

GRAIN AND GRAZE

MALLEE

Research Trial

Results 05



G&G Walpeup Research Trial Site

To define and promote the production responses of sheep and pastures at different stocking rates

Summary

The project hypothesis;

1. Sheep production will be higher and more profitable when stocked at 2 ewes/ha compared with 1 ewe/ha (winter grazed hectare).
2. Including lucerne to supplement annual pasture area will increase sheep production/ha and profit compared with annual pasture only.
3. Higher stocking rates will reduce grass production.

The Project findings;

1. The lambs and ewes at 8 ewes/7ha and 8 ewes/4ha maintained similar weight profiles throughout study and therefore the higher stocking rate was more profitable.
2. The October rainfall nullified any potential benefit from the lucerne supplement.
3. The grass and broad-leaf weed component declined comparably in treatments over the course of study irrespective of stocking rate.

Introduction

The role of the sheep industry is under review in the lower rainfall regions of the grain belt. Increasing proportions of farms being cropped with the associated technology (direct seeding, residual herbicides, inorganic N inputs etc.) along with poorly managed pastures are having a negative impact on both the perception and performance of mixed farming enterprises.

Less area of pasture result in fewer sheep on each farm or the same sheep on less area. Studies by Robertson (2005) has shown the potential for doubling stocking rates from the current Mallee regional <1 ewe/winter grazed hectare (Robertson, 2004). Latta and Carter (1998) found that increasing stocking rates on annual medic based pastures in a pasture crop rotation resulted in higher subsequent cereal grain yields and quality.

Robertson (2005) calculated a gross margin/ewe of \$58.12, thus increasing the stocking rate to 2 ewes/ha can produce comparable gross margins to cereal cropping (Unkovich et al., 2005). However there is concern about the environmental impact of increased livestock numbers on soil stability and potential erosion. Maintaining >50% plant biomass ground cover is recommended (Leys, 2002).

The project sets out to establish, under controlled scientifically valid conditions, the economic and environmental impact of doubling stocking rates in the central Mallee region at DPI Walpeup. It utilises a regenerating annual medic pasture and some second year lucerne to help determine variables in sheep and pasture performance in response to stocking rate.

Method

A group of 50 pregnant ewes were located on the 30-hectare research site pre-lambing. Ewes lambed in July under normal commercial practices (daily inspections were undertaken by Kevin Grayling as per Mallee Research Station commercial flock AEC Code No M2002-6.). The flock was supplementary fed until randomly allocated to stocking rate plots on the 7 September as described in Table 1 with an average of 135% lambs at foot.

Experimental Design

Three treatments each of two replicates (Paddock 13S was split into 2 x 7 and 4 x 4 hectare plots) with treatment 2 including 0.4/ha of lucerne to be grazed when forage becomes available.

Table 1 A replicated trial of 3 treatments

Treatment 1 (2 x 7ha)	Treatment 2 (2 x 4ha)	Treatment 3 (2 x 4ha)
8 ewes on 7ha	9 ewes on 4ha	8 ewes on 4ha
annual pasture	annual pasture+lucerne	annual pasture

All treatments were set stocked throughout study apart from treatment 2 (the lucerne supplement) where the lucerne was grazed twice, 5 - 27 October (ewes and lambs), 4 – 22 November (weaned lambs) and the annual pasture not grazed during that period. The sheep and lambs were weighed every 4-6 weeks from August until study was completed on 22 November when all ewes and lambs from trial were removed onto field crop stubbles and became part of the commercial flock.

Pasture measurements

Before ewes were placed on allotted plots 5 cages were sited in each paddock. Using the closed and open cage system pasture availability and growth rate was calculated. Using 0.2 m² quadrats pastures were harvested with blade shears to ground level each 4 – 6 weeks. Pastures were separated into species, washed to remove soil, dead material or root, dried at 60°C and weighed.

Botanical composition and ground cover measurements, using the levy point technique, were collected each 4 – 6 weeks, 50 records for each paddock. Bare ground, annual legume, grass and broadleaf components plus height of pasture were recorded.

Results

Production

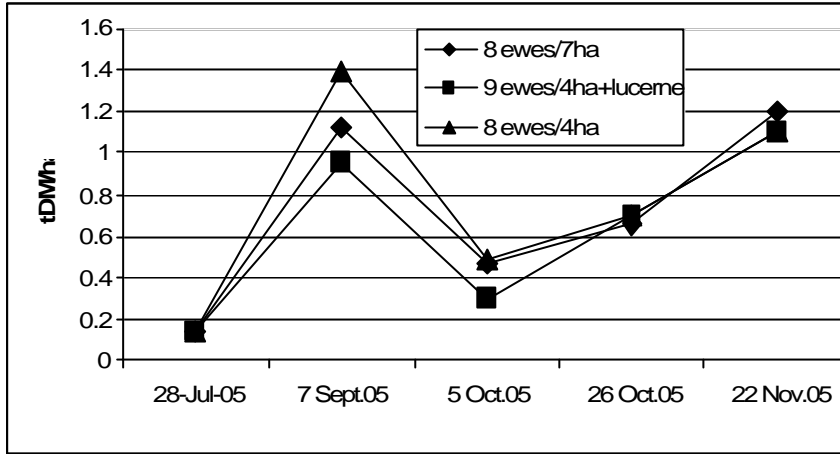


Figure 1 Available annual pasture biomass (t/ha). l.s.d. ($P=0.05$) n.s.d.

There was no difference in available pasture biomass throughout the study (Fig.1)

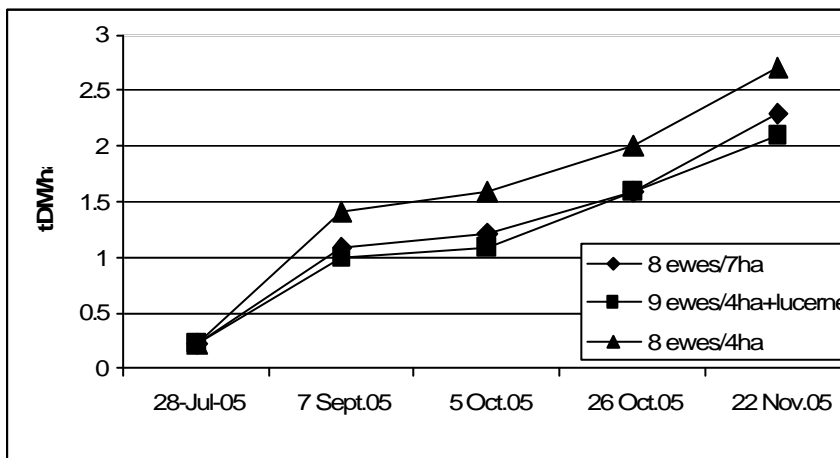


Figure 2 Total cumulative annual pasture biomass (t/ha). l.s.d. ($P=0.05$) n.s.d

There was no difference in total cumulative pasture biomass following the allocation of sheep to their treatments on 7 September (Fig.2). Treatment 3, subsequently 8 ewes on 4 hectares, measured increased production during the period of supplementary feeding and random whole of site grazing by flock of sheep.

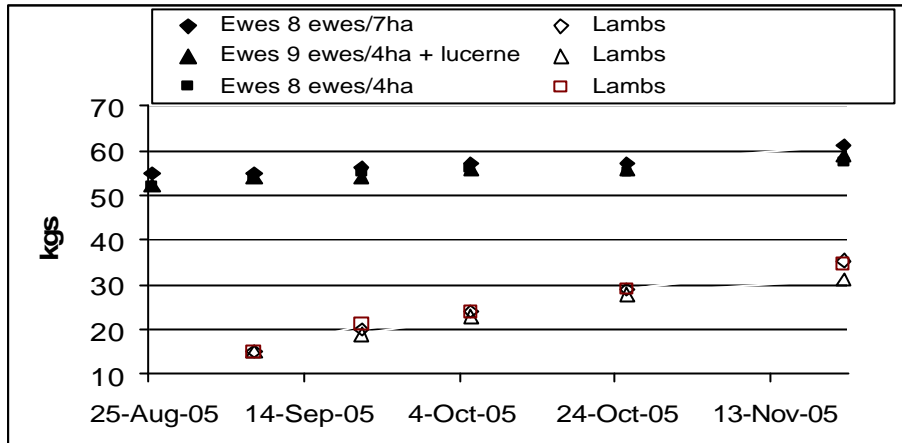


Figure 3 Ewe and lamb liveweights (kgs dry) over the course of study

Ewe and lamb liveweights did not vary comparatively in response to stocking rate from August until November when lambs were weaned and all livestock was removed from study and placed onto crop stubbles and measurement ceased. The lambs from the lucerne supplement treatment were weaned onto the lucerne pasture in October and recorded a reduced rate of weight gain in comparison to the lambs retained at foot on annual pasture.

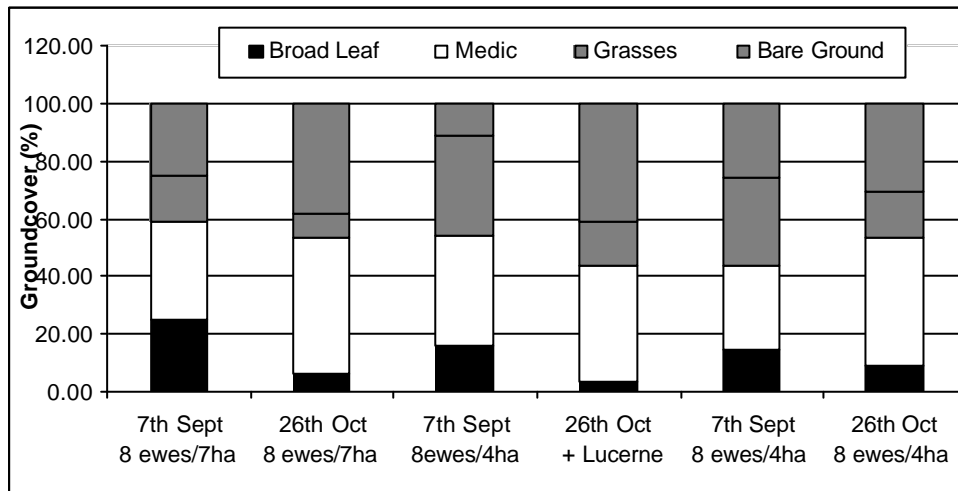


Figure 4 Ground cover % comparison

Figure 4 presents the change in pasture composition in response to stocking rate. At all stocking rates the grass and broad-leaf weed component declined over the September-October growing season, the bare ground % increased and the medic % was maintained or increased to around 40% by late October in all treatments.

Natural resource management

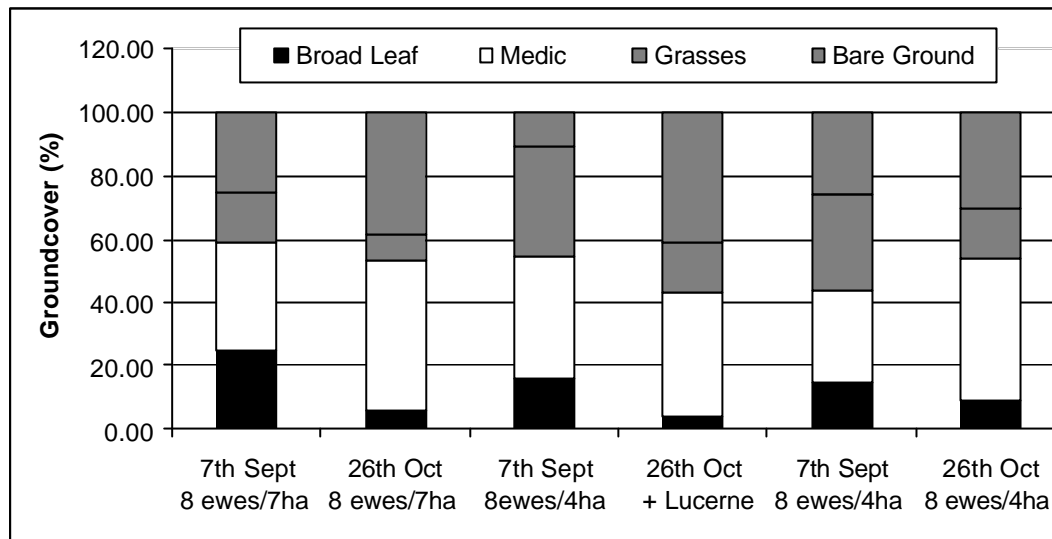


Figure 5 Bare ground (%)

The percentage of bare is an important measurement in respect of potential soil erosion. As the pasture desiccated during November and December, the percentage of bare ground increased above the recommended 50% irrespective of stocking rate.

Economic analysis

The annual medic pasture has been self-regenerating in a rotation of pasture-pasture-wheat since establishment at least 10 years previously. No cost of annual pasture management or establishment was considered to have been incurred due to the time elapsed and there was no fertiliser or pesticide applied in 2005. However, there has been no allowance made for infrastructure replacement or maintenance in the gross margin of \$58.12/ewe as calculated by Robertson (2005). The lucerne had an establishment cost of approximately \$100/ha, estimated as \$30/annum spread over a 3-4 year phase.

The gross margin estimates are for White Suffolk rams over Merino ewes with 90% marked lambs (135% marked in trial). There were allowances made for supplementary feeding for the winter period at \$8/head irrespective of stocking rate, with the assumption that crop stubbles will largely maintain livestock from harvest until time of cropping preparation, based on 50% or more of the farm being under crop.

Table 2. Estimated gross margins (\$/ha) of stocking rate treatments and wheat in 2005

8 ewes on 7ha annual pasture	9 ewes on 4ha ann. pasture+lucerne	8 ewes on 4ha annual pasture	Wheat @ 2t/ha
\$66	\$101	\$116	\$110

The amount of supplementary feeding may be reduced at the low stocking rate and the lucerne treatments (due to increased summer autumn pasture/crop stubble availability and production respectively) and possibly increased at the higher stocking rate (depending upon whole farm proportion of cropping to pasture ground). The estimates show a comparable performance from the livestock and cropping enterprise in response to increasing stocking rates and favourable market forces. There was no allowance made for infrastructure replacement or maintenance in the wheat gross margin

Discussion

The no impact of the stocking rate treatments on available or total pasture, the specie composition and groundcover outcomes were also similar. This was reflected in the animal live-weights where apart from the lambs from treatment 2 (lucerne supplement) all were similar at each measurement time. The lambs from treatment 2 were weaned onto the lucerne pasture component from 26 October and recorded a reduced rate of weight gain over the final 3 weeks of study compared to the lambs retained with ewes on the annual pastures.

One possible reason why there were no measured differences in animal production was the 60 mm of rain during October that allowed the annual pastures to continue to produce biomass into November and the completion of the study. During this period ewe weights increased even where lambs remained at foot at 8 ewes/4ha and annual pastures had senesced.

The increased potential for soil erosion with an increased stocking rate was not realised, all treatments had >50% groundcover on the 26th October but this declined to approximately 30% following the time of stock removal in November. The ground cover components of the pasture were also similar in October with approximately 40% medic, up to 40% bare ground and the rest grass or broadleaf weed.

The benefit that did accrue was the economics of increasing the stocking rate on Mallee winter grazed pastures compared to the current level. Opportunities to produce comparable gross margins (2005 figures) to cereal crops provide an important enterprise diversity option.

The study supported the findings of Robertson (2004, 2005), but in a more controlled system, that it is feasible to increase stocking rate either through increasing sheep numbers or maintaining current numbers on less winter grazed hectares. The risk factors in terms of fodder deficit or soil protection was not altered.