

## **Antioxidant supplementation and protection against mastitis**

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The micronutrients vitamin E (tocopherol) and selenium have been shown to protect against mastitis. Vitamin E is fat-soluble and protects against the initiation of oxidative chain reactions in membrane polyunsaturated fatty acids by abstracting radicals. The antioxidant function of selenium is exerted through its role as a cofactor for both cytosolic and phospholipid glutathione peroxidases which, respectively, reduce hydrogen and lipid peroxides. Thus vitamin E and selenium cooperate as antioxidants. The dietary availability of these nutrients may vary widely. The vitamin E feed source is mainly fresh green fodder; availability is compromised by the use of stored fodder. Selenium levels in feedstuffs vary with soil selenium status, soil pH and the type of fodder grown on that soil.

Mastitis is inflammation of the mammary gland and incidence is particularly high in early lactation. The common aetiological agents are *Staphylococcus aureus* or *Escherichia coli* or *Streptococcus* spp. Whereas clinical infections are easy to detect, subclinical ones are subtle and are indicated by high milk somatic cell counts. Mastitis causes considerable financial losses by way of discarded milk, the cost of antibiotic therapy and culling of chronically infected cows. Mastitis control measures such as dry cow therapy and better hygiene are effective but not completely so. Antioxidant nutrition appears to be another way of optimising defences against mastitis. A high vitamin E/selenium (E/Se) status is associated with lower rates of udder infections.

The beneficial effects of these antioxidants appear to involve enhancement of the functions of the key cellular defence line of the udder - the polymorphonuclear phagocyte (PMN) as well as lymphocytes and macrophages. Oral supplementation of multi-parous dairy cows with vitamin E and selenium increased the vitamin E/selenium status at parturition but did not afford any obvious improvements of cell-mediated immunity. However, subcutaneous supplementation of primi-parous dairy cows fed on a low vitamin E diet gave better results. The peri-parturient decrease in the E/Se status was reduced by supplementation; the most significant effect being on the vitamin E status. An improved E/Se status during the parturient period may decrease the usual high incidence of mastitis during early lactation. Supplementation of the heifers improved the production of PMN chemotaxins and lymphocyte function. These results as well as those of *in vitro* supplementation of isolated PMN, lymphocytes and macrophages suggest that improving the vitamin E/selenium status protects against mastitis by optimising the immunological defences of the udder.