

## SELENIUM SUPPLEMENTATION IN SELENIUM-DEFICIENT REGIONS

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Since 1957, it has been known and documented that selenium, in trace quantities, is an essential element for livestock, especially for growing and reproducing animals. Before that time, only the toxic effects of the element were known, but it is now understood that small quantities of it are required, and experiments with several species of animals have indicated that 0.1 ppm of selenium in the diet is enough to prevent deficiency symptoms.

The soils of most areas of the United States contain sufficient quantities of selenium to meet the requirements of forage or grain-consuming animals. Nevertheless, many sections of Oregon and the Pacific Northwest do not contain adequate levels of the element to assure optimum growth and production of farm animals. Areas of deficiency vary among counties, and may be localized within regions on a ranch, farm or geographical area, especially in the basins of Eastern Oregon. Selenium is available to livestock through plants which incorporate it from the soil. Soils derived from volcanic origins, such as those of much of the Pacific Northwest, are more likely to be deficient in selenium than soils of sedimentary sources. Acidity of the soil influences availability of selenium. Plants in alkaline soils provide higher levels of selenium than those from acidic soils. Additionally, rates of growth influence plant content of the element, and fast-growing plants are more likely to be deficient than slower growing ones. This is one disadvantage with the practices of fertilizing and irrigation of crops grown in soils of marginal selenium deficiency.

Livestock producers in severely deficient areas recognize the need to supply selenium to animals to prevent economic losses. Acute deficiencies of the trace nutrient become evident in the dystrophy of muscles of several farm species, especially lambs and calves. White muscle disease, so called because of the appearance of muscles on autopsy, rapidly leads to death of the animal. Reproductive impairment and high mortality demonstrate the need to inject or feed selenium in severely deficient areas. It is less easy to recognize the need for selenium supplementation in marginally deficient regions. Although white muscle disease may not be evident, and mortality rates appear to be normal, a sub-clinical deficiency of selenium results in reduced growth and efficiency of young animals. Research with selenium supplementation to calves and lambs in deficient areas has demonstrated that the element has a positive effect on growth and feed efficiency. Along with vitamin E, selenium prevents economic losses through white muscle disease, death and reduced animal production.

Among alternatives available to stockmen living in known deficiency areas are injection of preparations containing selenium, feeding diets, supplements or mixes supplemented with the element and the feeding of hay or grain grown in a selenium adequate area. Commercially prepared injectible solutions containing selenium (usually as sodium selenite) can be purchased.

Common concentrations of selenium in the solutions are 1 milligram and 5 milligrams per cubic centimeter (cc). The former is recommended for injection of offspring soon after parturition, and the latter is recommended for use with larger or more mature animals.

In 1979, the Food and Drug Administration allowed selenium to be marketed for consumption by livestock. Currently, commercial protein supplements and complete feeds containing added selenium are available through some feed dealers. Salt and mineral mixes also are available, and usually contain 20 to 30 ppm of selenium. Therefore, several methods are available to livestock producers to offer the selenium for consumption by animals in confinement or range conditions.

Feedstuffs or complete feeds obtained from areas of adequate selenium may reduce or eliminate the need for feeding or injecting the element, even in deficient regions. Creep feeds, protein supplements, grains, hay, etc., which are transported from regions of the United States outside the Pacific Northwest, Southeastern seaboard and the Northeast are likely more than adequate to meet the selenium needs of the animal.

It is recommended that livestock producers in areas of known selenium deficiency inject newly born animals with the element to prevent white muscle disease and improve growth. In a locale of extreme deficiency, one should inject gestating females with selenium about one month before parturition to prevent weak or stillborn offspring. Unless adequate levels of selenium are in the feed (at least 0.1 ppm), it is recommended that a salt or mineral mix containing selenium be available for animal consumption. Even in forages marginally adequate in selenium, supplementation is recommended because of reduced digestive availability, especially from legumes. With proper management, a soil selenium deficiency does not need to be a problem for livestock producers in Oregon.