

PERFORMANCE OF STEERS IN NORTH QUEENSLAND GRAZING NATIVE PASTURE AND TOWNSVILLE LUCERNE WITH AND WITHOUT FERTILISER

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Summary

The effect of three pasture treatments and three stocking rates on the performance of beef steers was examined over a period of twelve months. There was a gradation in performance between the pasture treatments, the poorest performance being associated with native pastures, the intermediate with Townsville lucerne-native pasture swards and the best with Townsville lucerne-native pasture swards fertilised with molybdenised superphosphate.

The highest stocking rate employed, resulted in an inferior animal performance; there was little difference between performances at the other two stocking rates.

I. INTRODUCTION

The high feeding value of Townsville lucerne (*Stylosanthes humilis* H.B.K.) was recognized as early as 1914 (Humphreys 1967). Norman and Arndt (1959), Shaw (1961) and Graham and Stubbs (1966) demonstrated high carrying capacities and animal performance on areas sown to Townsville lucerne and fertilised with superphosphate. However, there is a paucity of information on the year-round performance of animals grazing Townsville lucerne-native grass areas in the dry tropics of North Queensland.

This paper reports the first year's results of a trial on the effect of stocking rate, and fertiliser application on performance of steers grazing Townsville lucerne-native grass pastures and a comparison with that of steers grazing native pasture at two stocking rates.

II. MATERIALS AND METHODS

The trial was made at Millaroo, 70 miles south of Townsville, Queensland, which has an annual rainfall of 780 mm of markedly summer incidence, resulting in a four-month growing season (Prescott 1949).

An area of 337 ha, predominantly of greyish deep coarse sandy soils overlying solonized clay subsoils, was burned and a portion was disc-ploughed and sown to Townsville lucerne in December 1964. Half the area sown to Townsville lucerne received 125 kg/ha of super-phosphate with 0.03% molybdenum at planting and a further 250 kg/ha in October 1965.

Yields of herbage in the Townsville lucerne areas were measured in April 1966. Material from 50 x 0.4m² quadrats, randomly located along a diagonal in each paddock, were cut to ground level, sorted into Townsville lucerne and other species, oven dried and weighed, and treatment mean yields were calculated.

A group of 144 Shorthorn steers, approximately two years old and of mean liveweight 281 kg were allocated to twelve groups of ten steers and six groups of

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four steers by randomization on the basis of liveweight. The groups were randomly assigned to the following treatments so that there were two replicates of ten animals and one of four animals on each treatment.

<i>Treatment</i>	<i>Pasture</i>	<i>Stocking Rate</i>
I	Native pasture	0.25 steers/ha.
II	Native pasture	0.41 steers/ha.
III	Townsville lucerne-native pasture	0.41 steers/ha.
IV	Townsville lucerne-native pasture	0.82 steers/ha.
V	Townsville lucerne-native pasture and superphosphate	0.41 steers/ha.
VI	Townsville lucerne-native pasture and superphosphate	0.82 steers/ha.

In Treatments III-VI, areas of Townsville lucerne-native pasture had been wholly sown to Townsville lucerne. Some grass remained as the method of establishment did not destroy all of the grass, thus giving a sward of Townsville lucerne and indigenous plant species.

Grazing of the pastures began on December 16, 1965, following storm rains of 50.8 mm. During the experimental period, full liveweights were measured at monthly intervals using a standardised procedure of mustering and weighing. At each weighing, all animals were scored for condition using a scale ranging from 1 (emaciated) to 10 (prime).

Initial and final weights were the mean of three full **liveweights** taken on **three** consecutive days. Steers remained in the experimental treatments until December 1966 or until their mean liveweight had declined to the weight recorded at the start of the experiment.

The method of analysis of data used was a non-orthogonal analysis of variance.

III. RESULTS

Yields of herbage measured in April 1966 (Table 1) indicate that there was an increase both in Townsville lucerne and other species as a result of fertiliser application. There was also slightly more plant material available to the animals in the groups at the lower than at the higher stocking rate.

The changes in liveweight throughout the year showed an initial period of

TABLE 1
Pasture Yields in April 1966 (kg oven dry material/ha)

SPECIES	TOWNSVILLE LUCERNE		OTHER SPECIES		TOTAL	
Stocking Rate	0.82 steers/ha.	0.41 steers/ha.	0.82 steers/ha.	0.41 steers/ha.	0.82 steers/ha.	0.41 steers/ha.
Superphosphate Fertiliser —						
Without	103	282	262	261	365	543
With	476	650	492	441	968	1091

TABLE 2
Effect of Pasture Treatment and Stocking Rate on Changes in Liveweight

TREATMENT	TIME TO REACH MAXIMUM WEIGHT (days)	DAILY LIVEWEIGHT CHANGE TO MAXIMUM WEIGHT (kg/day)	MAXIMUM LIVEWEIGHT ATTAINED (kg)	DAILY LIVEWEIGHT CHANGE AFTER MAXIMUM WEIGHT (kg/day)
<i>Pasture Treatment*</i>				
Native Pasture	87.4	0.77	348.3	—0.64
Townsville lucerne	188.8	0.56	386.7	—0.44
Townsville lucerne + superphosphate	211.0	0.86	462.5	—0.40
<i>Stocking Rate*</i>				
0.25 steers/ha	177.0	0.68	401.4	—0.23
0.41 steers/ha	179.9	0.75	415.9	—0.37
0.82 steers/ha	130.3	0.77	381.3	—0.88

*The means for the pasture treatment are corrected for effect of stock rate, and *vice versa*.

gain followed by a period of loss (Table 2). The loss was so severe that the animals were removed from the two native pasture treatments (Treatments I and II) and from Treatment IV (Townsville lucerne stocked at the rate of 0.82 steers/ha) on 31 August.

The major differences in animal performance were in the maximum weights attained, the times taken to reach the maximum weights and the rates of weight change before and after these points. Growth was sustained over a longer period in the Townsville lucerne and superphosphate treatment than in the other two pasture treatments ($P < 0.01$) and a much higher maximum weight was attained. The rate of gain during this period was comparable to that achieved during a much shorter period on native pasture. The rate of liveweight loss in the two Townsville lucerne treatments was less than that in the native pasture group ($P < 0.01$) (Table 2).

Stocking rate affected performance markedly, with a significant depression in the length of the productive period for the highest stocking rate ($P < 0.01$). However, there were no significant differences in the rates of gain to maximum weights between stocking rates. Liveweight loss at the highest stocking rate was greater than at the other two rates ($P < 0.01$), and the loss at the medium stocking rate was greater than at the lowest rate ($P < 0.05$).

Changes in body condition (Table 3) reflected changes in liveweight. Animals from the Townsville lucerne and super-phosphate treatment were consistently in better condition than those of the other two pasture treatments ($P < 0.01$), and animals grazing Townsville lucerne were consistently in better condition than those grazing native pasture ($P < 0.01$). The highest stocking rate depressed the condition score below that of the other stocking rates ($P < 0.01$).

TABLE 3

Effect Of Pasture Treatment and Stocking Rate on Animal Condition Assessed Visually (1 = emaciated; 10 = prime)

TREATMENT	1966				
	APRIL	MAY	JUNE	JULY	AUGUST
<i>Pasture Treatment*</i>					
Native Pasture	5.29	4.99	4.76	4.68	3.50
Townsville lucerne	6.23	6.17	6.42	6.35	5.79
Townsville lucerne + superphosphate	7.48	7.36	7.79	7.72	7.54
<i>Stocking Rate*</i>					
0.25 steers/ha	6.33	6.35	6.67	6.65	6.36
0.41 steers/ha	6.33	6.31	6.54	6.57	6.19
0.82 steers/ha	6.33	5.87	5.79	5.53	4.28

*The means for the pasture treatment are corrected for effect of stocking rate, and *vice versa*.

IV. DISCUSSION

The response to superphosphate of Townsville lucerne and of the total forage available was of a similar order to that reported by Shaw (1961), with much greater responses in the legume than in total forage.

During the period of positive liveweight change, pasture treatment was the dominant factor. The Townsville lucerne plus superphosphate treatment was the best, producing gains for a longer period than the other treatments and at a higher rate than unfertilised Townsville lucerne. The productive period on unfertilised Townsville lucerne was much longer than on native pasture but rates of gain were lower on the Townsville lucerne.

Stocking rate was the dominant factor during the second half of the year on the improved pastures, when the decline in liveweight was least at the lowest stocking rate. This mirrored the total pasture available in the paddocks. For the 1966 season, the highest stocking rate was excessive, in that the condition of the animals became very poor as a result of severe feed shortage in the second half of the year. Animals on the unfertilised treatment had to be removed in August. The slight differences in animal performance between the other two stocking rates suggests that the medium stocking rate may give highest animal output per ha but this conclusion is subject to confirmation by results from subsequent years.

The stocking rates investigated in this study are similar to those used at Rodd's Bay (Shaw 1961) and Lansdown (Ritson 1966), but are not directly comparable with those examined at Katherine where the pastures were not grazed over the whole year (Norman and Arndt 1959; Norman and Stewart 1964). However, patterns of liveweight change recorded at Millaroo were similar to those obtained by Shaw (1961) and Norman and Stewart (1964), with greater gains over a longer period for the Townsville lucerne treatments. While these locations are widely spaced, annual rainfall is similar and markedly summer in incidence,

frosts are infrequent, the soils are low in phosphorus, and with the exception of Katherine, are solodic.

While the total dry matter availability on native pasture areas was apparently sufficient to satisfy appetite throughout the whole year, animal performance on the pastures declined slowly from March to June and thereafter declined rapidly.

On a subjective appraisal, all steers in the fertilised groups and 60% of those in the low stocking rate unfertilised Townsville lucerne group reached slaughter condition.

V. REFERENCES

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