

Pre-weaning selenium response in Hereford calves

In order to obtain a proper evaluation of livestock blood or liver selenium concentrations, a comparison must be made between these selenium concentrations and production response reference ranges. Because no such ranges have been established for cattle, the interpretation of analysts' reports tends to be based on sheep reference ranges. In his review of published and unpublished New Zealand calf trial results, Fraser¹ concluded that this is reasonable, although on several occasions, calves in the range deficient for sheep (below 10 $\mu\text{g}/\ell$) did not respond. A *Surveillance*² article also noted a group of young cattle, with blood levels similar to those reported here, that did not respond to a supplement.

Although sheep at Te Anau require selenium supplements, it is not usual to supplement either the local breeding cows, or the calves before they are weaned (selenised anthelmintic programmes commence at weaning). We took advantage of this situation by using calves from one of the Dale Hereford herds (1982 season) in a trial to assess weight gain response for the period between marking and weaning. Dale is one of the Te Anau Lands and Survey blocks being developed for subdivision.

Seventy-one calves were available for the trial. On 1.12.82 all were injected with Copagro (ICI Tasman), weighed, and bled, before being assigned by weight and sex to 2 groups, as shown in Table 1. Over the period of the trial, control group numbers fell from 36 to 33 because 2 calves died, and 1 lost its mother and did not grow.

One group of calves was given an oral dose of 15 mg selenium in the form of sodium selenate. The response after 111 days, measured in calves' bodyweights and whole blood selenium concentrations, can be seen in Tables 2 and 3. These tables show that selenium treatment produced a mean 9.9 kg growth response and a mean 15.8 $\mu\text{g}/\ell$ increase in blood selenium level, independent of sex difference.

Table 1: Composition of groups

	Castrated males	Females
Group 1 (Treated)	18	17
Group 2 (Controls)	19	17

Table 2: Final mean weights (kg) – adjusted for the covariates of sex, treatment or natural growth rate

By sex	Male	Female
	152.5	151.1 (NS)
By selenium treatment	Control group	Treated group
	146.7	156.6 ($P < 0.01$)

There was no difference in either weight gains or blood selenium levels which could be attributed to the difference in the sex of the calves.

While it is known that selenium deficiency adversely affects fertility in ewes, the same has not yet been demonstrated in cows, so we also bled 20 cows from the Dale herd on 21.3.83. The whole blood selenium concentrations ranged from 3-16 $\mu\text{g}/\ell$, with a mean and standard deviation of 6.1 ± 2.65 . Only 2 cows had more than 7 $\mu\text{g}/\ell$ (i.e. 9 and 16). Calving percentages are detailed in Table 4. Generally about 15% of cows diagnosed as pregnant in May do not produce a calf, so the pregnancy figures in the table are an estimate based on a 15% loss.

Table 3: Final mean selenium levels ($\mu\text{g}/\ell$) – adjusted for the covariates of sex, treatment or natural decline in selenium levels

By sex	Male	Female
	11.11	12.01
By selenium treatment	Control group	Treated group
	Mean blood level: range	Mean blood level: range
1.12.82	6.7 4-27	5.8 3-13
21.3.83	3.4 2-7	19.22 11-39

Table 4: Cow fertility

Year	Cows mated	Pregnant in May	Calves marked	Percentage
1978	945	821	698	73.8
1979	830	658	560	67.4
1980	663	634	539	81.3
1981	718	589	501	69.7
1982	692	396	337	48.7

The climate and topography of Dale are harder on livestock than are other areas of Te Anau, and the cows are "used" (to control regrowth) in the pasture development programme. Higher calving percentages occur on other Lands and Survey properties in the Te Anau basin.

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¹ Fraser, A.J.; Wright, D.F.: The relationship between blood selenium levels and the calf growth responses to selenium supplementation. *Proceedings of the 4th Seminar of the Trace Element Group of New Zealand*, Massey University, 1984. In press.

² *Surveillance*, 1984 Vol. 11 No. 3: 9.