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The Mineral Status of Cattle in the Northern Territory

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An investigation into the Mineral Status of Cattle in the North West Coastal Region of the Top End of the Northern Territory.

INTRODUCTION

The northern NT in general is not naturally good cattle carrying country. High rainfall and temperatures cause rapid leaching of the poor nutritive status soils, especially where sandy. Fast growth of tall grasses requires a high proportion of structural support elements which are of poor nutritive value to stock. Cattle are a relatively recent introduction to the system, and adaptation is required for best performance. For example, note the better performance of zebu than of British breeds in terms of heat and parasite tolerance, and survival ability on poor feed.

The major nutritional needs are for adequate protein, energy and minerals. Energy is related to the digestibility of feed, which is the proportion of the feed able to be digested by the animal (including by the rumen bacteria in ruminants such as cattle). Protein and digestibility levels are usually closely related. Both are usually adequate only in the early to mid wet season, (an exception here is good pastures on the black soil plains as they dry out). Minerals including trace elements become important only after the basic needs of protein and energy are met.

The obvious illthrift of some cattle grazing the lateritic and sandy ridges of the coastal country west of the Daly River and elsewhere has often attracted comment. These were mainly Shorthorn scrubber cattle, the last survivors prior to the BTEC cleanout. Speculation as to causes of ill-thrift include:

- copper deficiency. This is most likely found on sandy soils with high rainfall, and the cattle coats appear dull;
- calcium deficiency, as suggested by frequent bone fractures although more likely to be phosphorus deficiency or copper deficiency which can also exacerbate bone weakness.

Early reports and studies included a survey of copper, cobalt and Vit B12 status across north Australia by Dr H.J. Lee in 1964, which suggested copper could be marginal in the region of this study. The available data and evidence on copper and cobalt in the Top End of the NT was collated and published as Technote 20 in 1982 by Rob Wesley-Smith with Brian Ford. Although there was only limited experimental data, copper appeared to be marginal at times. A review of mineral deficiencies in 1980 by Gartner and others stressed the need to prove deficiencies by gaining a response to supplementation.

When reports came in of high mortalities in feral stock musters west of the Daly, it seemed useful to investigate further and obtain some data from what would probably be the last of the feral Shorthorn herds, as these would have had particular grazing habits and unfenced access to the area.

The observations were made on two cattle stations west of the Daly river, Palumpa and Peppimenarti. The aim of this Technote is to summarise the work done and to draw a few conclusions of relevance to pastoralists.

METHOD

Getting samples taken in the field from poor stock or those dying in the musters proved hard to achieve, and abattoir sampling was done on a number of occasions. A supplementation trial was carried out, with the assistance of Palumpa Station, using slow release rumen bullets.

The field trial was undertaken at Palumpa with two groups containing either Brahman cross heifers or young steers. They were weighed and supplemented in August 1988 with one of three treatments:

- no treatment (control)
- copper only
- copper, plus selenium, plus cobalt.

The next weighing was to be in the early Wet, as the stock left the lush black soil plains, but record heavy and early rains precluded reweighing the heifer group, and reduced the numbers available in the other. After the long Wet when the stock had been on poor upland soils the steers were reweighed and this data was analysed for statistical significance.

Abattoir samplings were as follows:

- Palumpa Shorthorn old cows were sampled in August 1984 for copper, cobalt and zinc status. Parasite egg levels in faeces, and pregnancy status, were also determined.
- Groups mustered at Peppimenarti were related as far as possible to geographic location. Livers were sampled for analysis for copper, zinc, manganese and iron, and 12th ribs were sampled for later measurement of the thickness of the compact bone. (This relates closely to the phosphorus status of the animal - see my ASAP paper).
- Palumpa Shorthorn old cows (again) that had been running with the trial animals had blood samples (for copper) and liver samples taken at Point Stuart.

It did not prove possible to get samples from trial animals because they were processed over an extended period at the new local abattoir at Palumpa.

RESULTS

Physical causes of losses

- The condition of many of the cattle (skinny, stunted with poor coats) suggested chronic deficiencies of dietary protein, energy and minerals.
- Huge water buffalo in excellent condition were mustered in with cattle of all ages. The weaker cattle therefore were prone to injury in the yards.
- The four wheel drive vehicle used for drafting in the wide race had no brakes, and caused broken ribs and bruising.
- Drinking or cooling water was not supplied at the yards or in the trucks. With delayed trucking due to the distances involved and lack of adequate planning, many animals suffered up to four days of deprivation, and some perished.

Abattoir studies: the first study of old cows indicated that liver copper levels were fairly low in almost half the cases, whilst zinc was satisfactory. As anticipated, it was impossible to get meaningful blood phosphorus levels due to the stress the animals are under at slaughter. Faecal worm egg counts were very low and most cows were pregnant.

The studies of Peppimenarti cattle at Meneling produced startling results. Liver copper levels were generally low, but 2 small groups, 1 of cows from the plains, and the other of bulls from the upland, showed record low levels of copper (4-5 ppm dry matter).

The rib bone study showed that all groups had thin compact rib bone within the 2-3mm average level where phosphorus deficiency is considered likely. As some individual samples were less than 2mm, particularly from a group of old Palumpa cows, frank phosphorus deficiency was present.

The analyses of samples of Palumpa cows in 1988 did not indicate copper or other deficiencies.

In addition, trial supplementation with copper of some of a large group of young stock at Stapleton Station did not produce any response (Colin McCool, personal communication).

The supplementation trial resulted in liveweight gains of 0.28 kg/hd/day for both groups in the first dry season. During the next 9 months the copper supplemented group gained 12 kg more than the control, but the difference was not quite statistically significant. The other group was in between.

DISCUSSION

It is often hard, in trials, to show responses to trace elements because major nutrients may be limiting, and their deficiencies must be corrected first. It is our general experience that protein and energy levels are too low in the Top End of the NT for adequate production, except perhaps for the first 2-3 months of the wet season. For example, see production figures in Wesley-Smith (1972). (The exception is good grass pasture in the dry season on the deep flooding black soil plains).

This work reinforced that experience, without definite proof. Although it appears likely that animal growth will be improved by copper supplementation once general growth is higher, this has not yet been established.

DPIF studies of phosphorus in soils and plant material in the region show very low levels. Some upland soil samples showed less than 1 ppm available P. This makes it impossible for cattle to have adequate nutrition unless some unknown natural source is available to them, or without externally supplied nutrients.

The evidence of the thin rib bones is most important - suggesting protein, energy and phosphorus deficiencies in those cattle.

FURTHER READING

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