

2013 Report

Use of Selenium-Rich Coproducts to Manage Selenium Deficiency in Oregon Sheep

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GENERAL PROTOCOL OF EVENTS: The selenium test product, abbreviated SeCO, was successfully tested at 3 locations; a fourth location agreed to test the product, but never confirmed using the product nor collected the required test samples. Locations A and B were typical shed-lambing systems, while Location C was a pasture lambing system. SeCO was manufactured using a natural selenium-rich, high-protein forage as the main ingredient. The product was pelleted and contained 16% crude protein, 67% total digestible nutrients, and 6 ppm selenium (dry matter basis). SeCO was fed for 22, 20, and 40 days at Locations A, B, and C, respectively.

RESULTS: SeCO enhanced the selenium status of ewes and their nursing young. Selenium content of whole blood in ewes increased 21%, 18%, and 52% for Locations A, B, and C, respectively (see Figure 1). Note that the increase was greatest for Location C, which is an effect of feeding SeCO twice as long as was fed at other locations. This response is consistent with the responses that were observed in a “laboratory” setting at the US Sheep Experiment Station.

Selenium content of whole blood in lambs nursing the test ewes increased 25%, and 117% for Locations B and C, respectively (see Figure 2). Whole blood samples were not collected from lambs at Location A. As with the ewes, duration of feeding SeCO to lactating ewes had a notable effect on whole blood selenium in ewes, with lambs from Location C having the greatest response. Note that lambs did not consume SeCO and, thus, received the benefit of the product through the ewes’ milk. This response is consistent with our previous results, and further demonstrates that the best time to enhance selenium status of lambs is to feed SeCO to the ewes during early lactation when milk accounts for >90% of the daily nutrition of lambs.

Selenium content of wool significantly increased at all locations after SeCO was fed to the ewes. Plotted in Figure 3 are the responses from Location B. I arranged the chart to compare the responses of the ewes with their offspring. First, note that the response was similar between ewes and their offspring, which demonstrates that the advantage of feeding SeCO during lactation. Second, note that the magnitude of response in wool is much greater than what was observed in whole blood (Figures 1 and 2). This demonstrates that selenium from SeCO readily enriches the body’s general protein pool with selenium. Many have asked why I focus on wool so much. Based on results from recent work, enrichment of wool with selenium is similar to what we observed in skeletal muscle when SeCO-like products were fed to sheep. Unlike a muscle biopsy, wool is easy to collect and doesn’t cause any harm to the animal. Therefore, when I see a doubling of wool selenium, I expect the same response in the muscle. This is where products that are high in selenomethionine, like SeCO, really “shine.” Selenium that is incorporated in the muscle tissue can act as a “selenium

reserve,” which slowly releases selenium back to the body over long periods of time; an effect not possible with sodium selenite.

IMPLICATIONS: These data demonstrated that what we had observed in a “laboratory” setting is repeatable on the farm; feedstuffs that are naturally rich in selenium can be used in a short-term feeding program to rapidly enhance the selenium status of ewes and their nursing young. The potential enrichment of skeletal muscle with selenium, as estimated by wool results, will have a long and lasting effect well after feeding SeCO on the selenium status of the ewes and lambs. In other words, a short-term feeding effort to achieve a long-term positive effect.

CONTINUATION: A second trial year was initiated spring 2013. Two locations agreed to test the product. Final samples will be collected in August. Analyses will be completed in October.

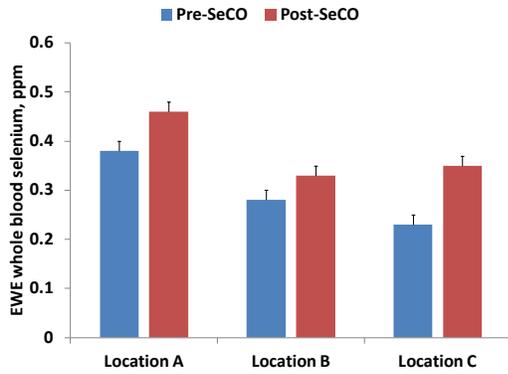


Figure 1. Effect of feeding SeCO, as naturally selenium-rich feed product, to ewes during early lactation on whole blood selenium. SeCO was fed for 22, 20, and 40 days at Locations A, B, and C, respectively. Within each location, blue bars (**left**) represent the whole blood selenium concentrations before SeCO was fed (Pre-SeCO), and red bars (**right**) represent the whole blood selenium concentrations after SeCO feeding stopped (Post-SeCO). Before and after values were significantly different ($\alpha = 0.01$) at all locations.

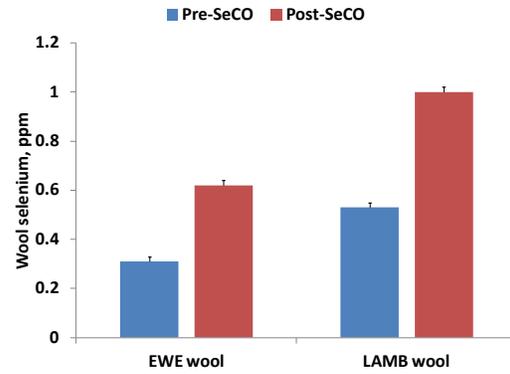


Figure 3. Effect of feeding SeCO, as naturally selenium-rich feed product, to ewes during early lactation on the selenium content of wool. Results are from LOCATION B only. See Figure 1 caption for chart description and SeCO feeding regimen. Before and after values were significantly different ($\alpha = 0.01$) at all locations.

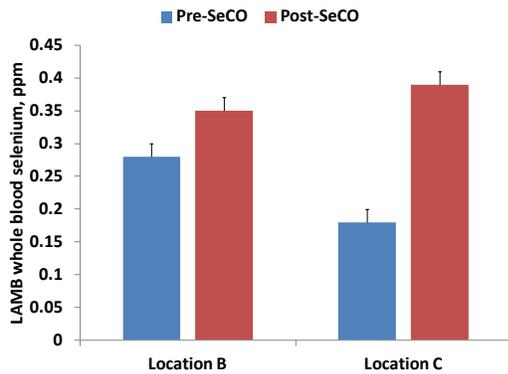


Figure 2. Effect of feeding SeCO, as naturally selenium-rich feed product, to ewes during early lactation on whole blood selenium of the offspring lambs. See Figure 1 caption for chart description and SeCO feeding regimen. Before and after values were significantly different ($\alpha = 0.01$) at all locations.