EVALUATION OF NEW MEDIC CULTIVARS FOR THE LOW RAINFALL WHEATBELT OF WESTERN AUSTRALIA: 2: DRY MATTER AVAILABILITY, LIVEWEIGHT CHANGES AND WOOL PRODUCTION

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SUMMARY

Increasing aphid infestations over the last decade have resulted in poor persistence of Cyprus barrel medic in the northern wheatbelt of Western Australia. Plots of Parabinga and Cyprus barrel medics and a mixture of Serena/Santiago burr medic were established in 1990. This paper presents sheep and wool data from grazing of the plots in 1991. There were high and low stocking rate treatments (5 and 8 hoggets/ha in 1991) of both Parabinga and Serena/Santiago while there was only the low stocking rate treatment for Cyprus. Swards containing Parabinga had 16 and 11% more total dry matter available ($P < 0.001$) and 75% and 150% more medic dry matter available ($P < 0.01$) than those containing Cyprus and Serena/Santiago respectively. At the stocking rate of S/ha, the liveweight gains and wool production of the hoggets on Parabinga and Serena/Santiago were not significantly different to those stocked at only 5/ha on Cyprus ($P > 0.05$).

Keywords: medic, dry matter, liveweights, wool.

INTRODUCTION

Cyprus barrel medic was once highly productive on the red loams of the low rainfall wheatbelt of Western Australia (Parkin 1966) but this plant is now failing to persist, probably because of increased aphid infestations in the 1980's. Previous research in the Mullewa district of WA highlighted the potential of Parabinga barrel medic and Serena and Santiago burr medics as replacements for Cyprus (Nutt 1989). These medics have a higher tolerance of aphid attack than Cyprus and should therefore be better able to withstand aphids during spring and hence set more seed, resulting in subsequently greater seedling density, more dry matter production and better persistence.

Pasture legumes are required on these soils for rotations with cereals and to carry sheep in winter and spring, with the crop stubbles providing grazing for summer and autumn.

This paper presents results of pasture dry matter availability, liveweight changes and wool production in the second year (1991) of a comparison of pastures of Parabinga barrel medic, a mix of Serena and Santiago burr medics and Cyprus barrel medic. There was limited grazing of the plots in the first year so as to achieve a good establishment. Results for the seed production of these pastures are presented by Nutt *et al.* (1994).

DESIGN AND METHODS

Five treatments were used; Parabinga at stocking rates of 5 and 8 hoggets/ha, Serena/Santiago mixture at 5 and 8 hoggets/ha, and Cyprus at 5 hoggets/ha. There were 3 replicate plots per treatment and a completely randomised layout was used. Details of the site and how the 3 pasture treatments were established are given in a related paper in these proceedings (Nutt *et al.* 1994).

Pasture estimates

Pasture dry matter available for grazing was estimated at 4-weekly intervals, starting on 11 June, using the average of 50 visual ratings calibrated against direct pasture cuts for each treatment. The 50 visual ratings were also used to estimate the relative mass of legume, other broadleaved plants and grasses (t'Mannetje and Haydcock 1963).

Animals and animal measurements

The 2 stocking rates involved the use of 2 plot sizes; 1.0 and 1.7 ha. In 1991, the plots were stocked on 11 June after the break of the season with 5 sheep each to achieve stocking rates of 3 and 5 sheep/ha. However, because of the good season, extra sheep were added on 26 June to lift the stocking rates to 5 and S/ha. The animals had been shorn in September 1990 and were about 10 months old when put onto the plots.

The pastures senesced by mid October 1991 and all sheep were removed from the plots on 12 November and shorn.

The sheep were individually weighed each fortnight. At shearing, the fleeces were weighed and sampled to estimate yield and fibre diameter.

Analyses of variance were used to evaluate data on availability of dry matter (total and medic), liveweight gains, clean fleece weights and mean fibre diameters of the fleeces.

RESULTS

Pasture composition

Medic comprised 34 and 31% of total dry matter available in Parabinga swards stocked at 5 and 8 hoggets/ha respectively, averaged over the growing season. By contrast, the medic proportion in the Serena/Santiago treatments averaged 26% at 5 hoggets/ha and 18% at 8 hoggets/ha. Medic comprised 20% of the dry matter available in the Cyprus treatment. Grasses (*Lolium rigidum*, *Hordeum leporinum* and *Bromus* spp.) made up less than about 10% of available dry matter in all treatments with broadleaved plants *(Arctotheca calendula, Raphanus raphanistrum, Erodium botrys* and *Emex australis*) making up the remainder.

Total dry matter

There was a significant effect of medic cultivars on the availability of total dry matter ($P < 0.001$), but no significant interactions with stocking rate or time ($P = 0.05$). Over the growing season, the swards containing Parabinga had 11 and 16% more dry matter available than those containing Serena/Santiago and Cyprus respectively (2.25 compared to 2.03 and 1.94 t/ha). The difference between the figures for Serena/Santiago and Cyprus was not significant ($P = 0.05$).

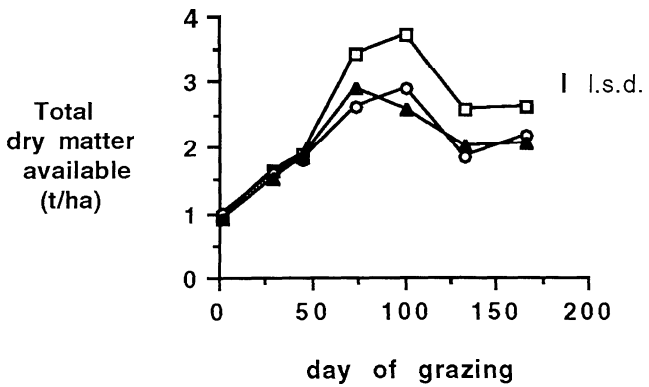

Figure 1. The effect of stocking rate (5/ha, open squares; and 8/ha, open circles) on the mean total dry matter available to merino hoggets grazing Parabinga or Serena/Santiago medic pastures. Results for Cypress medic pastures grazed at 5 hoggets/ha are shown separately (closed triangles)

There was also a significant interaction between stocking rate and the date on which total dry matter was measured ($P < 0.001$). This interaction appeared to be mainly due to a greater increase in available dry matter between days 45 and 74 at the low compared to the high stocking rate (Figure 1). For the last measurement on green feed (25 September), Cyprus pastures had only 67% and 69% of the total dry matter available in plots stocked at 5 hoggets/ha containing Parabinga and Serena/Santiago respectively. The amount for Cyprus was very similar to the mean of the other medics when stocked at 8 hoggets/ha (Figure 1).

After the sheep were removed from the plots, there was between 21 and 74% more dry matter available in the Parabinga treatments than in any of the others. Even at the 8/ha stocking rate, Parabinga had 33% more dry matter available than the Cyprus which was stocked at 5/ha (Figure 2).

Medic dry matter

The data on availability of legume dry matter over the green period showed significant interactions between cultivar and date ($P < 0.01$) and stocking rate and date ($P < 0.001$). The former interaction was due to greater increases in dry matter availability for Parabinga between days 45 and 74 compared to the

other cultivars, this being the case at both stocking rates (shown in Figure 3 for the stocking rate of 5 hoggets/ha). The latter interaction was due to smaller increases in dry matter availability at the higher stocking rates, so that by 25 September there was a mean of 0.82 t/ha of medic dry matter available in the plots stocked at 8 hoggets/ha compared to 1.2 t/ha in the plots stocked at 5 hoggets/ha.

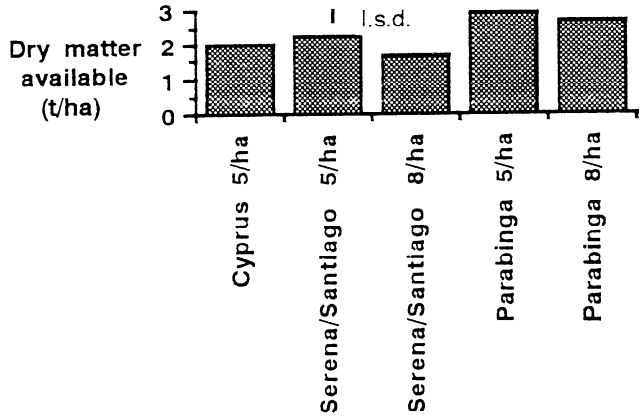

Figure 2. The amount of total dry matter available on medic pastures after sheep were removed in November 1991

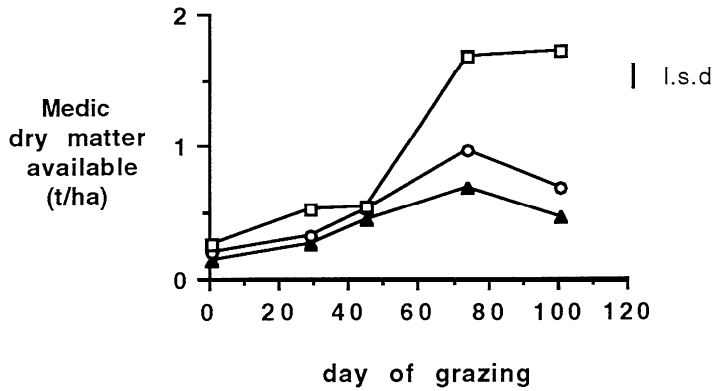

Figure 3. Availability of medic dry matter (Parabinga, open squares; Serena/Santiago, open circles; and Cyprus, closed triangles) on pastures grazed with Merino hoggets at a stocking rate of 5/ha

Broadleaved and grass dry matter

There were no significant treatment effects or interactions in regard to the amounts of broadleaved dry matter available ($P = 0.05$). There was a significant interaction of cultivar and date in the data on grass dry matter ($P < 0.05$). The availability of grass dry matter increased faster in swards with Serena/Santiago, but overall, grass was a minor component of these pastures.

Liveweights and wool

The only significant differences in these data were a greater gain in liveweight for the animals stocked at 5/ha on Parabinga compared to those on Cyprus, and a greater fibre diameter for animals on Serena/Santiago at 8 hoggets/ha compared to those on Cyprus ($P < 0.05$, Table 1). The latter treatment difference was barely significant. Large differences in the numbers of sheep grazing days/ha were associated with the stocking rate treatments (Table 1).

Table 1. Animal production data for Merino hoggets grazed on various medic pastures at different stocking rates near Mullewa in 1991

	Liveweight gained between 26 June and 22 Oct (kg/hogget)	Clean fleece weight (kg)	Fibre diameter (μm)	Sheep grazing days/ha between 11 June and 12 Nov
Stocking rate 5 hoggets/ha				
Cyprus	25.6	3.8	18.9	635
Serena/Santiago	28.1	3.9	20.5	635
Parabinga	29.7	3.7	20.0	635
Stocking rate 8 hoggets/ha				
Serena/Santiago	27.5	3.7	20.6	972
Parabinga	28.8	3.8	19.4	972
l.s.d. (P = 0.05)	3.8	0.6	1.7	-

DISCUSSION

Compared to Cyprus and the Serena/Santiago mixture, Parabinga was clearly superior in terms of the availability of medic dry matter and total dry matter.

Although the stocking rate of 8 compared to 5 hoggets/ha reduced the availability of both medic dry matter and total dry matter, neither the liveweight gain nor the fleece measurements was affected.

Thus, the Parabinga and the Serena/Santiago mixture at 8 hoggets/ha carried 60% more sheep/ha than the Cyprus pastures at 5 hoggets/ha with no reduction in the liveweight gains or fleece weights. Consequently, the wool production per hectare was also 60% higher.

Sheep on Cyprus had 16% lower liveweight gains than those on Parabinga at the same stocking rate. Moreover, Cyprus has a far inferior seed production compared to the other cultivars (Nutt *et al.* 1994). Over the years, this can be expected to effect plant numbers and dry matter production, so that the carrying capacity of Cyprus should then be substantially less than that of Parabinga or Serena/Santiago.

There are also important benefits to crop yields and grain quality from the use of improved pasture legumes in cereal rotations.

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