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THE INCIDENCE OF BLOAT ON PASTURES DIFFERING IN K:Na RATIO

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Abstract

The effect on bloat of increasing the concentration of Na in herbage was investigated in two experiments at Ruakura. NaCl fertiliser applied at 190-200 kg/ha to pastures contaming ryegrass and white clover increased the concentration of Na by two to three times. This resulted in K:Na ratios of 7 to 15 in fertilised herbage compared with 18 to 40 in unfertilised herbage in subsequent spring and autumn periods. Bloat was assessed using cows of high susceptibility to bloat. Under conditions when Only moderate bloat was observed, the incidence and severity of bloat on NaCl fertilised areas was similar to or higher than that on unfertilised areas in all seasons.

These data do not support suggestions that lowering the K:Na ratio through use of NaCl fertiliser will control or eliminate bloat.

Keywords: NaCl, survey, dairy cows, ryegrass, white clover.

INTRODUCTION

The use of sodium chloride (NaCl) fertiliser to increase the concentration of sodium (Na) and decrease the potassium (K):Na ratio in pasture has been advocated to control bloat (Anon 1982, 1985). The optimum K:Na ratio for bloat control was suggested to be 10 or less. While some farmers claim success in eliminating or reducing bloat through the use of NaCl, others report no effect. The effect on bloat of increasing the concentration of Na in herbage was investigated in two experiments at Ruakura in 1985-86.

MATERIALS AND METHODS

Two experiments on the effect of NaCl fertiliser application in autumn and spring on bloat potency of pasture were undertaken at Ruakura. Paddocks totalling 1.82 ha on Bruntwood silt loam and Te Kowhai silt loam soils were used in the two experiments. Each paddock was subdivided and one half treated with 190-200 kg/ha NaCl fertiliser. The fertiliser was applied in two equal dressings one to two weeks apart and followed by rain or sprinkler irrigation.

Experiment 1. Fertiliser was applied in March 1985 and the treatments (±NaCl) assessed for bloat potency in November 1985 and March 1986. Grazing was by 10 cows of high susceptibility (HS) to bloat per treatment. Bloat was observed on 18 occasions over 12 days in spring when the cows were lactating and on 15 occasions over 9 days in autumn when the cows were not lactating. The cows changed treatment group midway through each grazing period.

Experiment 2. Fertiliser was applied in October and bloat was assessed in November 1986. Grazing was by 12 non-lactating HS heifers per treatment. Bloat was observed on 16 occasions over nine days.

Feeding. Cows were offered two fresh breaks of feed each day. Non-lactating cows were restricted to 2 to 3 kg dry matter (DM) per cow in each break. They were removed from the break after two hours grazing. Lactating cows were offered all the pasture they could consume in two hours. They remained on the break until the next shift.

Bloat scoring. Cows were scored visually for bloat after 1.5 and 2 hours of grazing, on a scale from 0 (no bloat) to 4 (severe bloat) with half scores included. Cows reaching grade 3 were drenched with paraffin. The highest grade of the two scorings was recorded for each cow. Days on which at least one cow scored 1 or above were included in the analysis. Bloat scores were analysed using Genstat.

Pasture samples. Duplicate pasture samples from each treatment area were taken on the day prior to grazing. The pasture was clipped to 3 cm above ground level.

Samples were analysed for botanical composition and for concentration of Na and K, and the mean of the two samples presented.

RESULTS

The NaCl fertilised area in Experiment 1 averaged 40% ryegrass and 41% white clover on a DM basis. Corresponding values for the unfertilised area were 48% and 37%. Pasture on the fertilised area of Experiment 2 contained 42% ryegrass and 48% white clover, and that on the unfertilised area 53% ryegrass and 40% white clover.

The concentration of Na in herbage increased at least twofold following application of NaCl (Tables 1 and 2). The K:Na ratios were 2.5 to 3.1 times higher in unfertilised than fertilised pasture at the time of grazing.

The average daily bloat scores were higher ($P<0.01$) on NaCl fertilised areas than on unfertilised areas in both paddocks and all seasons (Tables 1 and 2). Mild to moderate bloat only was observed. A maximum bloat score of 2.0 was recorded on each area in Experiment 1, and a score of 2.5 in Experiment 2. No cows required treatment for severe bloat. The average score was higher on fertilised areas due to a higher number of instances of bloat rather than more severe bloat.

Table 1: Percentage Na and K and the K:Na ratio in pasture DM and bloat score of cows following autumn 1985 application of NaCl fertiliser (+Na) or no fertiliser (−Na) at Ruakura.

Response period	Spring 1985		Autumn 1986	
Treatment	+Na	−Na	+Na	−Na
Na	0.20	0.09	0.23	0.08
K	3.02	3.37	2.95	3.21
K:Na ratio	15	37	13	40
Average bloat score	0.50	0.26	0.50	0.26
Number of cases	86	46	67	47
cows scoring ≥ 2	5	1	3	1

Table 2: Percentage Na and K and the K-Na ratio in pasture DM and bloat score of cows following spring 1986 application of NaCl fertiliser (+Na) or no fertiliser (−Na) at Ruakura.

Response period	Spring 1986	
Treatment	+Na	−Na
Na	0.44	0.16
K	2.90	3.27
K:Na ratio	7	18
Average bloat score	0.89	0.25
Number of cases	117	40
cows scoring ≥ 2	29	4

DISCUSSION

Despite claims that increasing the concentration of Na in pasture will prevent bloat, data from two experiments at Ruakura provided no evidence that either the concentrations of Na and K or the K:Na ratio in pasture are associated with severity of bloat. A K:Na ratio of less than 10 is suggested to be optimal for bloat prevention but it did not prevent bloat in these experiments. Also in a bloat survey of dairy farms (Carruthers et *al.* 1987) farms with K:Na ratios less than 10 showed bloat problems ranging from nil to severe. Concentration of Na in pastures on severe bloat farms in this survey were similar to those on farms with nil or mild bloat. The pastures used at Ruakura contained high amounts of clover compared to the majority of those found in the survey and were not, therefore, fully representative of commercial farms. There was no suggestion from the survey data that Na in pasture and bloat severity were associated under specific pasture conditions. Thus while some farmers still claim success in eliminating bloat through use of NaCl fertiliser, the survey data could not identify any soil, pasture or management conditions under which Na may be effective in modifying the incidence or severity of bloat.

Neither the Ruakura data nor the survey data support suggestions that lowering the K:Na ratio in pasture will control or eliminate bloat.

References

Anon ,982. *NZ Journal of Agriculture 144: 4.* Anon 1985. *Dairy Exporter 60: 13.*
Carruthers V.R.. O'Connor M.B., Feyter C., Upsdell M.P.. Ledgard S.F. 1987. Results from the Ruakura bloat survey. *Proceedings Ruakura Farmers' Conference 39: 44-46*