm), feeding of trace-mineral supplements containing selenium may be detrimental or dangerous. Be sure to check with your veterinarian, nutritionist or Cooperative Extension agent before deciding on a mineral program for your herd.



Editor's note: Bill Beal is a beef cattle reproductive physiologist at Virginia Tech. He conducts research involving estrus synchronization, artificial insemination, embryo transfer and the use of ultrasound technology. This column is designed to provide answers to questions about reproductive management commonly posed by commercial and purebred breeders. If you have questions or comments related to the reproductive management of cows or bulls, e-mail them to him at wbeal@vt.edu or mail them to him at the Dept. of Animal & Poultry Sciences, Virginia Tech, Blacksburg, VA 24061-0306.