

EFFECT OF DISCING AND SUPERPHOSPHATE APPLICATION ON THE PERFORMANCE OF STEERS GRAZING NATIVE PASTURES IN NORTH QUEENSLAND

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Summary

The effect of discing and superphosphate application on the performance of steers grazing native pasture was examined over a period of three years. Discing reduced rate of dry season weight loss in two of the three years, but had no effect on wet season gains. Superphosphate application reduced dry season loss in one year, and reduced wet season gain in another year, but conferred little overall advantage.

Hot dressed carcass weights were higher on disced treatments in two of the three years, but fertilizer application had no effect.

I. INTRODUCTION

Low soil phosphorus levels occur over a large proportion of the beef areas of northern Australia, and phosphorus deficiency is widespread (Donaldson and Mawson 1961). Seasonal patterns of change in phosphorus content of pastures have been reported by Davies, Scott and Kennedy (1938).

Norman (1962) recorded increased yields and phosphorus content in native pastures at Katherine with superphosphate application. Following establishment of Townsville stylo (*Stylosanthes humilis*, H.B.K.) with the aid of discing, Winks and Lamberth (1968) recorded increased yield of native species where superphosphate was applied. However, there is a paucity of information on the performance of animals grazing native pastures treated with super-phosphate.

This paper reports three years' results of a trial on the effect of discing and fertilizer application on the performance of steers grazing native pasture.

II. MATERIALS AND METHODS

(a) Pastures and animals

The experiment was carried out at the "Swan's Lagoon" Cattle Research Station, Millaroo, near Townsville. The climate and pastures have been described by Winks, Alexander and Lynch (1970).

An area of 96 ha of native pasture was burned, and half was disc-ploughed in Oct. 1967. Half of each sub-area then received an application of 125 kg/ha of super-phosphate with 0.03 per cent molybdenum. A maintenance dressing of 125 kg/ha of superphosphate was applied annually in October until 1970.

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TABLE 1

Effect of cultural treatment on weight changes and carcase data

Treatment*	Daily liveweight change to minimum weight (kg/d)	Minimum weight (kg)	Daily liveweight change after minimum weight (kg/d)	Maximum weight (kg)	Hot dressed weight (kg)	Dressing percentage
1968-69						
Superphosphate	—0.19	288	0.69	395	192	48.4
No superphosphate	—0.24	285	0.69	385	186	48.2
Discing	—0.09	311	0.69	417	204	49.1
No discing	—0.33	262	0.68	364	174	47.6
1969-70						
Superphosphate	—0.51	250	1.24	440	222	50.5
No superphosphate	—0.49	254	1.20	437	221	50.5
Discing	—0.50	255	1.25	445	225	50.5
No discing	—0.51	249	1.19	432	219	50.5
1970-71						
Superphosphate	—0.23	274	0.70	422	224	52.8
No superphosphate	—0.25	273	0.80	446	227	50.9
Discing	—0.17	284	0.71	439	230	52.2
No discing	—0.33	264	0.79	429	221	51.6

*The means for the fertilizer treatment are corrected for the effect of discing, and *vice versa*.

The pastures were grazed with non-experimental cattle during the 1968 summer period until the study was commenced on May 29, 1968. Three groups of 40 steers grazed the area: Year 1 — Shorthorn steers aged 3 years and of mean liveweight 332 kg; Year 2 — Brahman-Shorthorn crossbred and Shorthorn steers aged 2 and 3 years respectively and of mean live weight 349 kg; and Year 3 — Brahman-Shorthorn crossbred and Shorthorn steers aged 2 years and weighing 347 and 271 kg respectively.

(b) Experimental procedure

The steers were allocated by stratified randomization on the basis of live weight and breed, to four groups, which were allotted to the following treatments: untreated pasture; discing; superphosphate; discing and superphosphate. A stocking rate of 1 animal/2.4 ha was employed.

During the experimental period, full liveweights were recorded at monthly intervals using a standardized procedure of mustering and weighing. Initial and final weights were the mean of three full liveweights taken on three consecutive days.

Animals remained on the experimental treatments for 12 months, when they were removed and replaced. After being removed, steers were slaughtered and carcase data obtained.

At each weighing, bulked faecal samples were collected from all treatments for analysis for phosphate, protein and ash (Moir 1960a).

The method of analysis of data was an analysis of variance of a balanced factorial design.

III. RESULTS

Rainfall registrations for the period of the study were 132, 34 and 77 cm for 1968, 1969 and 1970, respectively, and 56 cm for 1971 (January-May only).

Protein levels in the dried faeces followed similar patterns in all years, declining from a peak of 10-11 per cent in January to 7 per cent in May-June, with lowest levels of 5.0-5.5 per cent occurring in October. There were no differences between treatments during the wet seasons, but levels were higher on disced areas in all dry seasons, and on the fertilized area in 1968 dry season. The pattern of change of faecal phosphorus was also constant with the highest levels of 0.30 per cent occurring in January, declining to a minimum of 0.14 per cent in November. Superphosphate application and discing both raised the faecal phosphorus levels during the wet seasons.

The changes in liveweights showed an initial period of weight loss followed by a period of gain in all years (Table 1). Minimum weight was reached in December in years 1 and 2 and in October in year 3, independently of cultural treatment.

There was no consistent effect of treatment on animal performance. Rate of dry season weight loss was lower on the disced area than on the non-disced area in years 1 and 3 ($P < 0.01$) and higher minimum weights were recorded ($P < 0.01$). Discing had no effect on wet season weight gains in all years. Final

liveweight was significantly higher on **disced** areas in year 1 ($P < 0.01$) and hot carcase weights were higher on the **disced** areas in year 1 ($P < 0.01$) and year 3 ($P < 0.05$). Dressing percentage was higher on **disced** areas in year 1 only ($P < 0.01$).

Fertilizer application had very little effect on animal performance. Rate of weight loss was reduced by fertilizer application in year 1 ($P < 0.01$), but not in subsequent years. Minimum weights and wet season weight gains were independent of fertilizer treatment in all years, with the exception of year 3, where gains were significantly higher on the unfertilized area ($P < 0.01$), resulting in higher final live weights ($P < 0.01$). Fertilized areas recorded higher dressing percentages in year 3 ($P < 0.01$).

No significant interaction between the effects of cultural treatments occurred.

IV. DISCUSSION

The seasonal pattern of performance recorded in this study was similar to that recorded by Alexander and Chester (1956). Severe weight losses occurred in the 1969 dry season with animals losing 28 per cent of their May live weight compared with 11 per cent and 14 per cent in the other two years. This is an indication of the extent of nutrient stress experienced by animals grazing native pastures in drought years. The high rates of gain obtained in the 1970 wet season were an example of the ability of animals to compensate following a period of nutritional stress (Norman 1967).

Discing had the dominant effect during the periods of liveweight loss. In 1968 and 1970, animals on **disced** areas lost less weight than those on **undisced** areas. Faecal analyses indicated that animals on **disced** areas were consuming a ration higher in protein during these periods, which reduced rate of live weight loss either through increased dry matter intake, or increased digestibility or both. Limitation in available dry matter on **disced** areas possibly prevented this situation occurring in 1969. Superphosphate application reduced loss in 1968 when faecal protein levels were also higher, but not in subsequent years.

Cultural treatments had virtually no effect on performance of animals during the wet season. Faecal phosphorus levels were higher on fertilized areas during this period, indicating a higher intake of phosphorus (Moir 1960b). Animals failed to respond to the additional phosphorus, suggesting that the intake of phosphorus of the control group was adequate for that class of stock.

We agree with the conclusion of Norman (1962) that improvement in animal performance through application of superphosphate to native pasture is not a commercial proposition.

V. ACKNOWLEDGMENTS

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