

THE RELATIONSHIP BETWEEN LIVELWEIGHT GAIN OF CATTLE AND NITROGEN  
CONTENT OF THE DIET AT VARIOUS SITES IN AUSTRALIA

B. D. SIEBERT†, V.R. SQUIRES‡ and R.A. HUNTER\*

In experiments with Brahman x Shorthorn cattle grazing native and improved tropical pastures it was found that liveweight gain was highly correlated with the nitrogen content of the diet (Siebert and Hunter 1977). The relationship was as follows : -

$$\text{LWG} = 0.337 \text{ N} - 0.108 \quad (r = 0.99, s = 0.02)$$

where LWG is liveweight gain in kg/d and N is the nitrogen content per 100g organic matter (OM) calculated over a range of N between 1.5 and 2.7. Over the past year, studies near Adelaide and near Alice Springs have examined their relationship further in two quite different environments. The same breed of cattle near Adelaide were fed rye-grass/clover hay over a 3-month period. The mean N content of the hay over a period of August to October was 2.15g/100g OM, which according to the above relationship would determine a gain of 0.62kg/d. The measured rate over the period was in fact 0.66kg/d. Considering the site difference, the value was well within the limits of the regression.

Shorthorn cattle were used near Alice Springs, pastured on a grass/forb community. Twelve animals grazed an area of 40 ha together with 4 oesophageally fistulated animals which provided samples for analysis every 2 weeks between November and March after an episode of summer rain. The liveweight gain of the cattle was rapid and was related to the N content of the diet as follows :-

$$\text{LWG} = 1.154 \text{ N} - 1.58 \quad (r = 0.96, s = 0.08)$$

where LWG and N are as given above. The regression was calculated for values of N between 1.82 and 2.47. Thus there was high correlation between liveweight gain and N content of the diet at two sites but a marked difference in the relationships. The higher rate of gain by the Alice Springs animals was due to greater digestibility of their diet; the desert herbage being some 5 to 10 units greater in digestibility than the tropical for similar levels of N. Such differences are to be expected since large differences can occur with herbage at the same site in different years when seasonal conditions produce different patterns of plant growth (Pullman and Alden 1971). A general relationship for various sites might be possible when a factor such as the cell wall content of the diet is included in the relationship.

The findings illustrate a reason for the quite marked liveweight response frequently observed in desert herbivores after an infrequent rain. The N present in the herbage is accompanied by a large proportion of digestible energy. This fact emphasises the need for selection of pasture species in tropical areas that are more digestible than those which are being introduced at present on the grounds of N content or yield.

Pullman, A.L. and Alden, W.G. (1971) Aust. J. agric. Res. 22, 401-413.

Siebert, B.D. and Hunter, R.A. (1977) Agricultural Systems, 2, 199-208.

† Waite Agricultural Research Institute, Glen Osmond, S.A. 5064.

‡ CSIRO, Rangelands Research Programme, Alice Springs, N.T. 5750.

\* CSIRO, Division of Animal Production, Wembly, W.A. 6014.