

Factors affecting plant uptake of selenium following selenium topdressing

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Topdressing with sodium selenate has recently been introduced in New Zealand as an alternative method of preventing selenium deficiencies in livestock (1). This paper reports on field trials examining plant uptake of selenium from fertilisers on a diverse range of soil types in the Southern South Island.

Methods

In Series I at 16 sites selenium was applied as sodium selenate in pumice prills (0.6% Se) at rates of 0, 6 and 120 g Se/ha. Sulphate was applied at 0 and 30 kg S/ha. In Series II at 6 sites selenium treatments were control, pumice prills (0.6% Se) at 6 g Se/ha and 'Selcotee' prills (1% Se) at 10 g Se/ha. Lime was applied at 0, 2 and 8 t/ha.

Results and Discussion

There was a wide variation between sites in the pasture selenium concentrations at the first cut following selenium application. Levels ranged from 200 to 2000 ppb Se with 6 g Se/ha applied. Up to 3-fold seasonal variation was also observed. This will have some effect on the peak animal selenium status, although blood selenium tends to be buffered against the larger variations observed in pasture selenium (1). An exponential type of decline in herbage selenium concentrations was observed at most sites (Figure 1). The rate of decline was similar for most sites. In all cases pasture selenium remained above 30 ppb (below which marginal selenium deficiency is likely) for at least 5 months after selenium application.

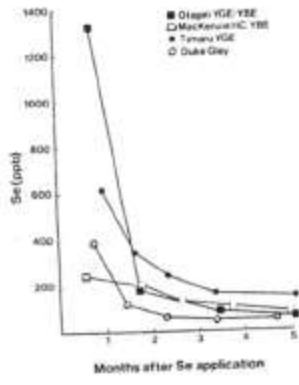
Selenium concentrations in ryegrass and clover showed similar patterns of decline with time. There was no consistent difference between the two species. Lucerne swards had selenium concentrations following topdressing similar to the grass/clover pastures in other locations.

Sulphate depressed selenium uptake in the initial harvest of half of the trials. The magnitude of the depression was proportional to the selenium application rate and, on average, resulted in a 46% depression in selenium uptake. The depression was only transitory and is related to the decline in soil sulphate levels following topdressing. The differences between sites were not closely related to soil sulphate levels.

Lime did not have any consistent effect on plant uptake of selenium.

The greatest intake of selenium by grazing animals will occur in the first few months following topdressing. For maximum effectiveness in preventing selenium deficiency in the following year it is important that all animals graze selenium topdressed pasture in these first few months following treatment.

Figure 1. Decline in pasture selenium levels following application of 6 g Se/ha and 30 kg S/ha on selected soil sets.



1. Watkinson, J.H. 1983. N.Z. Veterinary Journal 31, 78-85.