

SULFUR SUPPLEMENTATION OF HEREFORD X BORAN  
STEERS GRAZING SORGHUM ALMUM

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Two groups of Hereford x Boran steers were grazed on fertilized grass (*Sorghum almum*) containing 0.11 - 0.18% S for 10 months. Liveweight gain by steers given access to a salt lick containing 8% sulfur did not differ significantly from that of controls given salt alone.

Key words: Columbus grass, sorghum, forage, sulfur supplement, steers, liveweight gain

In many parts of the world sorghum forages may contain inadequate sulfur for satisfactory animal production (Wheeler 1980). Sorghum forages when crushed or ingested release hydrocyanic acid (HCN) which is detoxicated by the formation of thiocyanate (Conn 1978:)



Responses to supplementary sulfur by sheep grazing sorghum have been reviewed by Wheeler (1980).

This paper is a report of an experiment in which we provided a sulfur supplement to young Hereford x Boran cattle grazing for ten months on a pure stand of Columbus grass (*Sorghum almum*) near Nairobi, Kenya.

### Materials and Methods

An area of 5 ha on the University of Nairobi Field Station, Kabete, (1°S, altitude 1950 m), was sown with Columbus grass (*Sorghum almum*) on 23 March 1976 and divided into two equal plots. The soil type was Kikuyu red loam and was fertilized with calcium ammonium nitrate at 60 kg N ha<sup>-1</sup> when the crop was sown. Weeds were controlled by the application of 2,4-D herbicide.

Twenty-two Hereford x Boran steers aged 12-18 months were allocated at random to two groups having mean weights of 227 kg and 228 kg. The first group had access to a sodium chloride lick, the other to a lick of sodium chloride and sodium sulphate (8% sulfur). The groups were interchanged between plots at intervals of two weeks or more. Grazing began on 13 August 1976 and continued until 23 June 1977. In periods of severe feed shortage (October and November 1976 and February 1977) the steers were given *Chloris gayana* hay of average quality ad libitum.

The hay as feed was not analysed but similar *Chloris* hay from the same area contained 0.2% sulfur and 0.01% sodium.

Steers were weighed, without prior fasting, on twelve occasions and average daily gains were computed for each period. Estimates of the quantity of forage available were made on thirteen occasions during the exper

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iment by cutting 12 quadrats 30 cm x 50 cm to 3 cm.

Samples of 3 - 5 whole plants were taken on the same occasions on both plots, dried at 100°C and analysed by standard procedures for nitrogen, sulfur and sodium content.

### Results and Discussion

Rainfall was low in July and August 1976 and it was necessary to irrigate the plots with 50mm water before grazing could commence. Plant growth was restricted again in October 1976 and in January-February 1977 by lack of moisture.

The sodium content was invariably low (mean .009%), even for sorghum forage which is characteristically deficient in this element (Smith et al 1978; Wheeler 1980). In contrast the sulfur content was at all times greater than 0.1%, the level suggested by NRC (1976) as the dietary minimum necessary for beef production. The N:S ratios were slightly narrower i.e. more favourable, than 15:1 (Table 1) the criterion suggested by Bird (1974) as necessary for maximum beef production.

Table 1:  
Nitrogen:sulfur ratio of forage and liveweight change of control and five supplemented steers

Period ending	1976			1977							
	22/8	10/9	15/12	5/1	19/1	23/3	12/4	24/4	26/5	9/6	23/6
Forage											
N:S ratio	8.9	NA	NA	14.5	13.1	12.2	11.2	13.7	12.1	NA	NA
Wt. change(g/d)											
Control	1643	591	-71	2001	974	74	1782	364	39	1236	797
+ S	1760	539	-105	1841	1156	103	2085	474	100	1097	1200
SED	109	81	31	135	122	32	120	182	79	236	182
Response(%)	+7	-9	-52	-8	+19	+39	+17	+30	+256	-11	+50

Liveweight change varied considerably (Table 1). Provision of a salt lick containing 8% sulfur had no significant effect on liveweight change in any period of the trial or overall.

A similar lack of significant response occurred in the only other experiment with cattle grazing sorghum, of which we are aware. Archer and Wheeler (1978) increased weight gain in Hereford steers grazing a sorghum hybrid from 571 to 697 g/d<sup>-1</sup> (P < 0.01) by providing a salt lick containing 18% sulfur, but the provision of plain salt increased the gain from 571 to 697 g/d<sup>-1</sup>; the additional response attributable to sulfur was not significant. Published responses to supplements of sulfur by sheep grazing sorghum include two trials in which the effect was not significant (Said et al 1977).

A positive response to sulfur is dependent on several factors, notably the N:S ratio in the forage, the degradability of the protein, and the proportion of sulfur lost through the detoxication of HCN. If most of the HCN released within the animal is eliminated as SCN and if the HCN potential is high, as in young leafy material well fertilized with nitrogen or deficient in phosphorus, as much as a third of the sulfur may be rendered unavailable for meat, milk or wool production. Unfortunately data on HCN potential was not available in the present experiment.

The possible effects of an excessive intake of sulfur must also be considered where ruminants are given free access to salt-sulfur mixtures. These may include a severe reduction in feed intake, adverse effects on the nervous system, induced copper deficiency and disruption of molybdenum and selenium metabolism. Bird (1972) concludes that sulfate sulfur equivalent to 0.2% of the diet may be added without reducing feed intake. In the present study this would have been equivalent to about 9g S<sup>-1</sup>, a supplement that could only have been obtained by the steers ingesting more than three times the normal daily control. Supplemented groups were not abnormal for steers grazing sorghum and it seems unlikely that total sulfur intakes were excessive.

The overall response to sulfur of a 7% increase in liveweight gain, was not statistically significant. However, it may be noted from Table 1 that, with one exception, the negative responses to the sulfur supplement occurred in late 1976 and early 1977. In this period there was little but stem available and, for part of the time hay was being fed.

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