TECHNICAL NOTE

ROTATIONAL AND CONTINUOUS GRAZING OF ZULU FORAGE SORGHUM (*SORGHUM* SPP. HYBRID) BY BEEF CATTLE GRAZED AT 3 STOCKING RATES

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ABSTRACT

A grazing trial, using the hybrid forage sorghum (Sorghum spp. hybrid) cultivar Zulu, compared rotational grazing (a 4 week cycle, 2 weeks in each of 2 half-paddocks) with conventional continuous grazing at each of 3 stocking rates, 1.92, 2.85 and 4.34 beasts/ha over 3 years. Each year average daily gain was increased ($P < 0.05$) by rotational grazing for either the whole or the early part of the grazing period but the advantages measured were slight and are considered insufficient to compensate for the extra expense of fencing and provision of water.

RESUMEN

Una prueba de pastoreo, utilizando el hibrido de forraje sorgo (Sorghum spp. hybrid) cv. Zulu comparó por tres años el pastoreo rotativo (un ciclo de 4 semanas en cada uno de 2 medio-potreros) con pastoreo convencional y continuo a cada una de las 3 cargas, 1.92, 2.85 y 4.34 cabezas/ha. Cada año la ganancia promedia diaria ($P < 0.05$) aumentó por pastoreo rotativo, ya sea toda o la primera parte del período de pastoreo, pero las ventajas evaluadas fueron pocas y son consideradas insuficientes para compensar por el costo extra de la cerca y la provisión de agua.

INTRODUCTION

Forage crops, in the extensive farming areas of the brigalow lands of central Queensland, are normally continuously grazed. However, graziers frequently inquire about the potential advantages, if any, of rotational grazing. They are seeking means of improving both the rate of daily gain of liveweight per animal and the duration for which the forages are available to the grazing animals.

There have been some studies in which regular cutting, to simulate rotational grazing, has shown that the hybrid forage sorghums regrow vigorously after cutting and produce higher yields than older open pollinated sorghums (R. G. Henzell and W. Gillieron, personal communication). As well, rotational grazing with sheep, at Tamworth, N.S.W., extended the grazing period but not the liveweight gain (Anon. 1969).

In a series of studies with different forage sorghums, under continuous grazing, at the Brigalow Research Station, north-west of Theodore in central Queensland, adequate total liveweight gain and its duration was achieved only at the lowest stocking rate of 1.5 beasts/ha. These results were not greatly superior to liveweight gains that can be achieved over summer from newly planted grass pastures on these fertile brigalow soils (French *et al.* in press).

To answer graziers questions and as a follow-up of the earlier work, a small and simply monitored rotational versus continuous grazing study was conducted using Zulu forage sorghums. The results are presented in this note.

MATERIALS AND METHODS

For the present experiment, 30 hectares of the site used by French *et al.* (in press) on the Brigalow Research Station was used. A (3 × 2) × 2 randomized block design with 3 stocking rates, 1.92, 2.85 and 4.34 beasts/ha, was achieved by running 7 animals per paddock in 3.8, 2.4 and 1.6 ha paddocks. Paddocks were either continuously or rotationally stocked over the grazing season, which varied each year, depending on when planting was possible and when feed supply was exhausted in the majority of cells. The rotational treatment used a 4-week cycle, 2 half-paddock system (2 weeks in each half-paddock). There were 2 replications.

The area was planted each year to *Sorghum* spp. hybrid cv. Zulu at 5 kg/ha of seed in 300 mm rows. No fertilizers were applied. Before grazing plant populations and yield of forage sorghum on offer were estimated by counting plants, and cutting to ground level, 1.8 m of sorghum in 2 rows at 4 random positions per paddock. The cut samples were dried at 95°C for 24 hours to determine oven dry matter percentage. Initial forage-on-offer was then calculated.

Details of planting, commencement of grazing, mean plant populations, mean oven dry forage-on-offer and seasonal rainfall each year are shown in Table 1.

TABLE 1

Date of planting, commencement of grazing, mean plant population and mean oven dry forage on offer at the commencement of grazing each year, together with seasonal rainfalls at Brigalow Research Station, Theodore 1972-74.

Date planted	Grazing commenced	Mean plant population	Mean forage yield	Rainfall							
				Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
		(plants/ha)	(kg/ha ODM)					(mm)			
Dec 22-23, 1971	Jan 26, 1972	109 000	2 460	115	111	132	13	13	39	39	0
Jan 18-19, 1973	Feb 26, 1973	137 000	4 140	55	137	100	28	2	19	40	116
Jan 19, 1974	Mar 13, 1974	130 000	3 570	239	157	58	9	77	26	3	20

A new draft of Hereford steers was used each year, with initial mean liveweights of 294 ± 6.2 (SD) (1972), 288 ± 2.4 (1973) and 275 ± 1.7 (1974) kg/head. The steers were allotted to treatments by stratified randomisation and were weighed fortnightly after an overnight fast.

Liveweight gain for each animal was submitted to analysis of variance using a randomised block design, with pairwise testing of means by the LSD procedure. The interaction of stocking rate and grazing system was not significant ($P > 0.05$), hence only main effect means are presented.

RESULTS AND DISCUSSION

The rotational grazing system gave a higher average daily gain (ADG) each year (Table 2) but, over the whole grazing season, only reached significance ($P < 0.05$) in the first year. However, in both 1973 and 1974, there was a period in the early stages of grazing (1st phase, Table 2) in which ADG was improved ($P < 0.05$) rotational grazing. In 1974 this lasted until forage in the high stocking rate paddock was exhausted (May 8), but in 1973 the improvement disappeared 3 weeks before this date (April 9 to 27). This coincided with a period when the trial cattle were affected by bovine ephemeral fever.

It was first noticeable that the first year (1972) was the only year in which stocking rate effects were significant, with the low stocking rate cattle gaining more than those at medium or high stocking rates ($P < 0.05$).

The ADG's of 0.5 and 0.6 kg/head/day at the low stocking rate were only fair but were comparable to those from standover forage sorghums later in the year reported by Rudder (1977) from commercial conditions. As well, the 100+ days duration of

TABLE 2

Main effects of stocking rate and grazing system on average daily liveweight gain on Zulu forage sorghum at Brigalow Research Station 1972-74.

Stocking rate (Beasts/ha)	Average daily gain					
	1st phase			Whole period		
	1972	1973[1]	1974	1972	1973	1974
			(kg/ha)			
Stocking rate effect						
1.92 (Low)	0.68a[2]	0.73a(0.89)a	0.52a	0.60a	0.55a	0.53a
2.85 (Medium)	0.71a	0.66a(0.93)a	0.51a	0.48b	0.46a	0.41a
4.34 (High)	0.16a	0.64a(0.88)a	0.46a	0.48b	—	—
Grazing system effect						
Mean Rotational	0.67a	0.70a(0.98)a	0.53a	0.57a	0.51a	0.52a
Mean Continuous	0.66a	0.65a(0.83)b	0.46b	0.48b	0.50a	0.42a
SD	0.37	0.16(0.24)	0.08	0.13	0.19	0.30
Last Weighing	March 7	Arp 27	May 8	May 5	June 8	July 3

[1]Figures in brackets are ADG from start of grazing to April 9, 1973

[2]Means in the same column with a letter in common do not differ significantly ($P > 0.05$)

grazing was less than the 150 days reported by Rudder (1977). The medium to high stocking rates gave both inadequate rates of gain and duration of grazing.

Our study showed that rotational grazing was not able to consistently improve the ADG's of cattle, nor increase the duration of grazing of forage sorghum compared with the continuous system normally employed in Central Queensland. Some benefits were obtained but the overall results suggested that there was no practical advantage in using rotational grazing. These conclusions are reinforced when the extra expenses involved in the provision of fencing and water are considered.

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