Mineral Supplementation of Cattle Grazing Improved Pastures in the Thai Highlands

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Abstract

The estimated liveweight gains of cattle grazing an improved pasture based on *Desmodium intortum* while receiving a mineral supplement were compared with the liveweight gains of cattle not receiving a supplement. Liveweight gains of cattle on the two treatments did not vary significantly over 1 year, and the liveweight gains recorded of 108 g • hd^{-1} day^{-1} for a mixed herd and 230 g • hd^{-1} day^{-1} for young stock over 1 year are suggested to be suitable for use in development-planning budgets.

Improved pastures based on the legume greenleaf desmodium (*Desmodium intortum* cv. greenleaf) and some other species are suited to the highlands of north Thailand (Gibson and Andrews 1978). Such pastures when well managed, represent a potential increase in animal production over the existing levels recorded on native highland pasture in which the predominant species is *Imperata cylindrica* (Falvey et al. 1979).

Increases in per animal liveweight gains resulting from the use of improved instead of native pastures at much higher stocking rates have been recorded, such that liveweight gains per hectare were 180 kg • yr^{-1} compared to 4 kg • yr^{-1}. Such large increases in productivity do, however, depend on the level of management inputs (Falvey and Andrews 1979).

It is necessary to determine the maximum production that can be expected from cattle grazing improved pastures before any recommendation can be made concerning the possible economic advantages of improved pastures in this region. A deficiency of minerals is one apparent constraint to the productivity of cattle grazing native highland pastures (Falvey and Mikled 1979) and it is possible that such deficiencies may also limit production from improved pastures.

This paper reports a study of the response of cattle to a mineral supplement while grazing improved highland pastures.

Method

The experiment was conducted from June, 1978, to July, 1979, at Upper Khun Wang (altitude 1,350 m), a development site of the United Nations Programme for Drug Abuse Control. Approximately 20 ha of improved pasture, including the species *Desmodium intortum, Panicum maximum, Setaria anceps* and *Paspalum dilatatum,* was established in 1977 in an overgrazed *Imperata cylindrica* sward that had been invaded by various weed species. The principal (90% of d.m.) pasture component was greenleaf desmodium. The pasture received 120 kg • ha^{-1} of rock phosphorus (16% P) as a source of phosphate and 20 kg • ha^{-1} of gypsum (18% S) as a source of sulphur and weeds were cut twice per year. The area was first grazed in December, 1977. Dry matter availability of the sward was estimated on three occasions by cutting twenty, 1-m^2 quadrats at random positions within the pasture.

On June 28, 1978, 28 cattle, mainly breeding cows, were paired on the basis of age, sex, breeding state, and estimated liveweight and one animal of each pair was allocated at random to the mineral supplement treatment. Both groups grazed together each day and were herded into yards together each night.

Every four weeks, each animal in the treated group received a mineral supplement of $MgSO_4$ (6.7 g), K_2SO_4 (10.0 g), $CaCO_3$ (30.0 g), Na_2SO_4 (10.0 g), NaCl (26.7 g), $CoSO_4$ (3.3 g), $MnSO_4$ (6.7 g), $ZnSO_4$(13.0 g), Na_2MoO_4 (0.5 g),Na_2SeO_4 (0.03 g), I (0.05 g), and NaH_2PO_4 (75.0 g). The supplement was administered as an aqueous suspension from a bottle. All animals received regular veterinary care including an anthelmintic drench prior to the beginning of the experiment, and regular faecal worm egg counts indicated only occasional sub clinical levels of infestation.

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Girth measurement was taken at four weekly intervals and used to estimate liveweight as per the relationship calculated by Falvey et al. (1978). Faecal, blood, saliva, and pasture samples were collected at irregular intervals for chemical analyses.

Results and Discussion

The mean nitrogen, phosphorus, and in vitro dry matter digestibility values for *D. intortum* dry matter were 18 g N • kg^{-1}, 2.1 g P • kg^{-1}, and 41.40% respectively for samples collected in February and 18 g • N kg^{-1}, 2.1 g • P kg^{-1}, and 40.25% respectively for samples collected in May. Estimated dry matter yields were 4,230 kg • ha^{-1}, 1,300 kg • ha^{-1} and 61 kg • ha^{-1} respectively for the dates, November 1978, February 1979, and April 1979. Falvey and Andrews (1979) suggest low levels of dry matter production as a limiting influence on animal production in their study. It is possible that the higher levels of animal production recorded in our study were related to the higher availability of dry matter.

Liveweight changes of the treated animals were higher (45.9 kg) than that of untreated animals (34.7 kg) over the whole period of the study, although this difference was not significant ($P>0.05$). A significant difference in favour of the supplemented group was recorded (a mean of 13.4 kg c.f. 7.3 kg) over the period of November to February ($P<0.05$). No significant differences ($P>0.05$) between the treatment groups in terms of urea, Na, K, Ca, Fe, and Thyroxim $-T_4$ in serum or N and P in faeces were recorded from samples collected in October 1978. Serum P was, however, significantly higerh ($P<0.05$) in the treated group at this date. Analysis of samples collected in June 1979 showed no significant differences ($P>0.05$) in terms of uea, Na, K, Ca and P in serum while in saliva, Ca was significantly ($P<0.05$) lower in the treated group and K showed a tendency ($P<0.10$) to be lower in the treated group. It is of interest to note tht saliva Na levels were lower than the suggested critical level of 100 meq l^{-1} in both groups (Alexander 1973).

Cattle gained liveweight at the mean rate of 108 g< hd^{-1} day^{-1} over 360 days and a total of 23 calves were born (3 of which died) during the experimental period. The mean liveweight gain of young animals was 340 g< hg^{-1} day^{-1}. Such a level of production exceeds that recorded by Falvey et al. (1979) for cattle grazing native pastures where mean daily liveweight gains averaged 43 g< hd^{-1} day^{-1}.

This study suggests that no appreciable response to a mineral supplement by cattle grazing improved pastures may occur under the supplementary feeding regime imposed in this study. However, further research may be required concerning supplementation regimes.

Literature Cited

Alexander, G.I. 1973. Manual of techniques for field investigations with beef cattle. C.S.I.R.O., Australia.

Falvey, L., and C. Mikled. 1978. Dry season supplementation of cattle in northern Thailand. Proc. Aust. Soc. Anim. Prod. 12:175.

Falvey, L., R.F.J. Davies, E. Thanyalappitak, and C. Mikled. 1977. Relationships between weight, girth, height and age of the highland cattle of northern Thailand. Thai J. Agr. Sci. 10:187-194.

Falvey, L., P. Hengmichai, and P. Hoare. 1979. Productivity of cattle grazing native highland pastures. Thai J. Agr. Sci. 12:61-69.

Falvey, L., and A.C. Andrews. 1979. Improved pastures in the Thai highlands. Trop. Grassl. (in press).

Gibson, T.A., and A.C. Andrews. 1978. Pasture research in the highlands of northern Thailand. Proc. Aust. Soc. Anim. Prod. 12:203.