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THE ROLE OF SELENIUM IN GRAZING RUMINANTS

**A thesis presented in partial fulfilment
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SUMMARY

The objective of this research was to further the understanding of the production-limiting effects of selenium deficiency in grazing ruminants. The potential roles for selenium in antioxidant function, thyroid hormone metabolism, somatotropic function and appetite were investigated.

Initially, a series of field trials involving three levels of selenium treatment of dairy cattle was performed. Improvements in growth rate and milk production were recorded, however reproductive performance was not affected. The results of these trials support the use of the currently recommended selenium reference ranges for prediction of growth and milk production responses to supplementation of cattle.

A study was performed to evaluate the vitamin E status and polyunsaturated fatty acid intake of grazing cattle. Spring-calving dairy heifers managed under the conditions typical of New Zealand dairy farms did not appear to be at risk of periparturient disease resulting from high polyunsaturated fatty acid intake. These findings suggest that abnormal peroxide metabolism is unlikely to be an important mechanism in the impaired performance of selenium deficient adult cattle in New Zealand. Detailed examination of uterine involution and the events leading up to the first postpartum ovulation confirmed that supplementation with selenium, α -tocopherol, or both, does not affect postpartum reproductive function in first parity dairy cows fed pasture.

The effects of selenium supplementation on thyroid hormone metabolism, somatotropic function and growth were investigated. The results suggest that the adverse effects of selenium deficiency on calves may be mediated by altered thyroid hormone metabolism, but not through modulation of peripheral concentrations of growth hormone. Using Angora goat kids as a model, interactions between selenium and iodine supplementation were examined. The results suggest that selenium supplementation improves liveweight gain but that interactions between selenium and iodine status are of little importance in kids fed a diet moderately deficient in both selenium and iodine.

The effect of selenium supplementation on the voluntary feed intake of Angora goats was investigated. The results of this study suggested that selenium supplementation of kids does not affect the short-term intake of a selenium-deficient diet. It is concluded that increased appetite is unlikely to be the primary mechanism involved in the growth response to selenium supplementation in Angora goats.

Current concepts concerning the role of selenium deficiency in grazing ruminants are discussed and recommendations are made for future research.

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