BEEF PRODUCTION FROM TROPICAL LEGUME-GRASS PASTURES IN THE COASTAL RANGES OF SOUTH-EASTERN QUEENSLAND

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Summary

Bodyweight gains of beef cattle on a tropical legume-grass pasture were measured over a period of two years. In year 1, the stocking rate was 1.23 steers/ha. In year 2, stocking rates were 1.23 steers/ha and 1.82 steers/ha on the same pasture as in year 1.

The greater bodyweight gains were made by steers on the lower stocking rate. Bodyweight gains of between 130 kg and 180 kg beast year were achieved at this level, most of the gain taking place during summer. All groups behaved in a similar manner during summer and most of the treatment differences were expressed during winter.

The higher stocking rate produced the greater productivity per hectare while the lower stocking rate had the higher gain during the winter both on a per animal and per hectare basis.

Samplings were made to assess pasture yields.

I. INTRODUCTION

The development of tropical legume pastures suitable to the coastal zone of south-eastern -Queensland has been associated with dairying (Cassidy 1967). Where native pastures producing 28 kg/ha of butterfat have been replaced by these tropical legume pastures, increases to 145 kg/ha of butterfat have been recorded (P. Luck, personal communication). Payne (1963) considered that a good humid tropical pasture should support five dairy cows/ha.

No information is available regarding the capacity of the tropical legumes for beef production in this area. The land used is often on steep hillsides, with shallow soil supporting a natural cover of trees ***(Eucalyptus spp.***) and Lantana bush (*Lantana camara*). Its value as grazing is low, with a carrying capacity of approximately 0.25 animals/ha.

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Tropical legume-based pastures have been established on a number of grazing properties; this paper describes the results of two years of observations on the grazing potential of these tropical legume pastures.

II. MATERIALS AND METHODS

The study was conducted from June 1966 to July 1968 on Oakwood Station, approximately 40 km south of Gympie in latitude 26°26S. Average rainfall is 1066 mm annually. The area comprised relatively steep hillsides running down to a short creek frontage.

After clearing and ploughing, the area was sown in December 1964 with a mixture of glycine (G. *javanica*), *desmodiums* (***D.*** *intortum* and ***D.*** *uncinaturn)* ***and*** *Siratro* (*Phaseolus atropurpureus*), with 500 kg/ha of superphosphate containing 0.03 per cent molybdenum. An aerial dressing of 250 kg/ha of superphosphate was applied each subsequent year in September. The resulting pasture varied from a pure legume stand at the tops of the hills to a pure grass stand at the bottom.

In year 1, a 101 ha paddock of this pasture was used and in year 2, it was subdivided into two areas each of 50.5 ha. Pasture sampling of whole paddocks to a desirable level of intensity was not possible but the following method was used to assess the effect on the pasture of the differential stocking rates in year 2. Thirty-five 1.0 m^2 quadrats were cut in each paddock at approximately 40 m intervals and 20 to 30 m distant from the dividing fence, on a line from the top of the hillside down a regular slope to the creek bed. These provided a representative cross-section of the paddocks.

Sampling was carried out at approximately four-weekly intervals. Materials from the quadrate provide an estimate of the available dry matter at each sampling. A sub-sample of each quadrat was separated into grass or legume and bulked into three classes on a dry matter basis:

Legume dominant — 66 per cent or more legume
Legume/grass — 34-66 per cent legume
Grass dominant — 33 per cent or less legume

The nitrogen content of the bulked sub-samples on a whole plant basis was determined at each sampling.

The performance of animals was measured in two successive years. In year 1, 73 steers aged 9 months and 5 1 steers aged 21 months at commencement were grazed at a set stocking rate of 1.23 beast/ha. In year 2, the two paddocks were stocked with 1.23 and 1.82 beasts/ha. Two groups of 62 and 92 steers aged 9 months were randomly allocated to these treatments.

Bodyweights were recorded at approximately 28 day intervals, the animals being held overnight in a bare yard.

Very few ticks were observed, but cattle were dipped after every weighing as a routine measure. A precautionary anthelmipthic treatment was given in December 1966. Several routine faecal samplings indicated negligible worm burdens.

III. RESULTS

(a) Year 1

The cattle gained weight (0.13 kg/day) slowly from June until late September 1966. Growth was then more rapid (0.73 kg/day) until early in the following May, when rate of gain declined (0.3 1 kg/day) until the steers were removed in June 1967 (Figure 1). The mean daily gain for 348 days was 0.52 kg and the overall gain/ha was 222.6 kg/ha.

There were significant differences in performance between ages during the winter-spring periods of slow growth. In the first such period, older cattle grew faster ($P < 0.01$) but in the second period, younger cattle made more rapid gains ($P < 0.01$).

(b) Year 2

Steers introduced in late June 1967 had a similar pattern of growth to those in the previous year (Figure 2). During the initial period of slow growth, the steers at the lighter stocking rate gained 0.22 kg/day which was significantly faster than those at the heavier stocking rate with 0.19 kg per day ($P < 0.05$). However, the performance of the heavier stocking rate group was slightly superior at 0.34 kg/ha/day than the lighter with 0.27 kg/ha/day.

From October 1967 to early May 1968, there was no significant difference in animal performance between the two stocking rates, but the average daily gain/ ha was 0.86 kg/ha and 1.25 kg/ha respectively. From May to July 1968, steers

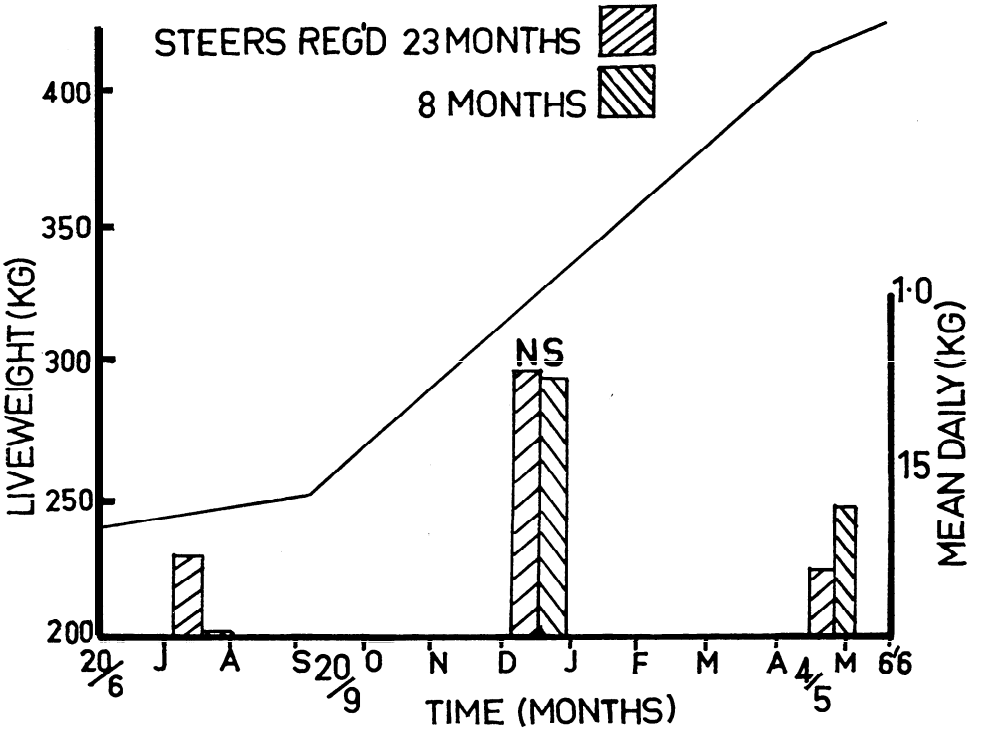

Fig. 1.—Bodyweight gains of steers at 1.23 beasts/ha (year 1) and seasonal mean daily gains for two age groups.

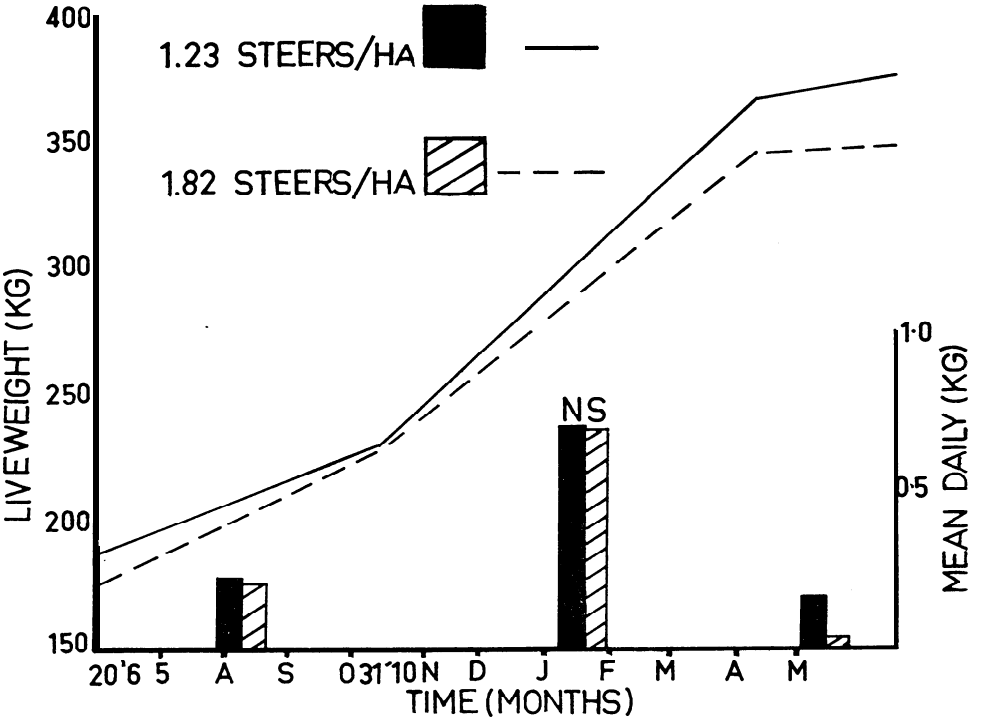

Fig. 2.—Bodyweight gains of steers at 1.23 and 1.82 beasts/ha (year 2) and seasonal mean daily gains for two stocking rates.

at the lower stocking rate gained significantly faster ($P < 0.01$) with 0.15 kg/day as compared with 0.03 kg/day for the higher stocking rate. In terms of gain per unit area, the gains were 0.19 kg/ha/day and 0.05 kg/ha/day respectively. Mean daily gain for the whole period (379 days) was 0.45 and 0.39 kg for the low and high stocking rates respectively. On a unit area basis, the performance on the

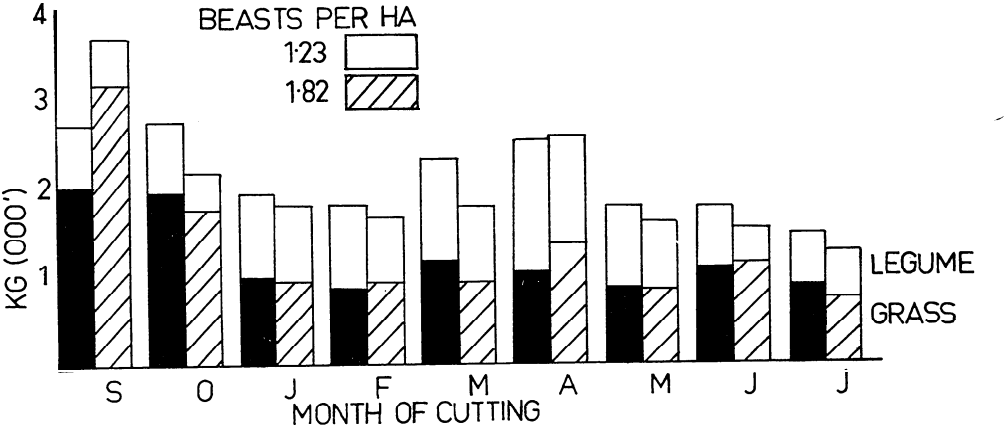

Fig. 3.—Amounts of available dry matter of cut quadrats at two stocking rates showing legume and grass components (year 2).

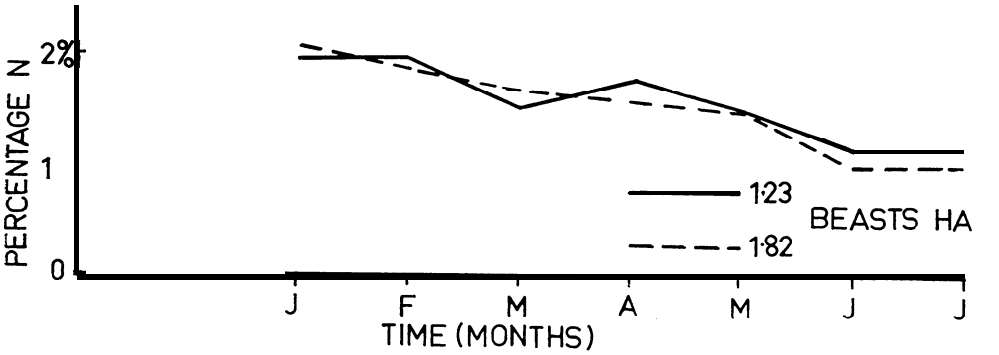

Fig. 4.—Percentage nitrogen content of whole plant sub-sample of quadrats at two stocking rates (year 2).

lighter stocking rate was 209.8 kg/ha while that on the heavier stocking rate was 269.0 kg/ha.

Available dry matter estimated from cut quadrats was 2000 kg and 1800 kg/ha for the lower and higher stocking rates **respectively.** Mean available legume on a dry matter basis was respectively 940 kg and 570 kg per ha for the two stocking rates (Figure 3).

Average percentage of quadrats with legume dominance at the lower stocking rate was approximately 40 per cent and at the higher stocking rate 25 per cent. There was a tendency toward maximum legume dominance at the end of summer. Nitrogen content of the available dry matter of the pasture varied little between the treatments declining from 2 per cent in summer to 1 per cent in winter (Figure 4).

IV. DISCUSSION

This investigation shows that tropical legume grass pastures in coastal south-eastern Queensland are capable of producing between 130 kg and 180 kg of bodyweight gain per beast in a 12 month period at a fixed stocking **rate** of 1.23 beasts/ha. Bodyweight gains were slow in winter and early spring and nearly all the gains occurred during summer and autumn. The absence of a difference in animal performance between stocking rates would suggest that the heavier rate could be used advantageously during the summer. This is supported by the gain per unit area for the two stocking rates during the summer. However, during the winter, the lighter stocking rate was superior in performance.

The constant rate of gain in both summers (0.7 kg/day) suggests that the animals may have been producing to the limit of the capacity of the pastures on a per animal basis so that improvement could be examined by varying the stocking rate. With available dry matter of approximately 2000 kg/ha, it is unlikely that quantity was a limiting factor. Between one quarter and one half of this amount was legume.

These same legumes were reported by Holder (1960) and Milford (1967) to have a crude protein content on a dry matter basis for glycine (G. ***javanica)*** of

from 18.9 per cent in the leafy stage to 12.9 per cent after seeding with a similar range for Siratro *(Phaseolus atropurpureus)* and silver leaf desmodium *(D. uncinatum)*. It is not likely, therefore, that protein was a limiting factor to bodyweight gains.

One explanation of the comparatively low production per head is the low energy value of the pasture which was estimated by Hardison (1966) to be able to support only 5 kg fat corrected milk/day from dairy cows.

V. ACKNOWLEDGMENTS

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