

Penshurst

The Penshurst farm was a total of 1045 ha arable area. Of that 110 ha cropped (80 ha wheat, 20 ha barley, 10 ha canola). The remaining 935 ha was improved pasture with prime lamb, first cross, self-replacing merinos and vealer operations run. The prime lamb flock contained 2300 breeding ewes (Dorset). The first cross flock contained 2500 breeding ewes (Merino), with half of them used to breed replacement Merino ewes and the other half cross with a Suffolk sire for first cross lambs. The self-replacing Merino flock contained 1350 ewes. The vealer operation involved 120 breeding cows.

The soil was a clay with a plant available water capacity of 193 mm.

Crops were generally sown late April – late May as per district practice to set a baseline. This was compared with three scenarios.

- i. Grazing normally sown crops
- ii. Earlier sowing and earlier grazing
- iii. Earlier sowing and earlier grazing with more stock to match the increase in area grazed over the year.

See the appendix for more details on varieties and dates.

1. Grazing crops in the existing systems

1.1. Net farm profit

Grazing crops and stubbles at Inverleigh in a standard system (ie. normal sowing dates, no management changes to accommodate grazing) resulted in 0.6% increase in average whole farm profit (\$2,956).

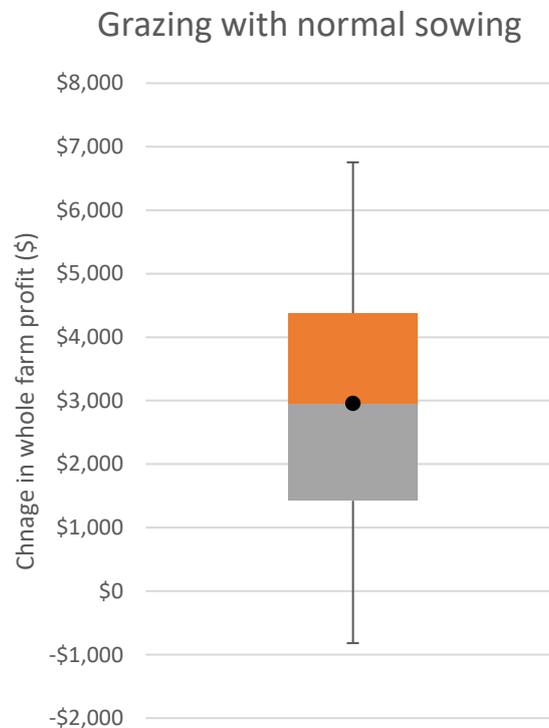


Figure 1. Change in whole farm profit with grazing crops compared to a baseline of not grazing

Wheat was grazed by terminal ewes in the prime lamb operation. Barley was grazed by Merino ewes crossed with Suffolk sires respectively. First cross lambs grazed stubbles for two weeks over summer.

1.2. Crop gross margins

Grazing crops that were sown on a standard date resulted in decline in crop gross margin (GM) 73% of the time. On average the change in crop GM with grazing was $-\$4.38/\text{ha}$ due to yield decline with grazing of wheat and barley (figure 2).

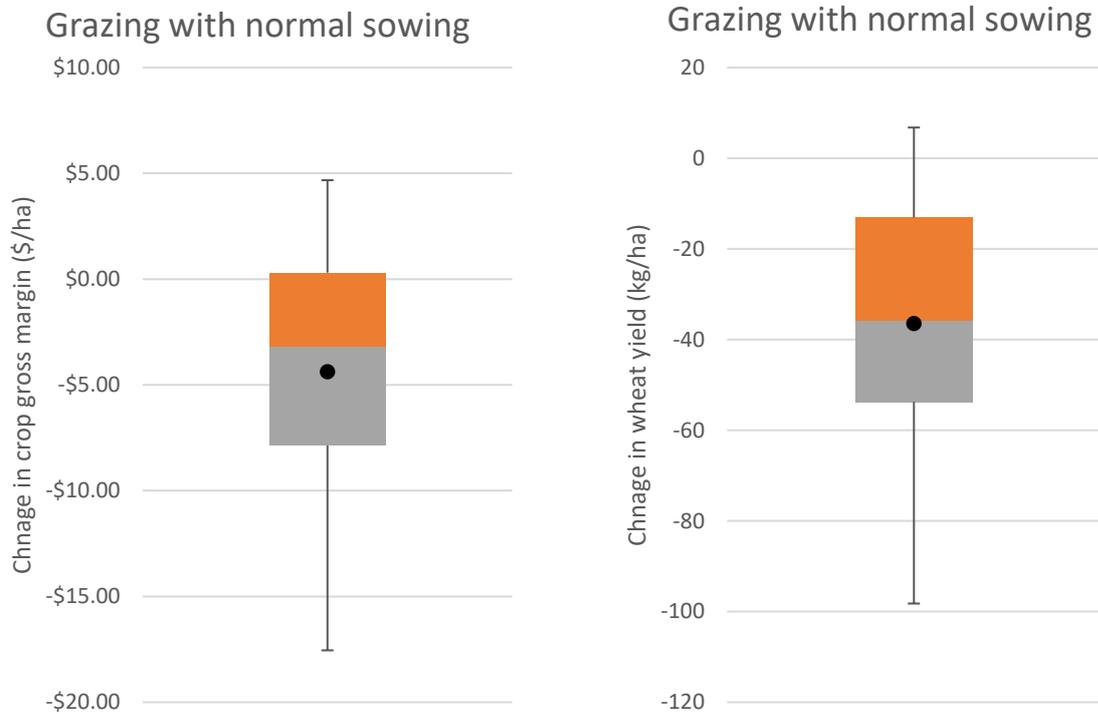


Figure 2. Change in crop GM (left) and wheat yield (kg/ha) with grazing compared to the baseline of not grazing.

1.1. Livestock gross margins

Sheep gross margin increased with grazing crops 94% of the time. On average the GM increased by $\$4.10/\text{ha}$ (figure 3). Cattle gross margins remained the same as they did not graze crops.

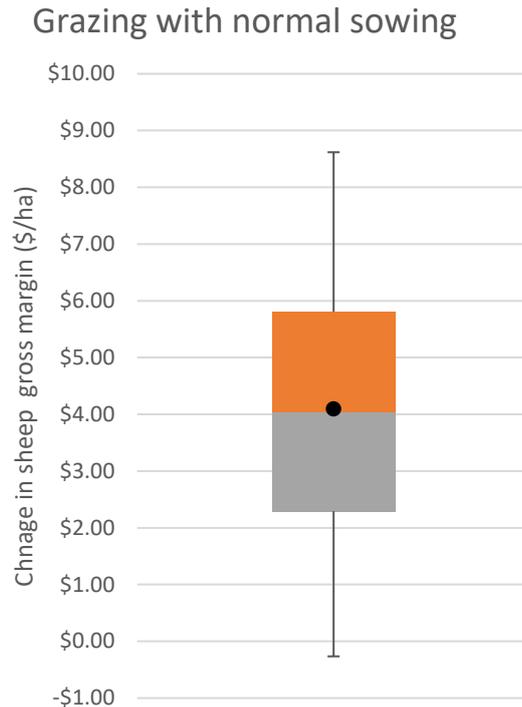


Figure 3. Change in livestock GM with grazing crops compared to a baseline of not grazing crops.

1.2. What is changing the crop GM?

Wheat yield decline with grazing was the main cause of decreased crop GM. The larger area of wheat planted than barley (80 ha wheat versus 20 ha barley) and higher prices of wheat meant the yield declines in wheat had a greater effect on crop margins than barley. Barley yields changed the same proportions from grazing as wheat¹.

Autumn sown canola is not generally grazed in south west Victoria because the winter is too cold for adequate recovery prior to flowering. Therefore, canola was not grazed in the model.

1.3. What is changing the livestock GM?

Lambing percentage

Grazing crops marginally increased lambing percentage for the prime lamb flock (average increase of 0.7%) and first cross ewes (0.9%) (figure 4). The self-replacing flocks did not graze crops so there was no change in lambing.

¹ APSIM does not allow defoliation (grazing) of barley so grazed barley was modelled by using the same proportional decline in wheat yields from grazing.

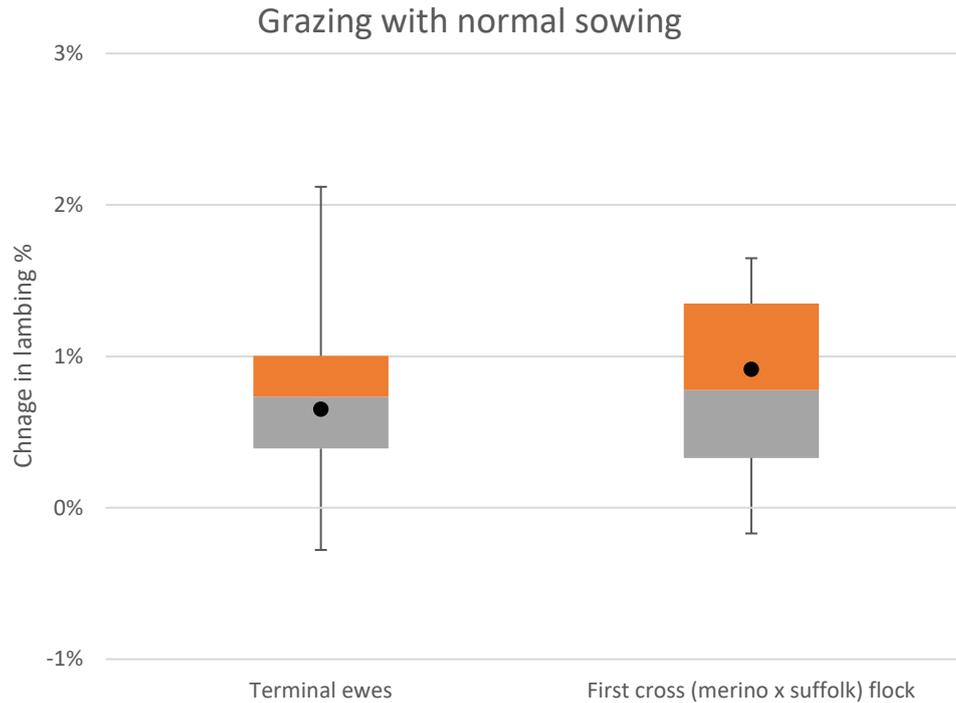


Figure 4. Change in lambing percentage with grazing crops compared to a baseline of not grazing crops.

- Prime lamb ewes grazed crop July 9-23 and lambed on August 26. Grazing crop meant they were 0.1 CS lower coming into lambing.
- First cross ewes grazed crop July 18-23 and lambed August 26. Grazing crop meant they were 0.02 CS heavier coming into lambing

Although both flocks were slightly heavier at lambing, the first cross ewes did not lose weight after lambing like the terminal ewes in the prime lamb operation.

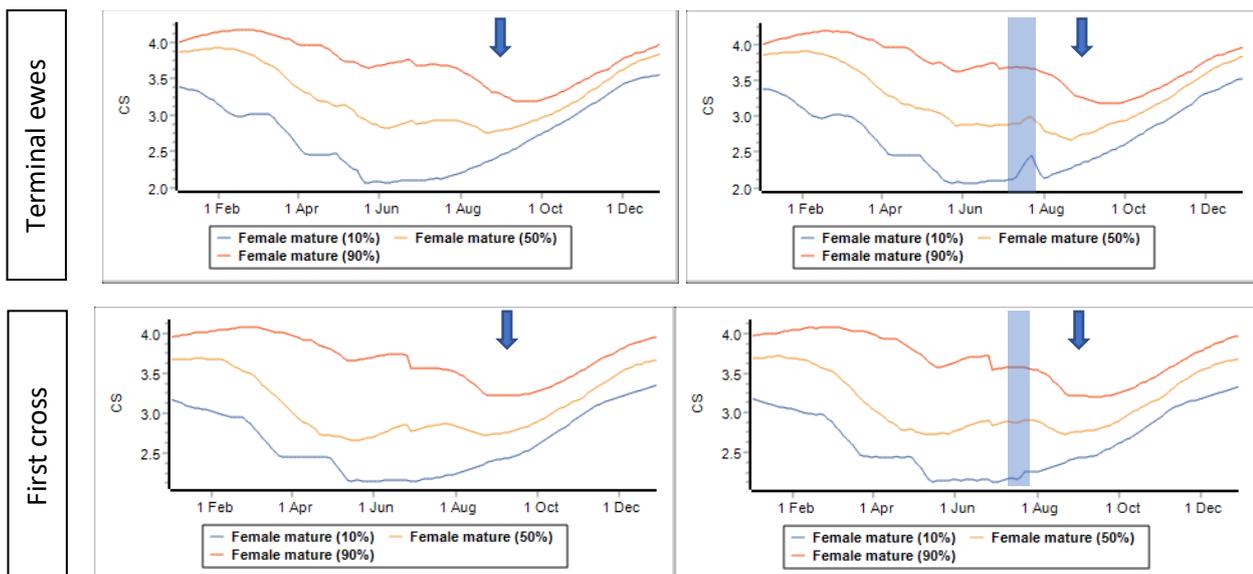


Figure 5. Ewe condition score² where crops are not grazed (left) and where they were grazed (right). Blue arrow shows lambing, shaded crop is crop grazing window.

Sale weights

Terminal ewes, first cross lambs and their maternal ewes were the only animal classes to change sale weight from grazing crops (figure 6). Prime lambs were sold when they reached 50kg so did not change weight, and the other animal classes did not graze crops.

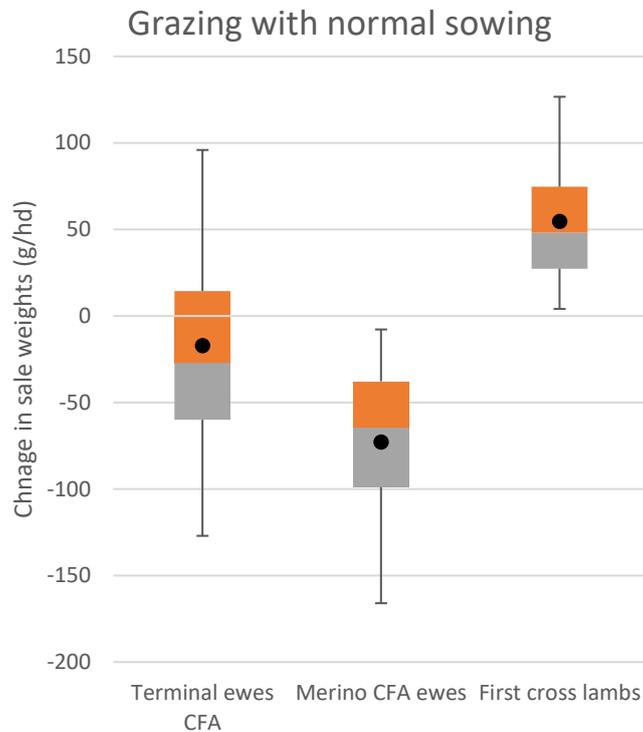


Figure 6. Change in sale weights of terminal ewes, CFA ewes from the first cross flock and first cross lambs.

It averaged out that terminal CFA ewes sold at about the same weight whether crops were grazed or not grazed (average -17 g/hd). CFA Merino ewes from the first cross mob sold on average 73 g lighter (-\$0.09/hd). First cross lambs sold on average 55 g heavier (\$0.12/hd).

Wool cut

Wool cut increased very little with grazing crops (figure 7).

Terminal ewe wool cut decreased on average 5 g CFW/hd. At a price of \$6.55 for 28 μ m wool, that is -\$0.03/hd. Prime lambs had no change in wool cut

Merino ewes in the first cross operation had a slight increase of 14 g CFW/hd. At a price of \$13.21/kg cIn for 19 μ m wool that is an average increase of \$0.18/ewe.

First cross lambs had a varying but on average the same wool cut (-2 g CFW/hd) whether stubbles and crop were grazed or not.

² Graph is generated from percentiles of the whole data set. Each line does not represent a singular year or ewe in the mob, but the (eg.) 50th percentile ewe CS for that day from across the 35 years of the model.

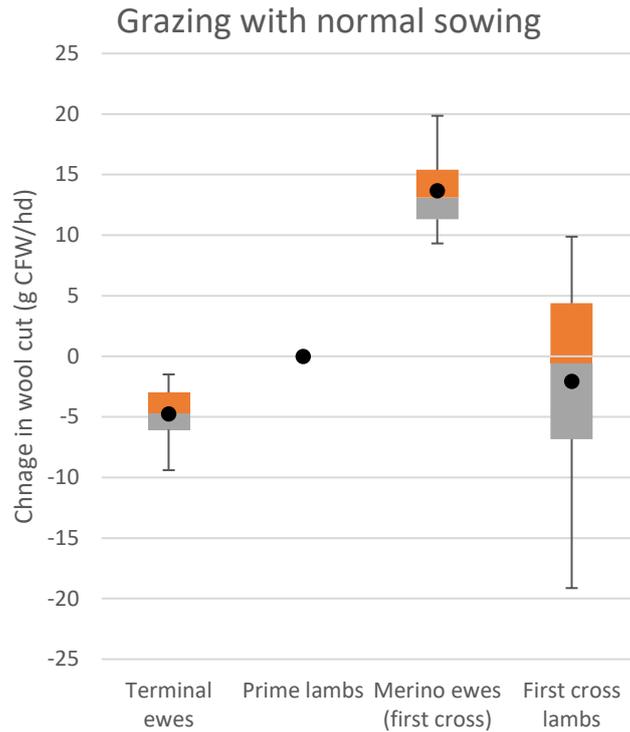


Figure 7. Change in wool cut across ewe that grazed crops and their offspring

Supplementary feeding

Supplementary feed reductions with grazing crops was not as substantial as may be expected. This was due to the small area of cropped country for grazing and the adequacy of pasture in most years.

The change was more substantial in the supplementary feeding of the first cross flock than the prime lamb flock (figure 8). There was a greater change even though only half the first cross flock grazed crop and stubbles (Merino x Suffolk part grazed crops). Most of that came from decreased feeding of lambs and hoggets over summer when they grazed stubbles.

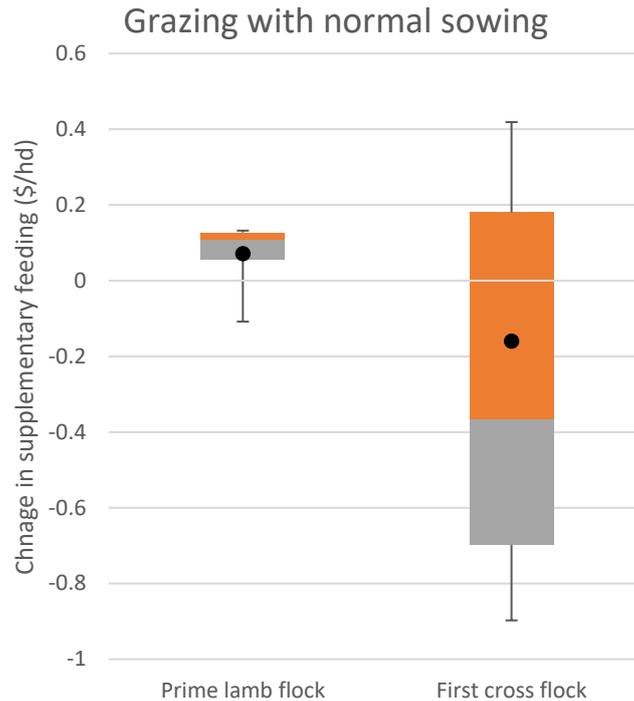


Figure 8. Change in supplementary feeding costs for the whole flock divided by the number of ewes.

The prime lamb operation generally increased feeding out with grazing crops, increasing on average 0.80 t feed (barley) which equated to +\$166 across the mob on average. This came from increased feeding of young stock for both maintenance and finishing.

The first cross mobs saved on average 1.84 t of feed, or -\$383, with the key savings being in feeding of young stock.

1.4. How often are crops grazed?

Crops were only grazed when the extra fodder was needed. When green pasture FOO was <750 kg DM/ha animals were put on crop. First cross lambs grazed stubble every year.

	Prime lambs		Merino x Suffolk (terminal ewes)	
	Frequency of years	Crops grazed	Frequency of years	Crops grazed
Grazing with normal sowing	15%	Wheat (9-23 July)	39%	Barley (9-23 July)

2. Grazing early sown crops

2.1. Net farm profit

Grazing crops and stubbles at Inverleigh when longer season varieties were sown resulted in 4.7% increase in whole farm profit (\$24,334).

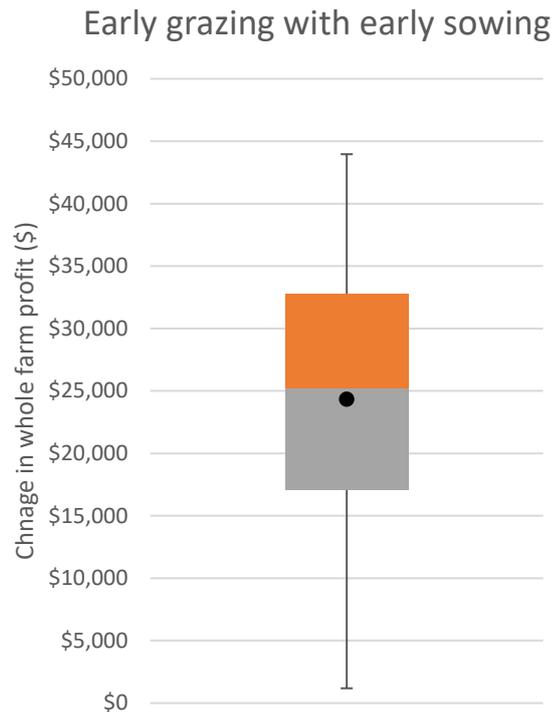


Figure 9. Change in whole farm profit with grazing crops compared to a baseline of not grazing.

2.2. Crop gross margins

Early sowing had a significant impact on yields (figure 10). The yield increase from early sowing outweighed the slight yield decline from grazing.

Grazing long season crop varieties that were sown earlier saw an increase in crop gross margin (GM) 60% of the time (figure 11). On average the change in crop GM with grazing was +\$7/ha (figure 10). See appendix 7 for sowing dates and varieties.

There was only a 9% chance of yield decline from grazing early sown wheat when compared with ungrazed wheat sown at a normal sowing time.

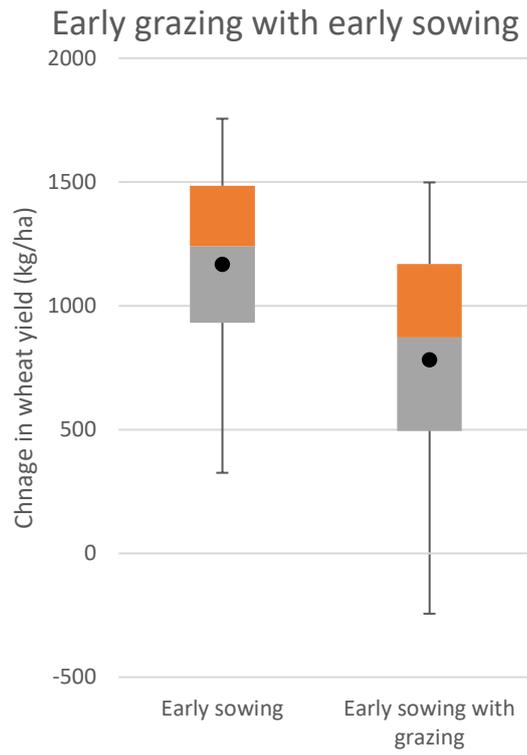


Figure 10. Change in crop yield with earlier sowing compared with normal sowing (left bar), and grazing of early sown wheat compared with normally sown ungrazed wheat (right bar)

Early grazing with early sowing

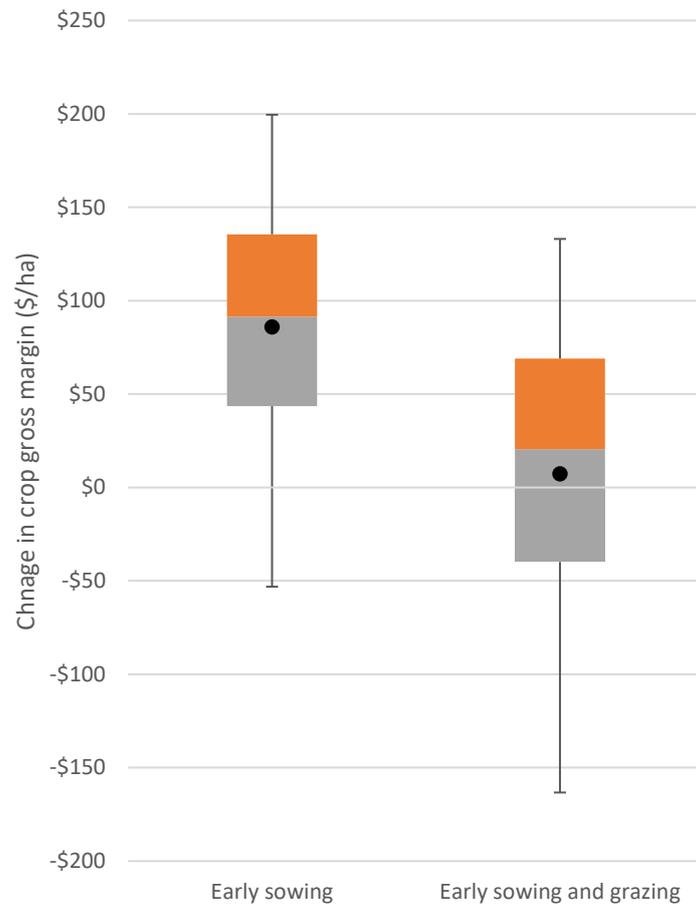


Figure 11. Change in crop GM (left) and wheat yield (right) with early grazing of early sown crops compared to the baseline of not grazing normally sown crops.

2.3. Livestock gross margins

Gross margin increased with early grazing of crops 99.8% of the time. On average the GM increased by \$9.99/ha (figure 12).

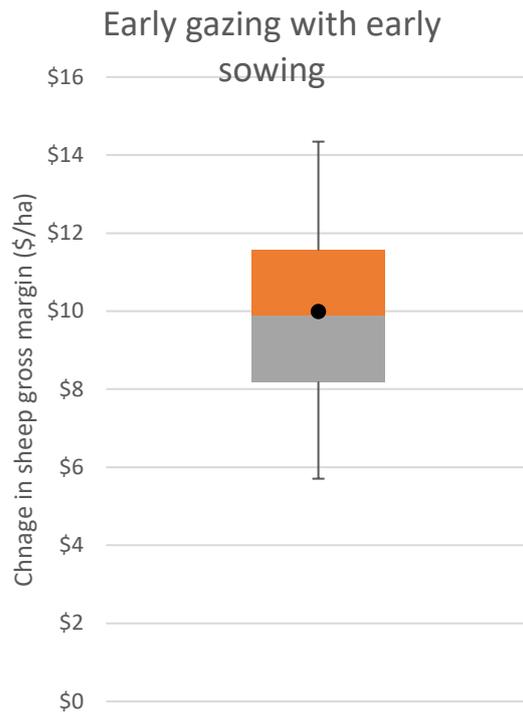


Figure 12. Change in livestock GM with early sowing and early grazing of crops compared to a baseline of not grazing crops.

2.4. What is changing the crop gross margin?

Early sowing of crops with a long season variety (Revenue) lead to wheat yields increasing on average 0.78 t/ha **with** grazing and 1.17 t/ha **without** grazing (figure 10). The increase in yield saw crop income increase, even though the wheat variety was changed from a milling to feed variety³.

Barley variety was changed to long season cultivar Capstan, with yield changes being the same proportions from grazing as wheat⁴. Canola was not grazed but the long season cultivar Taurus was sown.

2.5. What is changing the livestock gross margin?

Lambing percentage

Grazing crops increased lambing percentage for the first cross flock (Merino x Suffolk) on average 1.1% and prime lambing percentage 1.4%. The self-replacing flocks did not graze crops so there was no change in lambing.

³ Discount in feed wheat price was 10% of APW price

⁴ APSIM does not allow defoliation (grazing) of barley so grazed barley was modelled by using the same proportional decline in wheat yields from grazing.

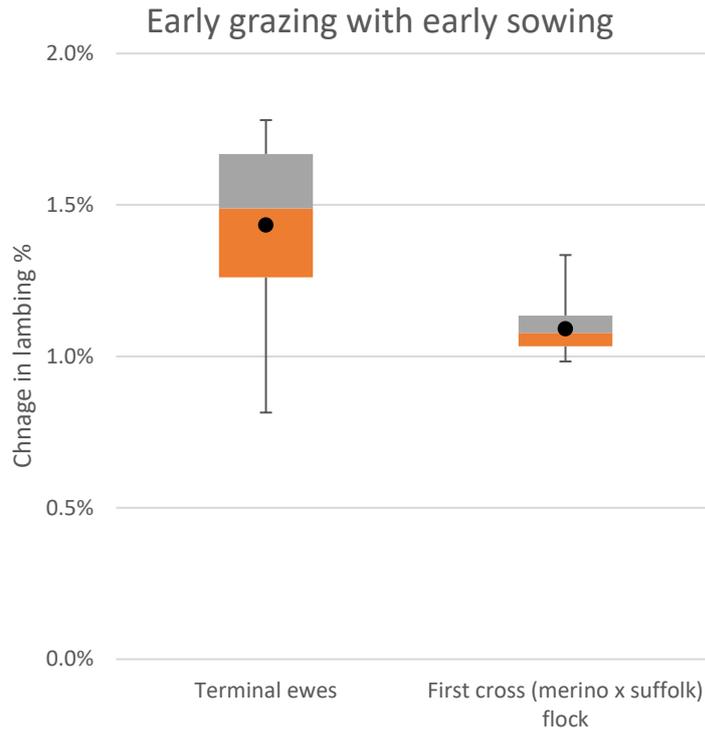


Figure 13. Change in lambing percentage for the prime lamb mob with early grazing of early sown crops compared to a baseline of not grazing crops.

- First cross ewes grazed crop June 4-18 and lambed on June 12. They were 0.1 CS higher at lambing than if they had not been on crop.
- Prime lamb ewes grazed crop June 12-18 and lambed on August 26. They were 0.1 CS higher coming into lambing than if they had not been on crop

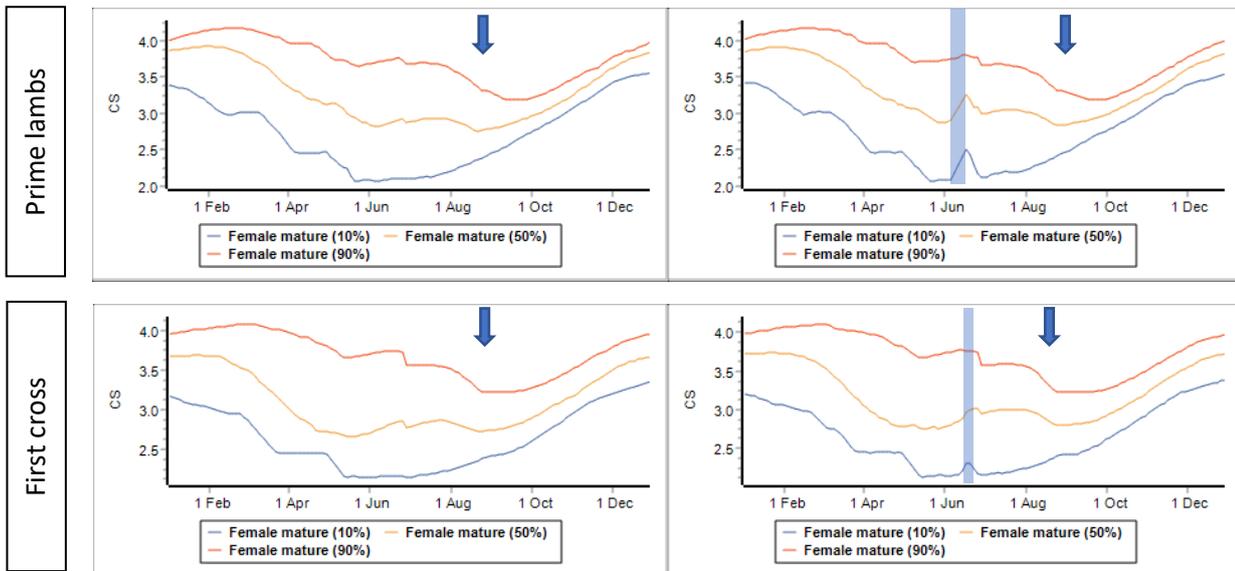


Figure 14. Ewe condition score⁵ where crops are not grazed (left) and where they were grazed early at a normal stocking rate (right). Blue arrow shows lambing, shaded crop is crop grazing window.

⁵ Graph is generated from percentiles of the whole data set. Each line does not represent a singular year or ewe in the mob, but the (eg.) 50th percentile ewe CS for that day from the 35 years of the model.

Sale weights

Terminal ewes, first cross lambs and their maternal ewes were the only animal classes to change sale weight from grazing crops (figure 6). Prime lambs were sold when they reached 50kg so did not change weight, and the other animal classes did not graze crops.

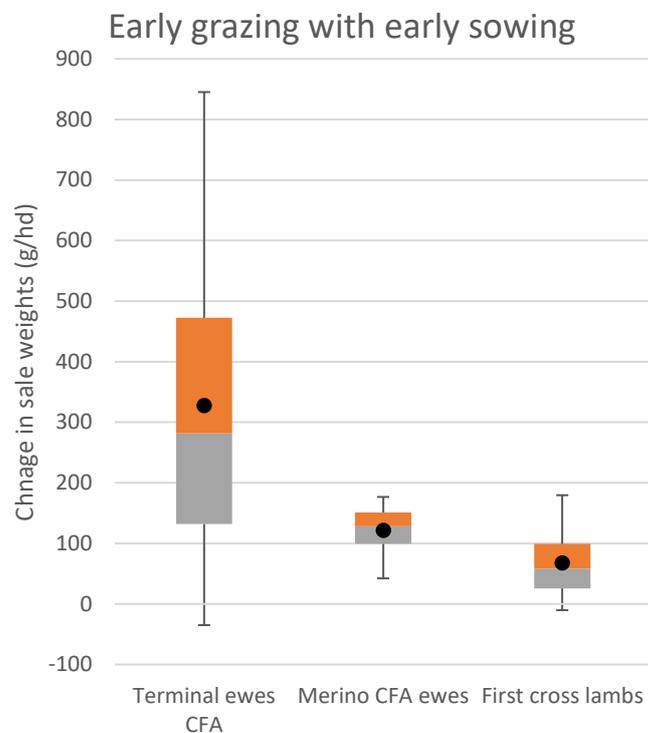


Figure 15. Change in sale weights of terminal ewes, CFA ewes from the first cross flock and first cross lambs.

With grazing crops, terminal CFA ewes sold 330 g heavier (+\$0.42/hd). CFA Merino ewes from the first cross mob sold on average 121g heavier (+\$0.15/hd). First cross lambs sold on average 68 g heavier (\$0.15/hd).

Wool cut

Wool cut increased very little with grazing crops (figure 7).

Terminal ewe wool cut decreased on average 5 g CFW/hd. At a price of \$6.55 for 28 μ m wool, that is -\$0.03/hd. Prime lambs had no change in wool cut

Merino ewes in the first cross operation had a slight increase of 38 g CFW/hd. At a price of \$13.21/kg cln for 19 μ m wool that is an average increase of \$0.50/ewe.

First cross lambs had a slight increase of 10 g CFW/hd. At a price of \$10.43/kg cln for 23 μ m wool that is an average increase of \$0.40/ewe..

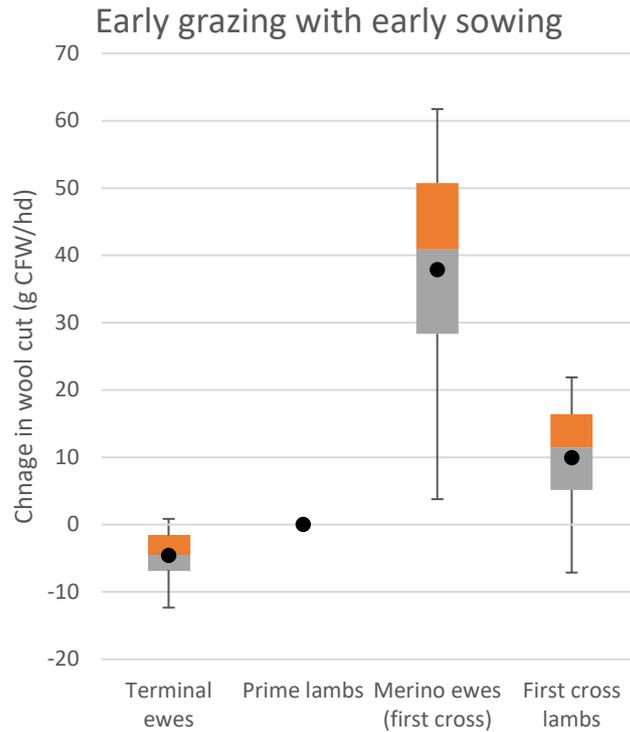


Figure 16. Change in wool cut across ewe that grazed crops and their offspring

Supplementary feeding

Supplementary feed reductions with grazing crops was not as substantial as may be expected. This was due to the small area of cropped country for grazing and the adequacy of pasture in most years.

The change was more substantial in the supplementary feeding of the first cross flock than the prime lamb flock (figure 17). There was a greater change even though only half the first cross flock grazed crop and stubbles (Merino x Suffolk part grazed crops). Most of that came from decreased feeding of lambs and hoggets over summer when they grazed stubbles.

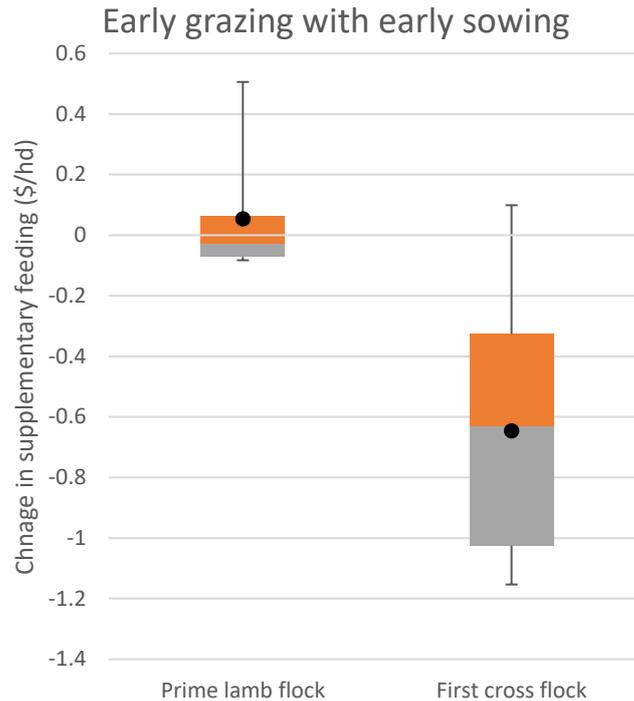


Figure 17. Change in supplementary feeding for the whole flock divided by the number of ewes in the flock where early sown crops were grazed.

The prime lamb operation generally increased feeding out with grazing crops, increasing on average 0.65 t feed (barley) which equated to +\$136 across the mob on average. This came from increased feeding of young stock for both maintenance and finishing.

The first cross mobs saved on average 7.68 t of feed, or -\$1,596, with the key savings being in feeding of young stock.

2.6. How often are crops grazed?

Crops were only grazed when the extra fodder was needed. When green pasture FOO was <750 kg DM/ha animals were put on crop. First cross lambs grazed stubble every year.

	Prime lambs		Merino x Suffolk (terminal ewes)	
	Frequency of years	Crops grazed	Frequency of years	Crops grazed
Early grazing with early sowing	61%	Wheat (4-18 June)	63%	Barley (4-18 June)

3. Grazing early sown crops with a higher stocking rate

The total grazing area across the year was calculated, and if cropped area grazed and time on crop were adequate, the number of stock was increased to maintain the same stocking rate (see Appendix 1 for a calculation example).

At Penshurst, with only 110 ha cropped land, there was insufficient grazing time and area for stock number to be increased across the year.

Appendix 7– Peshurst farm system

Soil type

Clayey (Dunkeld No632-YP); PAW 193mm

Grazed area

297 ha with 2300 Dorset ewes for prime lambs

323 ha with 2500 Merino ewes. Half joined with a Merino ram for self-replacing ewes, half joined with a Suffolk ram for first cross lambs.

174 ha with 1350 self-replacing Merino ewes

Cropped area

80 ha wheat; 20 ha canola; 10 ha barley

Varieties and sowing dates

Crop	Normal sowing date and variety		Early sowing date and variety	
Canola	Hyola 650 TT	April 25 – May 5	Taurus	April 11 – April 18
Wheat	Bolac	May 8-15	Revenue	April 1 - 10
Barley	Commander	May 20-27	Capstan	May 1 - 5

Crop grazing

	Prime lambs		Merino x Suffolk (terminal ewes)	
	Frequency of years	Crops grazed	Frequency of years	Crops grazed
1. No grazing, normal sowing	Never	-	Never	-
2. No grazing, early sowing	Never	-	Never	-
3. Late grazing, normal sowing	15%	Wheat (9-23 July)	39%	Barley (9-23 July)
4. Early grazing with early sowing	61%	Wheat (4-18 June)	63%	Barley (4-18 June)