BCG Farming Systems pasture and livestock data

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Introduction

The systems trial conducted by the Birchip Cropping Group is designed to compare the profitability of four different farming systems. Pastures and livestock contribute to three of the systems. This report quantifies the productivity of pastures and livestock during 2001, the second year of the trial.

Detailed pasture measurements were recorded for pasture and fallow paddocks for the systems utilising sheep. For 2001, these were paddocks 2 (Hungry Sheep), 3 (Reduced Till), 8 (Fuel Burners) and 21 (Fuel Burners).

Methods

Pastures were assessed at the end of each month.

Green biomass - kilograms of dry matter (DM) per hectare was assessed every month from 20 observations per paddock using a calibrated visual estimation technique.

Botanical composition was measured seasonally by recording each class of green plant material as a percentage of all (green and dead) plant material present in 50 observations per paddock.

Plant density was measured by counts from 30 quadrats each $0.1m^2$ at the end of June.

Monthly pasture growth was calculated as the increase in green biomass plus pasture consumed by sheep between successive estimations of pasture biomass.

Pasture consumed was estimated using the Grazfeed model

Pasture quality was assessed by Feedtest laboratory analyses from samples collected in late July.

Sheep records were kept of the number of sheep, class of sheep and when sheep grazed each paddock. Sheep were weighed several times throughout the year.

Pasture management

The Hungry Sheep paddock 2 was the only pasture sown during 2001. It was sown at a rate of 10 kg/ha medic and 75 kg/ha oats on 9 April with 30 kg/ha MAP fertiliser. All other pastures were fallowed during winter or spring. Cultivation and chemical operations are listed in Table 1.

Table 1. Cultivation and chemical operations for pasture paddocks during 2001

Paddock	Chemical Use (per ha)	Date sprayed	Cultivations
Hungry Sheep 2	0.5 L gramoxone	22 Oct	No
Reduced Till 3	1L Roundup ct 0.3L Ester 2-4-D 0.1L Garlon 1% Spray-treg 1L Creditt & Bonus 0.8L Spark 1.5L Atrizine 1.2L Roundup ct 0.8L Surpass	4 Jan 25 Jul 14 Nov	No
Fuel Burner 8	0.25 L Targa 0.2 L Dimethoate	26 Jul	
Fuel Burner 21	0.25L Targa 0.2L Dimethoate	26 Jul	30 Aug 18 Sep

PASTURE PRODUCTION

Botanical composition

Paddock 2 was the only paddock in pasture throughout the year - other paddocks were chemically fallowed or ploughed up prior to late October. Despite this, some green grass remained in paddock 3 until late spring.

The late autumn break and heavy stocking rates used retarded the growth of pasture in paddock 2 and the oats sown failed to contribute the quantity of feed expected. Medic was the dominant live species for much of the year.

Plant density

For an adequate pasture in the 350 mm rainfall zone, target seedling density is around 300 medic plants/m^2. Pastures with less than 200 plants/m^2 need topping up with seed if the pasture is to be productive. Medic seedling density ranged from fair to good.

Despite being sown with 10 kg/ha medic and 75 kg oats/ha, the Hungry Sheep pasture did not have higher plant numbers than other pastures. The systems trial site was a good medic pasture prior to establishment of the trial, and high medic plant numbers in other systems are a result of paddock history, not the farming systems being trialed. The Reduced Till pasture (paddock 3) contained considerably more grass and medic seedlings in winter than other pastures (Table 2). However, it is too early in the trial to suggest this is due to the farming system.

Table 2. Number of plants per square metre measured on 26 July 2001

Paddock	Medic	Grass	Broadleaf
2 Hungry sheep	240	154	4
3 Reduced till	585	465	2
8 Fuel burners	154	147	3
21 Fuel burners	305	78	8

Pasture growth rates

The late break to the season resulted in slower than average pasture growth rates, particularly in paddock 2 where the high stocking rate kept leaf area low, thereby limiting use of sunlight. Table 3 shows the average growth rate of pasture in Hungry Sheep paddock 2. All other pastures were fallowed in winter/spring. Negative growth rates indicate pasture or green weeds dying due to low rainfall at the end of the growing season and during summer.

Table 3. Estimated monthly pasture growth rate (kg DM/ha/day) in paddock 2 during 2001

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Estimated Pasture growth kg DM/ha/day	-0.2	0.7	0.8	0	0.5	2	2.3	16.1	20.8	-29.5	0

Pasture quality

The quality of pastures was only measured for paddocks 3 and 21 during July, due to a low biomass in other paddocks making sampling difficult. The digestibility of the dry matter in both paddocks was around 80%, with a metabolisable energy content of 11.5 to 12.1 MJ ME/kg DM. The protein content of grasses at this time was around 31%. These results indicate the pastures had a high nutritive value, as expected for young plants in vegetative growth.

SHEEP PRODUCTION

Stocking rate

Only the Hungry Sheep system runs sheep year round (Table 4). The hungry sheep system carries a very high stocking rate, with large numbers of weaner sheep grazing stubbles during autumn, and high levels of supplementary feeding for June/July lambing ewes. The stocking rate for this system was also higher than normal for 2001 because the 4 ewes in the trial produced 5 lambs - giving a lambing percentage of 125%. This systems aims to carry a long-term average of 8DSE/ha. The DSE (dry stock equivalent) ratings used in these calculations are shown in Table 6. A DSE rating of 1.4 was used for weaners in all systems to account for the slow growth rates while grazing stubbles during autumn.

Table 4. Average annual stocking rates for each farming system in 2001

	Average DSE per effective grazing ha*	Average DSE/non-crop ha
Hungry Sheep	10.3	19.3
Reduced Till	1.3	2.3
Fuel Burners	1.3	1.6

*Effective grazing ha is the non-cropped area plus 1/5 of the crop area, to account for grazing of stubbles.

The following graphs demonstrate the differences in stocking rates throughout the year, and the use of different feed sources.

Average annual stocking rates for each paddock in each of the three systems are shown in Table 5. Even allowing for fallowing of paddocks 18 and 19 in winter/early spring, the utilisation of these paddocks is much less than for the pasture in paddock 2. The Hungry sheep system also utilises stubbles to a much greater extent than the other systems.

Table 5. Average annual stocking rates for individual paddocks 2001

System	Paddock	Average dse/ha 2001	Use 2000	Use 2001
Hungry Sheep	2	8.0	Barley	Pasture- medic/oat
	5	4.1	Wheat	Barley
	13	0	Pasture/fallow	Wheat
	26	1.7	Lentils	Wheat
	32	4.4	Wheat	Lentils
Reduced Till	3	0.6	Barley	Pasture/fallow
	14	0.4	Wheat	Barley
	19	0.1	Pasture/fallow	Wheat
	24	0.7	Wheat	Barley
	30	0.8	Lentils	Wheat
Fuel Burners	8	1.5	Wheat	Pasture/fallow
	10	0.6	Peas	Barley
	18	0.1	Pasture/fallow	Wheat
	21	0.7	Wheat	Pasture/fallow
	29	0.2	Pasture/fallow	Wheat

The Hungry Sheep system

Breed: self-replacing Merino

Wool production: 5.5 kg; 21.5micron; 30-35 N/ktex

Lambing Percentage: 125% (is an overestimate since the 4 ewes in the trial is not a representative number).

Liveweight change

Because of insufficient biomass of pasture, ewes were in poor condition (score 1) and lost liveweight during early lactation, despite supplementary feeding of 214g/head/week barley grain from 18 June until 18 September. However, their merino lambs grew at acceptable rates:

191 g/day between 2 August and 18 September

250 g/day between 18 September and weaning on 16 October.

DISCUSSION

The systems trial has not been operating for a sufficient period of time for the full effect of different management on pasture production to be defined. It could be expected that the medic component of pastures would be reduced by the Reduced Till and Fuel Burner systems where pastures are fallowed in winter, preventing medic seed set. The failure of these systems to sow a pasture could be expected to reduce the biomass of pasture produced, and as the legume component would also be expected to be lower, reduce the nutritive value and potential carrying capacity. At this early stage of the trial, these effects are not apparent.

The Hungry Sheep system demonstrated the significantly higher than average stocking rates possible in the Birchip area. It implies a much larger income obtainable from non-cropped land area if pastures and sheep are managed to support high stocking rates. Due to the late autumn break in 2001 and high stocking rates, the sheep in this system were under considerable nutritional pressure. However, lamb growth rates and wool production were still satisfactory. In comparison, the pastures of the other systems were underutilised, even prior to fallowing. An economic comparison is needed to assess the benefits of pasture versus fallow on a whole-farm system basis.

Table 6: DSE ratings for different classes of sheep

Medium frame sheep 50 kg	Class of sheep
1.0	Dry or early pregnant ewe
1.5	Late pregnant ewe (last 6 weeks)
2.4	Ewe and lamb to weaning, 80% lambing
2.7	Ewe and lamb to weaning, 100% lambing
2.8	Ewe and lamb to weaning, 120% lambing
1.1	Wether, adult
1.4	Merino hogget, 1 to 2 years
1.5	Merino weaner, weaning to 1 year
1.8	XB weaner, fast growth
1.6	XB weaner, medium growth
1.4	XB or Merino weaner, slow growth
2.0	Rams

* Assumes lambs are weaned 14 weeks after the start of lambing.