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 improved 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 stylo (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 year (LAY), the whole block continually for 8 months each year from March to November (L8C) or a quarter of the leucaena block at a time, in rotation, between March and November each year (L8R).

There were no differences (P > 0.05) in annual weight gains of steers grazing the different treatments. Average annual weight gain was 156 kg/steer (range 149-170 kg/steer). In most years, L8R tended to give better steer growth than LAY, although not significantly (P > 0.05), and more consistent cattle production from year to year than from the stylo pastures. We conclude that the shrubby stylos are suitable alternatives to leucaena for improving cattle production from native pastures and that 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 Queensland is often limited by poor pasture quality, particularly during winter (McLennan et al: 1988). One option for improving pasture quality is to grow legumes. Until recently, lucerne (Medicago sativa) and leucaena (Leucaena leucocephala cv. Peru) were the only legumes well adapted to the clay soils of the speargrass region. However, lucerne is only short-lived (3-5 years) and leucaena can be difficult to establish. Other legumes that showed promise for this region included types of shrubby stylo (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 were allowed access to leucaena as a supplement during winter and spring. In that study, each leucaena area was subdivided into blocks, and cattle grazing native pasture had access to these blocks on a rotational basis, resting some blocks while grazing another. There are obvious benefits of being able to graze the 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 with 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 Station, Gayndah (20°39'S.151°45'E.) in sub-coastal, south-east Queensland. Average annual rainfall is 720 mm with 70% occurring from October to March. Soils on the experimental site were predominantly brown clays and black earths with some solodics. Twelve paddocks of native pasture dominated by forest 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 block design with 2 replications.

Three of the treatments were native pasture plus leucaena with 25% of the paddock established to a single block of leucaena, in rows 3 m apart. Cattle were allowed access to the leucaena either (i) rotationally from March to November each year (4 sub-blocks of leucaena, each grazed for 1 week in 4) (L8R, the control treatment), (ii) continuously all year (LAY), or (iii) continuously from March to November each year (L8C). The other 3 treatments were native pasture oversown with either (i) Fitzroy stylo (Stylosanthes scabra cv. Fitzroy), (ii) shrubby stylo CPI 55856 or (iii) shrubby stylo CPI 49834. The leucaena blocks were established in 1969 as described by Addison et al. (1984). After chisel ploughing the paddocks twice, the stylo paddocks were sown in February 1982 and rolled with a 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 m²) 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 (1.5 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 m² 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>
<thead>
<tr>
<th></th>
<th>Spear grass with 25% leucaena</th>
<th>Speargrass oversown with Stylonothus scabra</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L8R</td>
<td>LAY</td>
</tr>
<tr>
<td>1983–84</td>
<td>206</td>
<td>165</td>
</tr>
<tr>
<td>1984–85</td>
<td>161</td>
<td>132</td>
</tr>
<tr>
<td>1985–86</td>
<td>143</td>
<td>135</td>
</tr>
<tr>
<td>1986–87</td>
<td>183</td>
<td>160</td>
</tr>
<tr>
<td>1987–88</td>
<td>157</td>
<td>177</td>
</tr>
<tr>
<td>Mean</td>
<td>170</td>
<td>154</td>
</tr>
</tbody>
</table>

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 stylo 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 (LSC) for 8 months a year or grazed all year (LAY).

<table>
<thead>
<tr>
<th></th>
<th>LSR</th>
<th>LAY</th>
<th>LSC</th>
<th>LSR</th>
<th>LAY</th>
<th>LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar–Apr.</td>
<td>230</td>
<td>685</td>
<td>434</td>
<td>3200</td>
<td>4030</td>
<td>3540</td>
</tr>
<tr>
<td>Nov–Dec.</td>
<td>1/8</td>
<td>538</td>
<td>1/0</td>
<td>1710</td>
<td>2180</td>
<td>1700</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>cv. Fitzroy</th>
<th>CPI 55856</th>
<th>CPI 49834</th>
</tr>
</thead>
<tbody>
<tr>
<td>(kg/ha)</td>
<td>(%)</td>
<td>(kg/ha)</td>
</tr>
<tr>
<td>Aug. 1983</td>
<td>1479</td>
<td>37</td>
</tr>
<tr>
<td>Aug. 1984</td>
<td>515</td>
<td>11</td>
</tr>
<tr>
<td>Aug. 1985</td>
<td>356</td>
<td>21</td>
</tr>
<tr>
<td>Aug. 1986</td>
<td>744</td>
<td>19</td>
</tr>
</tbody>
</table>

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 leucaena 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 LSR. 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 LSR 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.

ACKNOWLEDGMENTS

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