CATTLE PRODUCTION ON BLACK SPEARGRASS PASTURES IMPROVED WITH EITHER LEUCAENA OR SHRUBBY STYLO

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SUMMARY

Weight gains of cattle grazing native black speargrass *(Heteropogon contortus)* pasture impro with either leucaena *(Leucaena leucocephala cv.* Peru) or shrubby stylo *(Stylosanthes scabra)* were measured for 5 years. Steers grazed paddocks of black speargrass oversown with Fitzroy s *(S. scabra* cv. Fitzroy), *S. scabra* CPI *55856* or *S. scabra* CPI 49834, or with 25% of the paddock sown with leucaena in rows 3 m apart. Steers were allowed access to blocks of leucaena for either all (LAY), the whole block continually for 8 months each year from March to November (L8C) o quarter of the leucaena block at a time, in rotation, between March and November each year (L8

There were no differences *(P* > 0.05) in annual weight gains of steers grazing the diffe treatments. Average annual weight gain was 156 kg/steer (range 149-170 kg/steer). In most years tended to give better steer growth than LAY, although not significantly *(P* > 0.05), and more co cattle production from year to year than from the sty10 pastures. We conclude that the shrubby sty suitable alternatives to leucaena for improving cattle production from native pastures a production from leucaena is unaffected by the grazing management systems tested.

Keywords: leucaena, shrubby stylo, native pasture, black speargrass.

INTRODUCTION

Cattle growth on native black speargrass *(Heteropogon contortus)* pasture in south-east Queens is often limited by poor pasture quality, particularly during winter (McLennan *et al.* 1988). One for improving pasture quality is to grow legumes. Until recently, luceme *(Medicago sativa)* and leucaena *(Leucaena leucocephala* cv. Peru) were the only legumes well adapted to the clay soils of t speargrass region. However, luceme is only short-lived (3-5 years) and leucaena can be difficu establish. Other legumes that showed promise for this region included types of shrubby *(Stylosanthes scabra).* Cattle production from these pastures required testing in this environment.

Addison *et al.* (1984) increased annual liveweight gain of steers by 30 to 50 kg/head when they w allowed access to leucaena as a supplement during winter and spring. In that study, each leucae was subdivided into blocks, and cattle grazing native pasture had access to these blocks on a rot basis, resting some blocks while grazing another. There are obvious benefits of being able to gra leucaena as a single unit but data on animal production from such a system were not available.

In this study, the productivity of native pastures oversown with shrubby stylos was compared w that of native pasture supplemented with leucaena that was managed in different ways.

METHODS

Trial site, design and treatments

The experiment was conducted from June 1983 to May 1988 at 'Brian Pastures' Research Sta Gayndah (20°39'S. 151°45'E.) in sub-coastal, south-east Queensland. Average annual rainfall is 72 with 70% occurring from October to March. Soils on the experimental site were predominantly b clays and black earths with some solodics. Twelve paddocks of native pasture dominated by for bluegrass (*Bothriochloa bladhii*), Queensland bluegrass *(Dichanthium* spp.) and black speargrass were used, each paddock was 3.24 ha. Six treatments were allocated to these paddocks in a randomised b design with 2 replications.

Three of the treatments were native pasture plus leucaena with 25% of the paddock establish single block of leucaena, in rows 3 m apart. Cattle were allowed access to the leucaena e (i) rotationally from March to November each year (4 sub-blocks of leucaena, each grazed for 1 week i (L8R, the control treatment), (ii) continuously all year (LAY), or (iii) continuously from Ma November each year (L8C). The other 3 treatments were native pasture oversown with either (i) l stylo *(Stylosanthes scabra* cv. Fitzroy), (ii) shrubby sty10 CPI 55856 or (iii) shrubby stylo CPI 49834. The leucaena blocks were established in 1969 as described by Addison *et al.* (1984). After chis ploughing the paddocks twice, the sty10 paddocks were sown in February 1982 and rolled with Cambridge roller. Sowing rates were 3.4, 3.8 and 2.8 kg/ha of Fitzroy, 55856 and 49834 respectively.

Each paddock was grazed by one 6 to 18 month old and one 18 to 30 month old,

3/8 Sahiwal x 5/8 Hereford steer. Thirty-month-old steers were replaced by 6-month-old steers in June each year. Cattle were not inoculated with mimosine-degrading rumen bacteria but Quirk *et al.* (1988) found no advantage in growth rates to cattle dosed with the bacteria when only a small area of leucaena was used as a supplement.

Measurements and statistical analyses

All pastures, except blocks of leucaena, were sampled each season from March 1983 to April 1986 using the BOTANAL technique (Tothill *et al.* 1978) with 100 quadrats (0.25 m^2) estimated in each paddock. In paddocks oversown with stylo, the numbers of stylo plants and seedlings were also recorded. Leucaena blocks were sampled in March and November each year up to 1986 by harvesting leaf, green pods and stems (I 5 mm) from a 10 m length of row at 4 sites in each block of leucaena. Pasture between rows of leucaena was also measured by cutting pasture from 0.25 m^2 quadrats, 5 at each sampling site. Cattle were weighed unfasted at 6 week intervals.

Analysis of variance was used to test treatment and year effects on cattle weight changes and pasture yields.

Rainfall

Annual rainfall totals for the period June to May for the years 1983-84 to 1987-88 were 637, 691, 878, 676 and 506 mm respectively compared with the long term average of 720 mm. Autumn rain in 1983 was 3 times the long term average for this period. Rainfall in the summers of 1983-84, 1984/85 and 1987-88 were 62, 57 and 36% of the long term average respectively. However, these low recordings were countered by autumns and winters that were wetter than usual.

RESULTS

Average annual weight gain of cattle was similar ($P > 0.05$) from all pastures (range 149-170 kg/head) (Table 1). Weight gains from LAY were less (8 to 40 kg/steer.year) than from L8R in all years except 1987-88, but only significantly less ($P < 0.05$) in 1 year (1983-84). Similarly, weight gains from stylo pastures were lower than from L8R in all years except 1985-86, but only 55856 and 49834 in 1 year (1987–88) were significantly lower.

Table 1. Annual weight gains (kg/head) of steers grazing 6 pasture treatments from June 1983 to May 1988

Leucaena grazed in rotation for 8 months (L8R) or year round (LAY) or continually for 8 months
l.s.d. ($P = 0.05$) = 36.3 for treatment comparisons within years

	Spear grass with 25% leucaena			Speargrass oversown with *Stylosanthes scabra*		
	L8R	LAY	L8C	cv. Fitzroy	CPI 55856	CPI 49834
1983–84	206	165	172	200	201	189
1984–85	161	132	160	140	139	137
1985–86	143	135	142	141	146	156
1986–87	183	160	155	156	161	174
1987–88	157	177	170	127	99	109
Mean	170	154	160	153	149	153

Presentation yields of native pasture or native pasture plus stylo mostly exceeded 1500 kg/ha in all treatments. Low yields occurred only after the dry summers of 1983-84 and 1984-85, and then only in the stvlo treatments.

Leucaena yields in the L8C and L8R treatments averaged 434 and 685 kg/ha respectively in March each year (Table 2). In contrast, presentation yield of leucaena in the LAY treatment averaged only 230 kg/ha at the same time, about half of the yield in the L8C treatment and one third of the yield in the L8R treatment. Average yields of inter-row pasture were similar across treatments for each sampling time.

Fitzroy stylo consistently yielded more than the other stylos (Table 3) but yields of all stylos varied greatly from 1 year to the next. For example, yield of Fitzroy in August 1984 was only 21% of the yield measured in August 1983.

DISCUSSION

Average weight gains of cattle grazing stylo pastures were similar to those from leucaena pastures, highlighting the value of stylos as alternative legumes for clay soils. Average weight gain for all

Table 2. Dry matter yields (kg/ha) of edible leucaena and inter-row pasture in March and November averaged over 1983 to 1986 in pastures where leucaena was rotationally grazed (LSR) or continually grazed (L8C) for 8 months a year or grazed all year (LAY)

	Leucaena			Pasture		
	L8R	LAY	L8C	L8R	LAY	L8C
Mar.–Apr.	230	685	434	3200	4030	3540
Nov.–Dec.	178	338	170	1710	2180	1700

Table 3. Dry matter yield (kg/ha), and percentage of total pasture DM yield, of stylo plants in treatments oversown with shrubby stylos *Stylosanthes scabra* cv. Fitzroy, *S. scabra* CPI 55856 or S. *scabra* CPI 49834

	cv. Fitzroy		CPI 55856		CPI 49834	
	(kg/ha)	(%)	(kg/ha)	(%)	(kg/ha)	(%)
Aug. 1983	1479	37	148	5	654	20
Aug. 1984	313	17	41	3	76	7
Aug. 1985	356	21	70	6	68	6
Aug. 1986	744	19	272	8	44	1

pastures was 156 kg/steer.year, about 30-40 kg/steer more than could be expected on native pasture alone (Quirk *et al.* 1990) and 26 kg more than from cattle grazing an adjacent native pasture paddock over the same period. Also, our results suggest that the productivity of leucaena is not greatly sensitive to the grazing management systems we tested.

Although the weight gains from stylo and leucanea treatments were similar when averaged over the duration of the experiment, there were some years (e.g. those of low summer rainfall) when cattle production from stylo was up to 50 kg/head less than L8R. Stylo plant densities were always adequate, being greater than 5 plants/m2 for most of the trial (data not presented) but low presentation yield in some years may have limited cattle production. This indicates stylo pastures may be more susceptible than leucaena to year-to-year variations in climate. Greater perenniality of leucaena plants and the ability to produce green shoots in warm periods during wet winters, e.g. 1984 and 1985, may account for the better production from leucaena in some years. However, our analysis showed significant ($P < 0.05$) differences between leucaena and stylo pastures occurred in only 1 year, 1987-88. This work shows the value of shrubby stylos, particularly Fitzroy, as alternative legumes to leucaena for this environment. Unfortunately, these stylo cultivars are susceptible to the fungal disease anthracnose (*Colletotrichum gleosporioides*) and therefore have limited use in Queensland. However, the shrubby stylo cultivar Seca is tolerant of anthracnose and may fulfil this role.

We are surprised that year-round grazing of leucaena did not give a significant penalty to steer growth when compared with rotational or continuous grazing systems that incorporated a summer rest. Evidence from elsewhere shows that grazing leucaena continually, all year, can reduce its growth (Jones and Jones 1982), in turn reducing the amount of leucaena available for steers. Commercial experience supports these findings (Partridge 1985). Although weight gains from L8R were greater than from LAY in all years except 1987-88, they were significantly greater only in 1983-84. The duration and design of the trial may not have been adequate to detect such differences. There are obvious advantages, such as less fencing and less cattle management, to grazing a single block of leucaena continuously, and we believe further testing is required to clarify the issue.

We have shown that shrubby stylos are another option for pasture development on clay soils in this region. Our results also suggest that there is no benefit from deferred or rotational grazing systems for leucaena pastures.

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