

## 8.9 Determining Optimal Lamb Stocking Rates For Grazing Of Dual Purpose Wheat - Cressy, Tas

**Location:**

“Pisa”, Cressy, Northern Midlands, Tasmania

**Author:** Geoff Dean

**Funding Organization:** Grain and Graze

**Acknowledgment:**

Ian and AG Morrison for land and assistance with weighing lambs.

**Researchers:**

Geoff Dean, Regan Parkinson (SFS/TIAR)

**Rainfall (Feb-Nov):**

264 mm plus 90mm irrigation

**Summary of Findings:**

A grazing trial consisting of lambs stocked at five different rates (10, 20, 30, 40, 50 lambs/ha) was conducted on March-sown Mackellar wheat. Individual live-weight gains were highest at the lower stocking rates, but income per hectare was considerably greater at the higher stocking rates with income over \$1000/ha at rates of 40 and 50 lambs/ha.

Grain yields tended to be higher for the lowest stocking rate but it is likely this was largely due to increased populations of ryegrass with higher grazing pressure. Adequate chemical control of ryegrass is therefore an important consideration when deciding on stocking rates and duration of grazing.

With gross returns of over \$3000/ha dual purpose wheat can no longer be regarded as just a break crop in the irrigated rotation but should be treated as a high value crop with inputs and resources to match.



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**Background:**

Fodder crops provide a valuable feed resource for filling the feed supply gap over the winter months. They enable producers to maintain lamb growth rates and therefore deliver finished animals during the period of depressed supply and higher prices.

Over the last four years TIAR has conducted field trials measuring the dry matter production from different cereal species and varieties. While this provides valuable data on available feed, farmers require further information on potential live weight gains and optimal stocking rates to best utilise this fodder.

**Treatments and Method:**

The paddock was sown on 12<sup>th</sup> March 2007 with Mackellar wheat at a rate of 100 kg/ha and followed a canola crop. DAP fertiliser was applied at sowing at 125kg/ha.

The trial consisted of six fenced blocks with lambs stocked at five different rates (10, 20, 30, 40, 50 lambs/ha). To account for the inter-animal variability in growth rates and mob behavioural effects under grazing conditions, a minimum of 10 animals were used per treatment group. Plot sizes ranged from 0.2 to 1.0 ha. Apart from two blocks of 20 lambs/ha there was no replication as the aim of the experiment was to produce a response curve across a range of stocking rates.

Crossbred wether lambs with an average initial weight of 41.0 kg were used in the trial, being representative of lambs grown out in Tasmania under commercial conditions for slaughter in late winter. At the initiation of the trial 65 uniform (live weight and condition) animals from the farmers' commercial flock were drafted off and allocated to treatment groups. A colour coded ear tag was applied to enable identification of individual animals and treatment group.

There is very little information available on optimal stocking rates for animals grazing dual purpose wheat. The aim of this study was to determine the optimal animal production and economic stocking rate for lambs grazing dual purpose wheat crops over winter and to assess the effects of different stocking rates and grazing intensity on subsequent plant growth and final grain yield.

Stock were introduced to the treatment blocks on 1<sup>st</sup> June and over the ten week duration of the trial the lambs were weighed at 14 day intervals and scored for condition at 8 weeks. The trial was set stocked as rotational grazing would have involved significantly more blocks and fencing. Stock were removed when dry matter on offer fell below approximately 500 kg/ha and average lamb weights had stopped increasing.

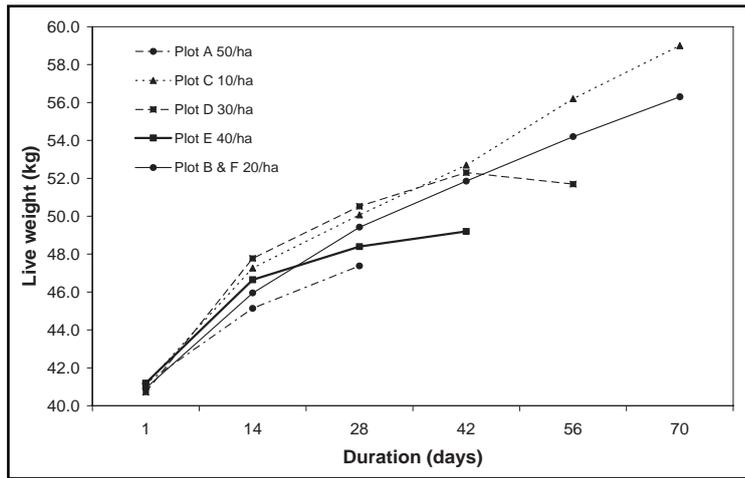
Supplemental magnesium has been shown to increase live weight gains and a magnesium/salt mix was supplied to each treatment group along with adequate water.

Nitrogen (50 kgN/ha) was top-dressed over the paddock on 7<sup>th</sup> September. A fungicide was applied by plane on 25<sup>th</sup> October.

Dry matter cuts were taken at generally 2 weekly intervals over the duration of grazing and at flowering and prior to grain harvest (10 quadrats). Wire cages in each block provided comparative data on ungrazed crop with cuts being taken at the end of grazing, flowering and prior to harvest. To assess grain yield two plot harvester cuts were taken through each block on Jan 7<sup>th</sup> 2008.

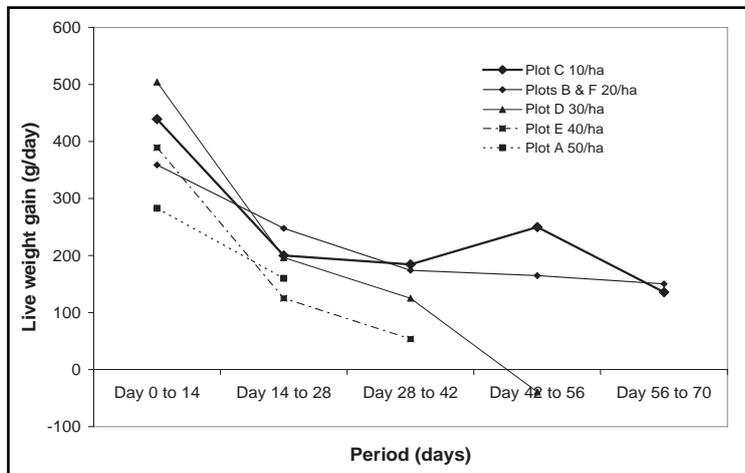
**Results and Discussion:**

**Live weight gains:** Lambs grew well and not surprisingly gains were greatest in the lowest stocking rates where there was most feed on offer. The 10 lambs/ha treatment resulted in average final live weights of 59.0 kg compared with 47.4 kg for the highest stocking rate. Where grazing reduced available feed, increases in live weight plateaued and with the 30 lambs/ha stocking rate there was a slight decrease in live weight. Stock were removed when available feed was reduced below 500 kg/ha -after 4, 6, 8 and 10 weeks for the 50, 40, 30 and 20 lambs/ha stocking rates respectively. Grazing was concluded after 10 weeks (10<sup>th</sup> August) when the more advanced wheat plants reached Zadoks growth stage 30-31.



▲ Figure 8.22: Changes in average lamb live weights (kg) with different lamb stocking rates, Cressy 2007.

The rate of average live weight gain decreased over the duration of the trial. The initial high growth rates of 300-500 g/day over the first 14 days were due to compensatory growth after coming off a lower quality feed. For the lower stocking numbers the rate of live weight gain only decreased slightly after this compensatory growth ie rates of 150-200 g/day.



▲ Figure 8.23: Changes in average live weight gains (g/day) of lambs with different stocking rates, Cressy 2007.

The increase in live weight gain for 10 lambs/ha between 42 and 56 days was probably due to less frosts in mid July plus some milder weather and rainfall. This is also reflected in increased dry matter in the lower stocking rate treatments.

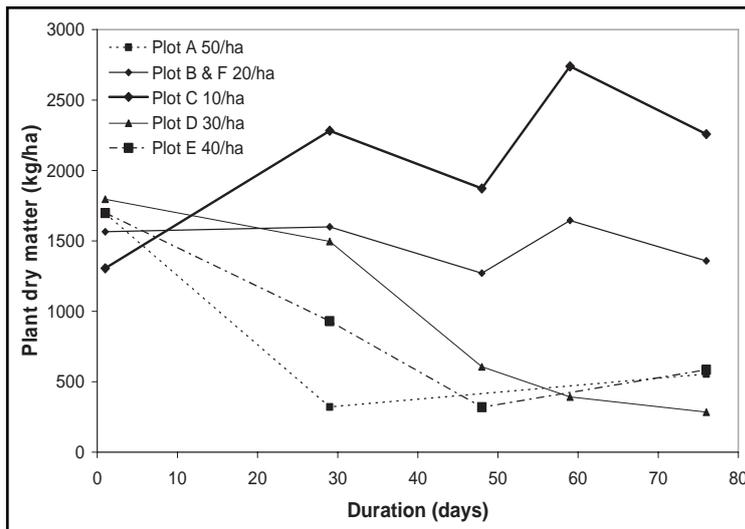
**Crop dry matter production and quality:**

Residual plant dry matter for treatments with 50, 40 and 30 lambs/ha at the finish of grazing was around 300-400 kg/ha. There was still over 2000 kg of dry matter available at the conclusion of the trial at the lowest stocking rate, compared with the 1300-1800 kg of dry matter at the start of the trial. This treatment was obviously under grazed. In contrast at the highest stocking rates there was additional fodder regrowth after stock removal that was not utilised. As a comparison, by the end of grazing, average dry matter production from uncut samples in wire cages was 4250 kg/ha.

Protein content was above 30% at the start of the trial but was still 20% at the completion of grazing and varied little between both samples collected at the end of grazing.

Feed quality of the lightly grazed wheat plants was high with only small decreases in digestibility and metabolisable energy (ME) over the duration of the trial (data not presented). In contrast samples taken from the remaining residue after heavy grazing were much lower in digestibility and ME and contained higher fibre.

It should be noted however that at the higher stocking rates, there is little margin for error and for lambs at 50 and 40/ha there was no feed left after 4 and 6 weeks respectively. Consequently if the starting live weight were considerably lower, it would be difficult to achieve a target weight of 47 kg and the associated premium of \$3.60/kg. A more conservative rate eg 30-35 lambs/ha may be more appropriate to ensure all stock achieve target live weights. A wet winter with crop waterlogging would also reduce plant growth and carrying capacity.



▲ **Figure 8.24: Comparison of available plant dry matter (kg/ha) of dual purpose wheat with different lamb stocking rates, Cressy 2007.**

#### **Recovery from grazing and grain yield:**

The effects of different grazing treatments persisted until flowering with the ungrazed wheat being a week more advanced. The least grazed treatment (10 lambs/ha) was also slightly earlier. The least advanced plants were from the 30 lambs/ha treatment which had been heavily grazed at 2 weeks prior to the conclusion of grazing. There were little differences in dry matter cuts taken at flowering between grazing treatments (average of 300 kg/ha) but ungrazed areas were considerably higher at 400 kg/ha.

To reduce variability, grain yields in Table 8.39 are expressed as average yields for the 2 blocks at 20 lambs/ha and the average of the higher rates (30, 40 and 50 lambs/ha). The grain yield was highest in the least grazed block suggesting an effect of more intensive grazing on grain yield. However the average yield from the two 20 lamb/ha blocks was lower than the average of the higher stocking rates. In addition grazing in all blocks was concluded before plant growing points were removed and irrigation in spring ensured a high leaf biomass prior to flowering.

Samples cut prior to harvest are still being processed but it appears there were more ears/m<sup>2</sup> with the lowest stocking rate. However comparing data from the ungrazed cages indicates there was also more ears/m<sup>2</sup> in the ungrazed area in this block suggesting a site variation effect.

The animals were scored for condition (thanks to Roberts Ltd) after 8 weeks. By this time the higher two stocking rates had been removed. Lambs at the stocking rate of 30/ha averaged a score of 3.9 (out of 5), compared with 4.4 for the 10 and 20/ha treatments.

This is the problem with unreplicated trials. Even with only a small amount of variation it is often difficult to explain results and this is compounded enormously when using large trial areas. Nevertheless the site chosen was good for soil uniformity by Tasmanian standards and the grazing results in particular (with lamb replicates) clearly illustrate the trends.

▼ **Table 8.39: Effect of lamb stocking rate on grain yield and density of ryegrass plants in Mackellar wheat, Cressy, Tas, 2007-08.**

Stocking rate (lambs/ha)	Grain yield (t/ha)	ryegrass plants (/m <sup>2</sup> )
10	6.30	3
20	5.08	17
30, 40, 50 (average)	5.44	21

Importantly, grain yields reflect the differences in ryegrass density. The density of annual ryegrass plants was 500-600% lower in under-grazed plots with 10 lambs/ha compared with 20 lambs/ha and higher rates (30, 40 and 50 lambs/ha). The additional leaf biomass on plants in the 10 lambs/ha treatment was visually apparent through to harvest and this would have reduced late germination and vigour of ryegrass plants. In nil-grazed exclusion areas the density of ryegrass was comparable with the lowest stocking rate.

**Economics:**

A simple comparison of the economics of the different stocking rates using gross income is very revealing (Table 8.40).

Although live weight gains and returns per lamb were much higher with the lower stocking rates, the income per hectare from grazing was considerably greater for the higher stocking rates i.e. over \$1000/ha. Income from grain tended to be the inverse of grazing income and consequently total income was more uniform. Grain yields from Table 8.40 have been used but with higher seasonal rainfall and without competition from ryegrass could realistically be 8t/ha under irrigation. Total gross income with costs to be deducted could therefore be as high as \$4000/ha which is competitive with a number of high value crops.

▼ **Table 8.40: Gross income from different lamb stocking rates, Cressy 2007-08**

Stocking rate (lambs/ha)	Grazing (weeks)	Final average live wt (kg)	Final lamb value per hd (\$)	Return per head (\$)	Grazing income /ha (\$)	Grain income /ha (\$)	Total income /ha (\$)
50	4	47.4	\$84.79	\$23.29	\$1,164	\$2,176	\$3,340
40	6	49.2	\$87.70	\$26.20	\$1,048	\$2,176	\$3,224
30	8	51.7	\$91.75	\$30.25	\$908	\$2,176	\$3,084
20	10	56.3	\$99.21	\$37.71	\$754	\$2,032	\$2,786
10	10	59.0	\$103.58	\$42.08	\$421	\$2,520	\$2,941

Calculations used

*Initial average lamb value:* Initial live weight = 41 kg  
Initial value = \$61.50 at store lamb price of 150c/kg

*Final average lamb value:* Carcase weights calculated at 45% of live weight at slaughter  
Final carcase price based on Tasman meats price of 360c/kg  
Includes \$8 for skin value

*Grain value:* \$400 per tonne (for now)

The final decision on grazing intensity will need more detailed individual analysis and will depend on relative animal and grain prices as well as feed availability. Further work is planned if funding is available.



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