

# Minnipa

The Minnipa farm was a total of 1800 ha arable area. Of that 1300 ha cropped (850 ha wheat, 340 ha canola, 110 ha field peas). The remaining 440 ha was medic self-regenerating pasture with a self-replacing merino flock run on it. Sheep were run at 3.9 DSE/ha with a total of 780 ewes (620 mature ewes, 159 hoggets).

The soil was a sandy clay loam with a plant available water capacity of 205 mm in the top 100cm.

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 wheat only (insufficient canola biomass early on for grazing)
- II. Earlier sowing and earlier grazing of wheat and canola
- III. Earlier sowing and earlier grazing of wheat and canola 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 Minnipa in a standard system (ie. normal sowing dates, no management changes to accommodate grazing) resulted in -14.9% change to median whole farm profit (-\$18,865).

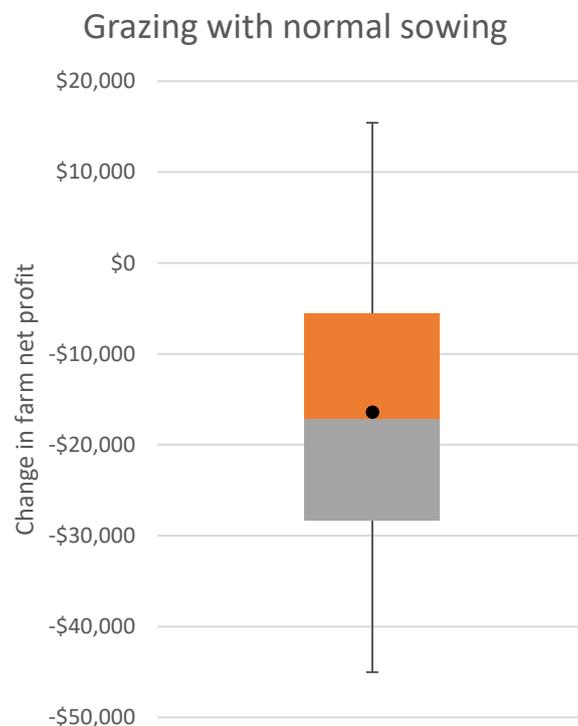


Figure 1. Change in whole farm profit with grazing crops compared to a baseline of not grazing

### 1.2. Crop gross margins

Grazing crops that were sown on a standard date resulted in decline in crop gross margin (GM) 99% of the time. On average the change in crop GM with grazing was -\$28/ha due to yield decline with grazing (figure 2).

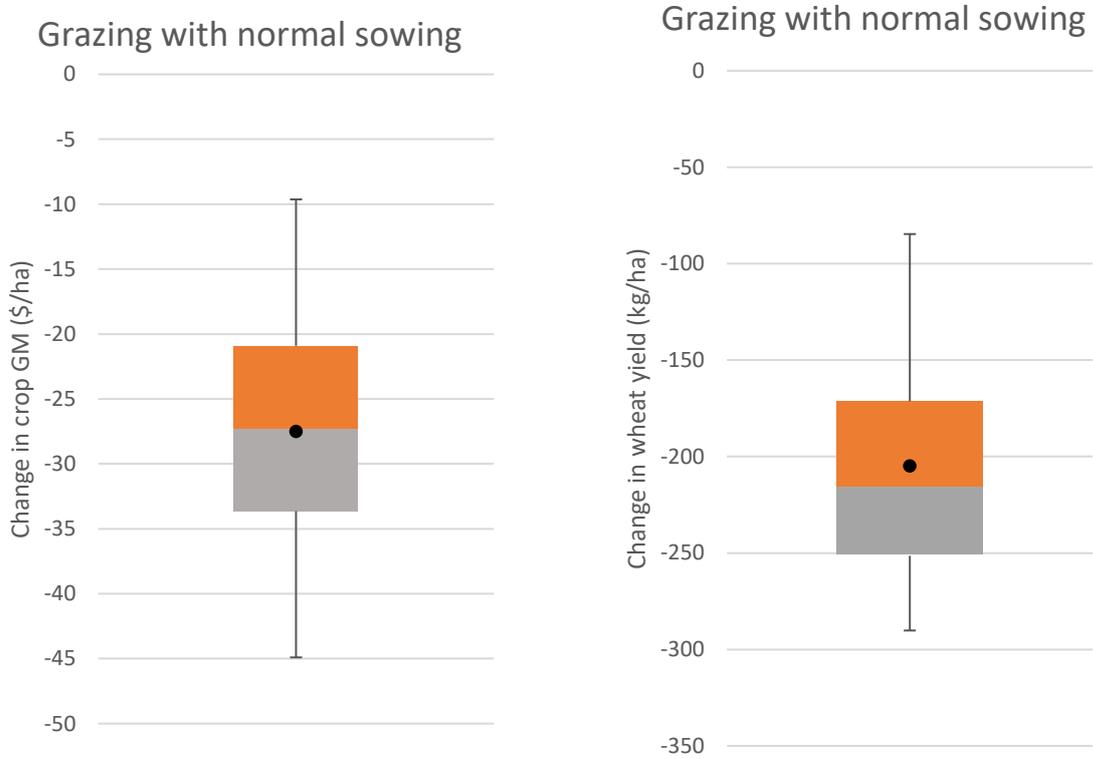


Figure 2. Change in crop GM (left) and wheat yield (kg/ha) with grazing compared to the baseline of not grazing.

### 1.1. Livestock gross margins

Gross margin increased with grazing crops 99.6% of the time. On average the GM increased by \$29/ha (figure 3).

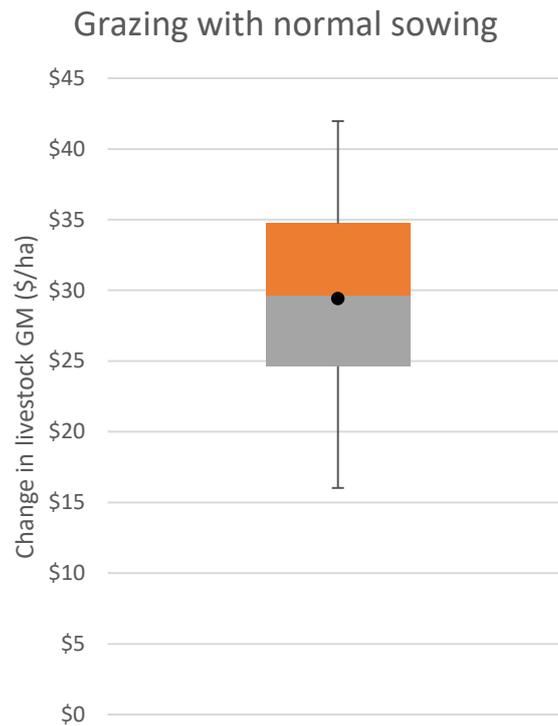


Figure 3. Change in livestock GM with grazing crops compared to a baseline of not grazing crops.

#### 1.2. What is changing the crop GM?

Canola and peas were not grazed, so the change to crop GM was completely due to wheat yield decline. Almost half the farm was sown to wheat (850 ha of the total farmed 1800 ha), so even a marginal decline in yield would have had a significant impact on the bottom-line.

- Without grazing, wheat made up 59% of the total crop income
- With grazing, wheat made up 55% of the total crop income

#### 1.3. What is changing the livestock GM?

##### *Lambing percentage*

Grazing crops significantly increased lambing percentage for merino ewes at Minnipa (average increase of 10.9%).

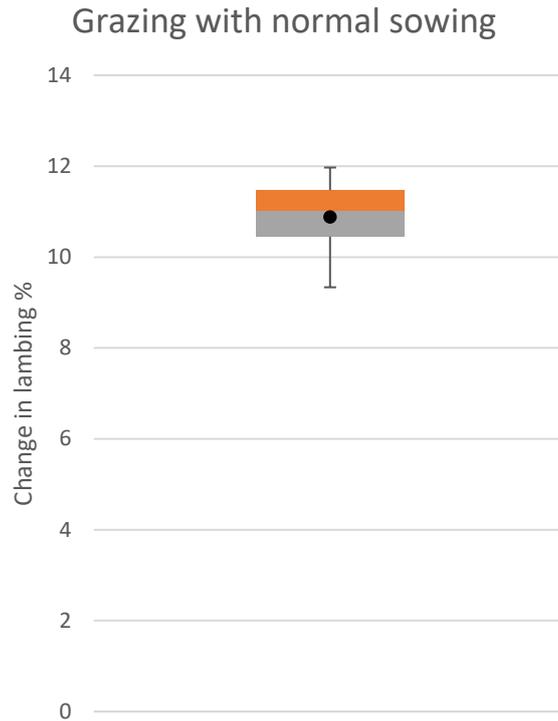


Figure 4. Change in lambing percentage with grazing crops compared to a baseline of not grazing crops.

Merino ewes grazed crop July 16-31 and lambed on the crop (July 28). When grazing crop, they were 0.1 CS higher at lambing than if they had not been on crop (figure 5).

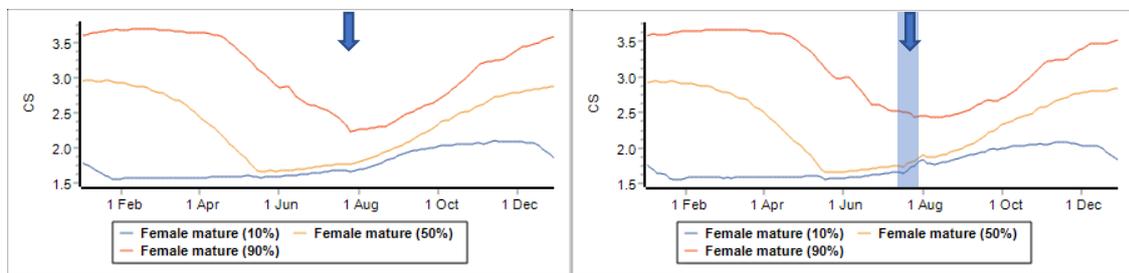


Figure 5. Ewe condition score<sup>1</sup> where crops are not grazed (left) and where they were grazed (right). Blue arrow shows lambing, shaded crop is crop grazing window.

*Sale weights*

<sup>1</sup> 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.) 50<sup>th</sup> percentile ewe CS for that day from across the 35 years of the model.

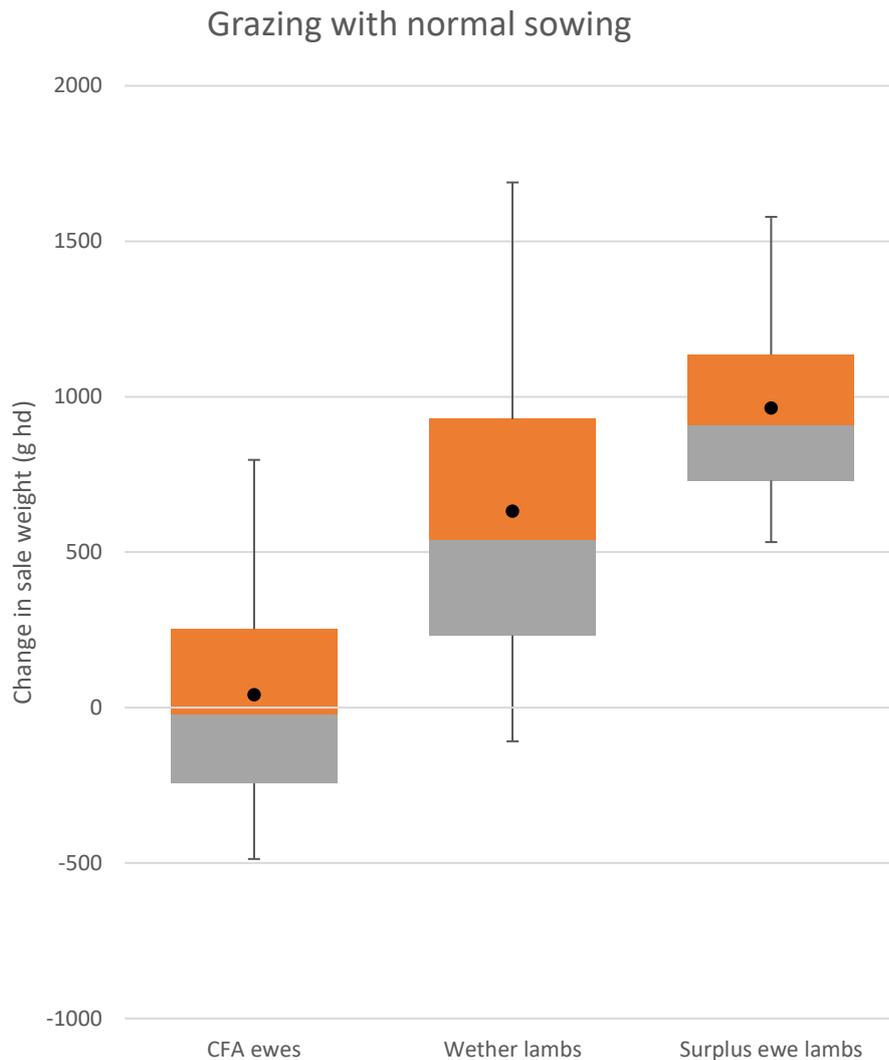


Figure 6. Change in sale weights of first cross lambs and CFA ewes from the prime lamb mob with grazing crops.

CFA ewe sale weights changed varying amounts, but averaged to be 41.6 g/hd heavier at sale (+\$0.05/hd). CFA ewes were sold August 1, straight off the crop, so sale weight reflects the change in ewe weight going back onto pasture. It is surprising therefore that almost half the older ewes were lighter coming off crop than if they had stayed on pasture. It may be a reflection of the higher ewe production from being on crop (increased lambing percentage and wool cut).

Wether lamb sale weights increased 632 g/hd (+\$0.81/hd) with grazing crops and stubbles, while surplus ewe lamb sale weights increased 963 g/hd (+\$1.34/hd). It appears that grazing stubbles meant the ewe lambs gained more weight, so feeding out to maintain average lamb mob condition (across males and females) was reduced. Without grazing, there was 5.0 kg/hd difference between ewe and wether lamb sale weights. With grazing the difference was reduced to 4.7 kg/hd, picked up from wethers selling slightly lighter and ewes slightly heavier.

#### *Wool cut*

Change to wool cut with grazing crops varied across the animal classes. Young stock did not graze crops, so the gains were from grazing stubbles over summer.

*Mature ewes:* Mean wool cut changed +3.9% for mature ewes (176 g CFW/hd). At \$13.21/kg cln it equated to +\$2.32/hd

*Hoggets:* Mean wool cut changed +9.2% for hoggets (292 g CFW/hd). At \$14.45/kg cln it equated to +\$4.21/hd

*Lambs:* Mean wool cut changed +11.2% for lambs (248 g CFW/hd). At \$15.91/kg cln it equated to +\$3.95/hd

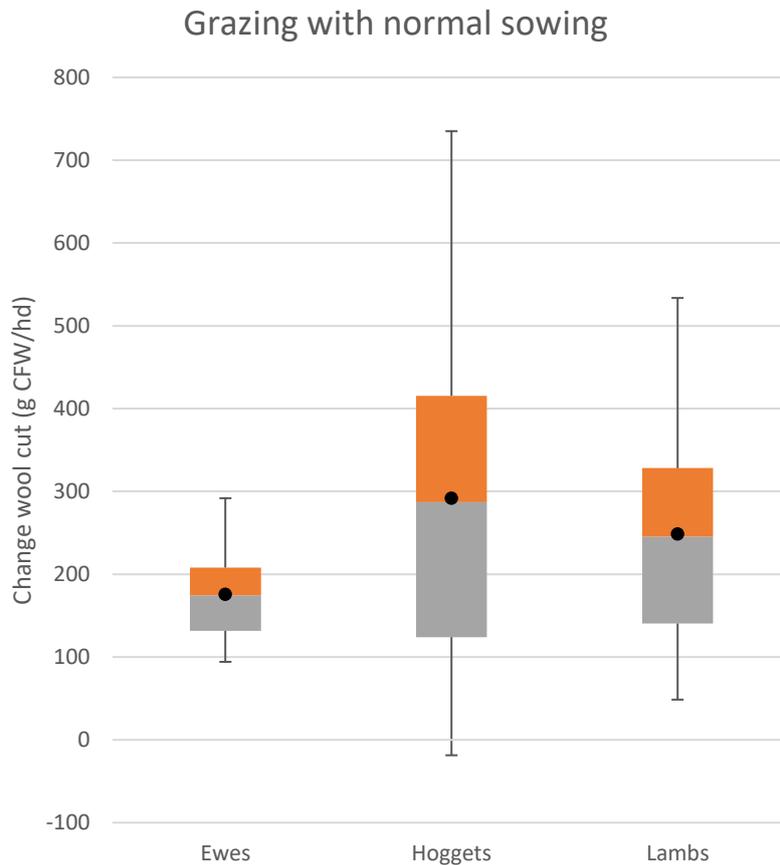


Figure 7. Change in wool cut with grazing crops

#### *Supplementary feeding*

Supplementary feeding was kept to a minimum at Minnipa, with feeding to maintain the thinnest animals at 1CS. At the end of summer and early autumn before the break, ewes were fed to maintain 1.5CS as it's a time of year most growers would be supplementary feeding animals. Lambs were fed to reach 50 kg by November 1 when they were 15 months old.

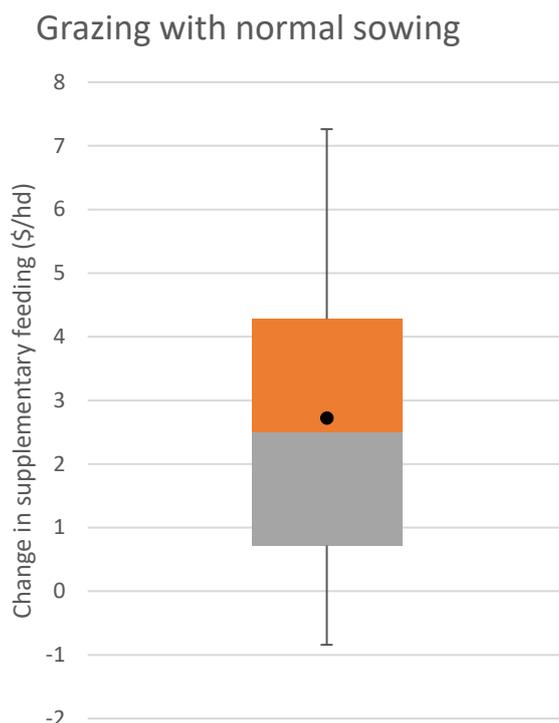


Figure 8. Change in supplementary feeding costs for the whole flock divided by the number of ewes.

Supplementary feeding increased 82% of the time with late grazing of crops. The main increases were in lamb maintenance and finishing feed. The higher lambing percentage meant more animals to feed with the same number of ewes. Figure 8 takes the net supplementary feeding and divides it by the number of ewes, so does not show the increase in lamb turn off.

The supplementary feed across the mob increased 8.4 t feed (barley) which equated to \$1,966 across the mob on average.

#### 1.4. How often are crops grazed?

Crops were only grazed when the extra fodder was needed. When green pasture FOO was <800 kg DM/ha animals were put on crop. Young stock grazed stubble every year.

	Frequency of years	Crops grazed
Grazing with normal sowing	86%	Wheat (16-31 July)

## 2. Grazing early sown crops

### 2.1. Net farm profit

Grazing crops and stubbles at Minnipa when longer season varieties were sown resulted in a 101% increase in median farm profit (+\$121,050).

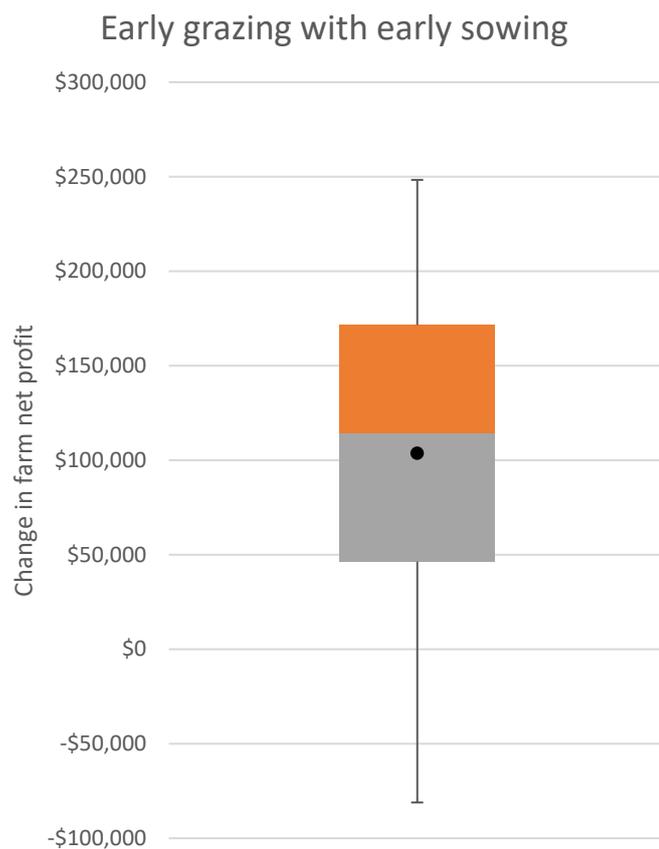


Figure 9. Change in whole farm profit with grazing crops compared to a baseline of not grazing.

## 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) 86% of the time (figure 11). On average the change in crop GM with grazing was \$66/ha (figure 10). See appendix for sowing dates and varieties.

There was only a 14% chance of yield decline from grazing early sown wheat when compared with ungrazed wheat sown at a normal sowing time.

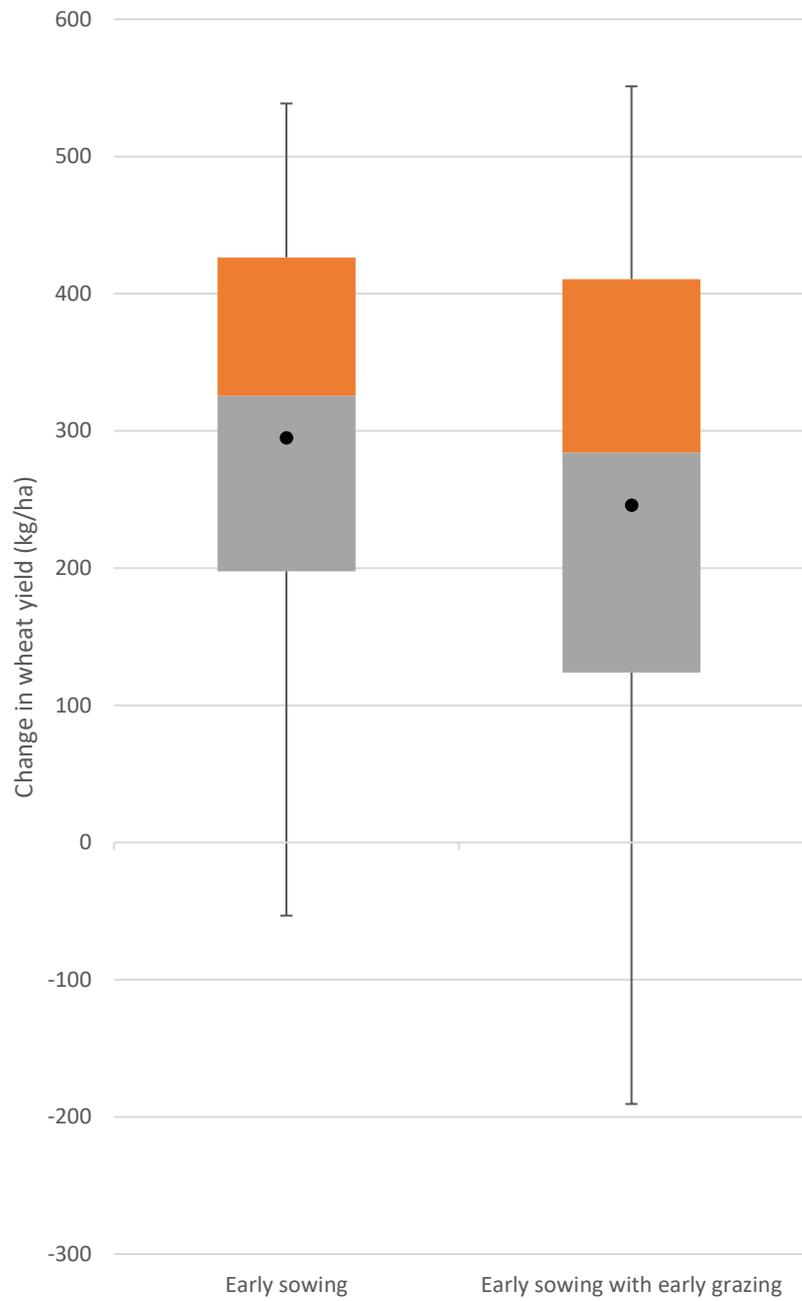


Figure 10. Change in crop yield with earlier sowing compared with normal sowing (left bar), and grazing of early sown wheat compared with normally sown ungrazed wheat (right bar)

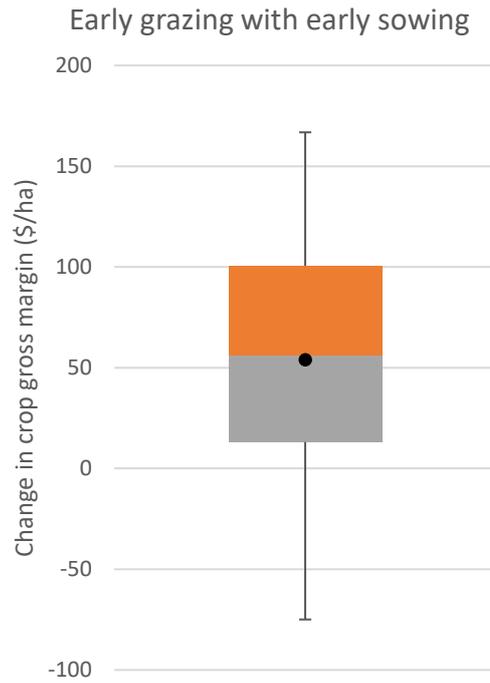


Figure 11. Change in crop GM (left) and wheat yield (right) with early grazing of early sown crops compared to the baseline of not grazing normally sown crops.

### 2.3. Livestock gross margins

Gross margin increased with early grazing of crops 100% of the time. On average the GM increased by \$47.20/ha (figure 12).

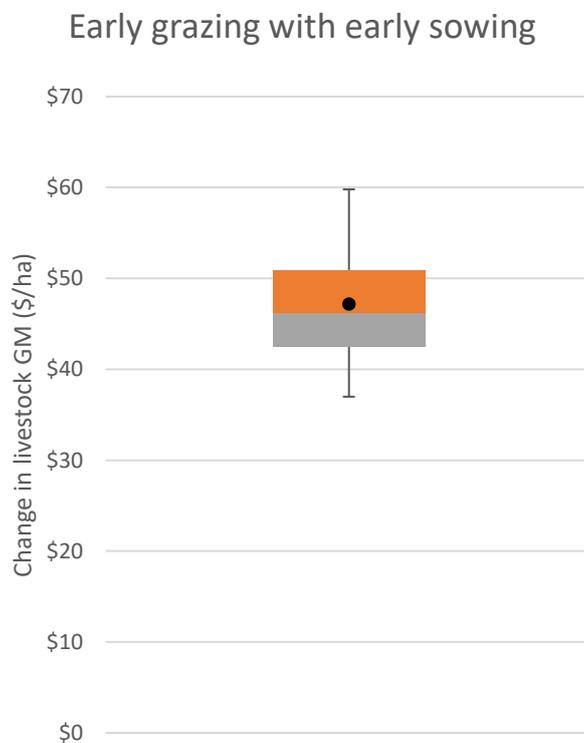


Figure 12. Change in livestock GM with early sowing and early grazing of crops compared to a baseline of not grazing crops.

#### 2.4. What is changing the crop gross margin?

Early sowing of crops with a mid-season variety (Trojan) lead to wheat yields increasing on average +0.25 t/ha **with** grazing and +0.29 t/ha **without** grazing (figure 10).

Canola variety was changed from Stingray to Hyola 650TT. Early sowing **with** grazing on average changed yield +0.29 t/ha and +0.36 t/ha **without** grazing.

Pea variety was changed from Twilight to Kaspera. Peas were not grazed, but the earlier sowing on average changed yields -0.13 t/ha.

#### 2.5. What is changing the livestock gross margin?

##### *Lambing percentage*

Early grazing of crops increased lambing percentage for the Merino ewes at Minnipa on average 12.1%.

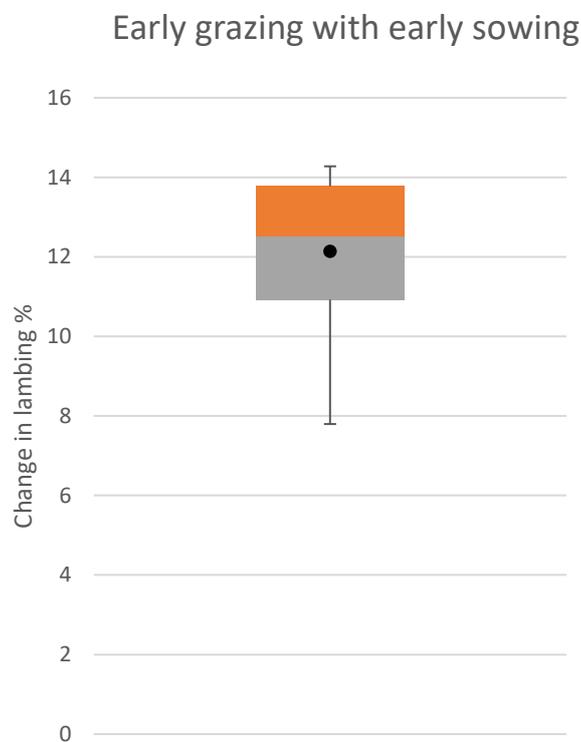


Figure 13. Change in lambing percentage for the prime lamb mob with early grazing of early sown crops compared to a baseline of not grazing crops.

Ewes grazed crop June 18- July 16 and lambed on June 12. They were 0.2 CS higher at lambing than if they had not been on crop.

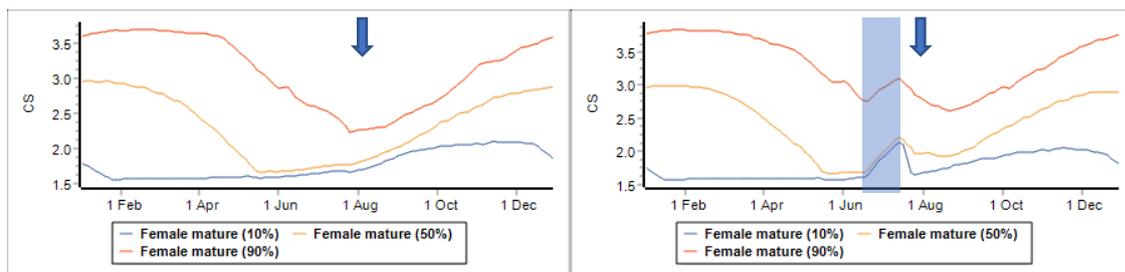


Figure 14. Ewe condition score<sup>2</sup> where crops are not grazed (left) and where they were grazed early at a normal stocking rate (right). Blue arrow shows lambing, shaded crop is crop grazing window.

*Sale weights*

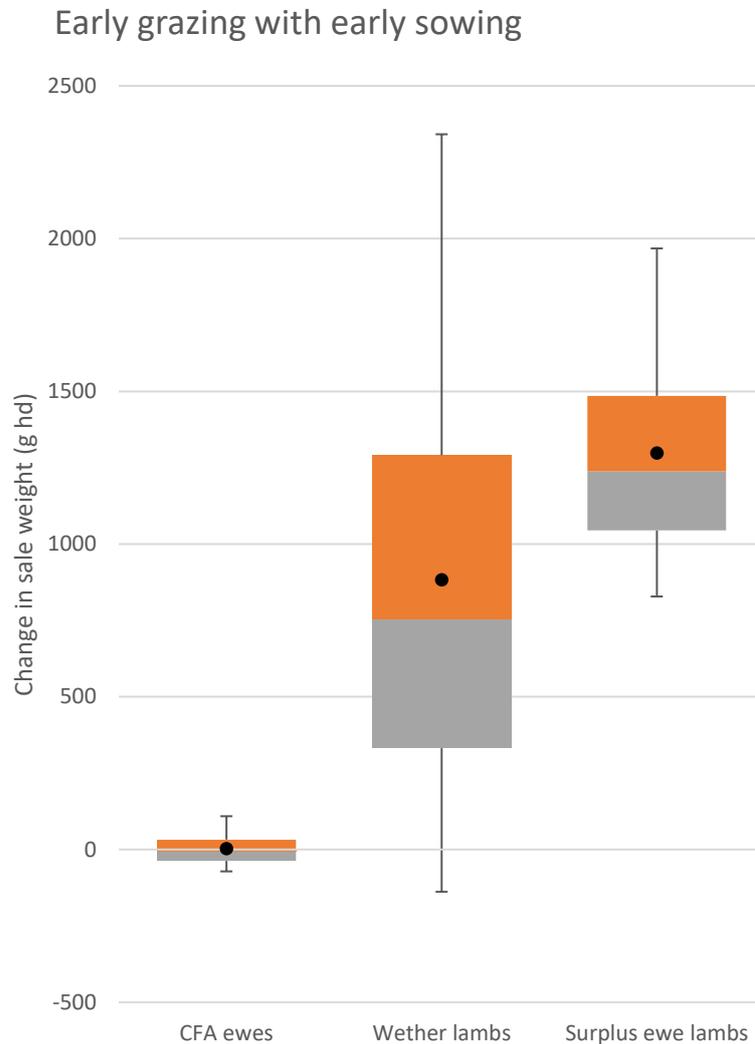


Figure 15. Change in sale weights of CFA ewes, surplus ewe lambs and wether lambs with early grazing of early sown crops stubbles.

CFA ewe sale weights was about the same whether crops were grazed or not grazed. CFA ewes were sold August 1, by which point they had lost much of the weight gained on crop.

Wether lamb sale weights increased 883 g/hd (+\$1.13/hd) with grazing crops and stubbles and surplus ewe lamb sale weights increased 1297 g/hd (+\$1.80/hd). Grazing stubbles decreased the margin between wether and ewe lamb sale weights. Without grazing, there was 5.0 kg/hd difference between ewe and wether lamb sale weights. With grazing the difference was reduced to 4.6 kg/hd. It is likely because the wether lambs were closer to target weight (50kg) already, whereas ewe lambs were selling slightly lighter with grazing stubbles bringing them closer to the target weight.

<sup>2</sup> 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.) 50<sup>th</sup> percentile ewe CS for that day from the 35 years of the model.

### Wool cut

Change to wool cut with grazing crops varied across the animal classes. Young stock did not graze crops, so the gains were from grazing stubbles over summer.

**Mature ewes:** Mean wool cut changed +3.9% for mature ewes (176 g CFW/hd). At \$13.21/kg cIn it equated to +\$2.32/hd

**Hoggets:** Mean wool cut changed +9.8% for hoggets (310 g CFW/hd). At \$14.45/kg cIn it equated to +\$4.48/hd

**Lambs:** Mean wool cut changed +11.8% for lambs (262 g CFW/hd). At \$15.91/kg cIn it equated to +\$4.17/hd

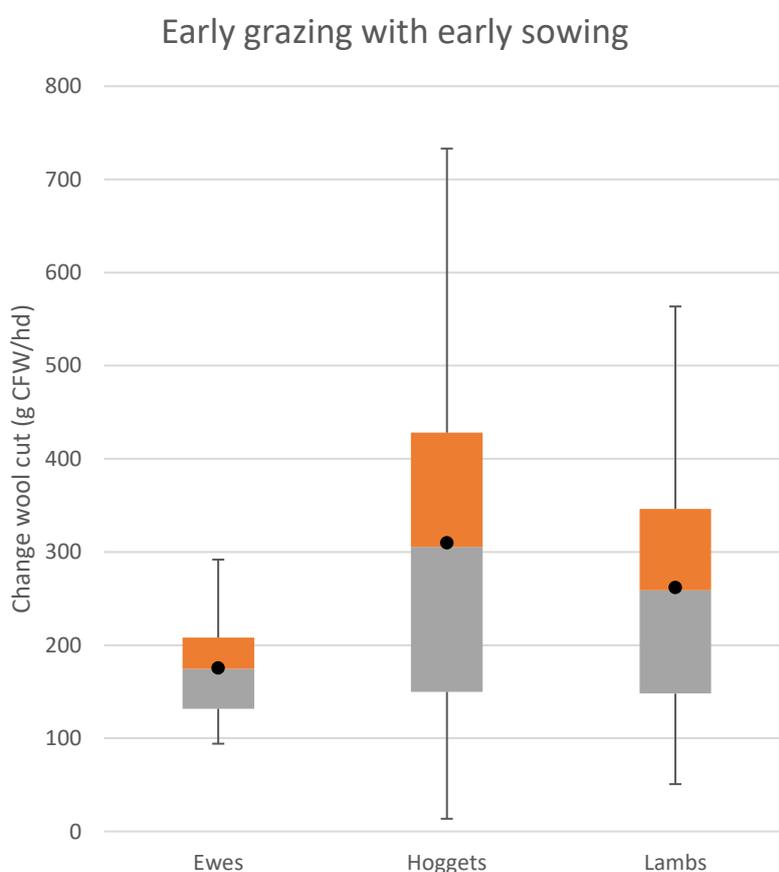


Figure 16. Change in wool cut from merino ewes and first cross lambs with early grazing of early sown crops

### Supplementary feeding

Supplementary feeding was kept to a minimum at Minnipa, with feeding to maintain the thinnest animals at 1CS. At the end of summer and early autumn before the break, ewes were fed to maintain 1.5CS as it's a time of year most growers would be supplementary feeding animals. Lambs were fed to reach 50kg by November 1 when they were 15 months old.

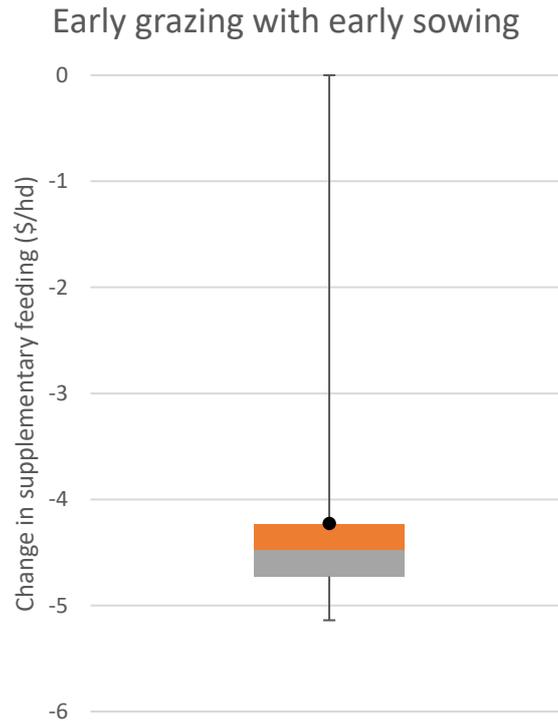


Figure 17. Change in supplementary feeding for the whole flock divided by the number of ewes in the flock where early sown crops were grazed.

Supplementary feeding was heavily skewed, with a median saving of \$4.50/hd and average of \$4.20/hd. The main feed savings were in ewe maintenance, with the slight increases in lambing feeding (discussed in section 1.3) being outweighed by the ewe savings. Feeding out decreased on average 15.0 t across the mob, equating to \$3,510.

### 2.6. How often are crops grazed?

Crops were only grazed when the extra fodder was needed. When green pasture FOO was <800 kg DM/ha animals were put on crop. First cross lambs grazed stubble every year.

	Frequency of years	Crops grazed
Early grazing with early sowing	89%	Canola (18-1 June) Wheat (2-9July)

### 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 in the Executive Summary for a calculation example).

At Minnipa, the area and grazing period was adequate to increase Merino ewe number from 778 to 866.

#### 3.1. Net farm profit

Grazing crops and stubbles at Minnipa when longer season varieties were sown and higher stock number resulted in 97% increase in median whole farm profit (+\$116,907).



Figure 18. Change in whole farm profit with grazing crops compared to a baseline of not grazing.

### 3.2. Crop gross margins

The marginal increase in stock number did not affect crop yields, so the crop margin was the same as when crops were sown early and stock number was kept the same (see section 2.2. Crop gross margins)

### 3.3. Livestock gross margins

Gross margin increased with grazing crops 100% of the time. On average the GM increased by \$37.8/ha (figure 19).

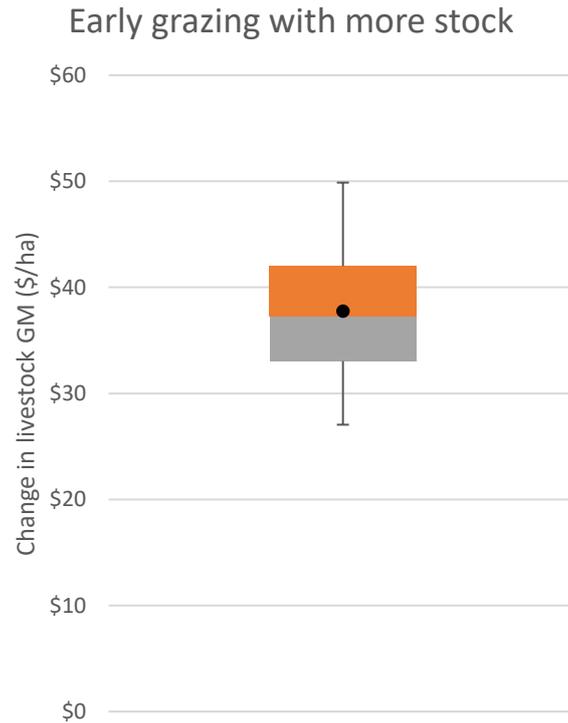


Figure 19. Change in livestock GM with a higher stock number and early grazing of early sow crops compared to a baseline of not grazing crops.

#### 3.4. What is changing the crop gross margin?

Sowing earlier with long season varieties caused a significant shift in crop gross margins. See Section 2.4 for more.

#### 3.5. What is changing the livestock gross margin?

##### *Lambing percentage*

Early grazing of crops increased lambing percentage for the Merino ewes at Minnipa on average 11.3%.

## Early grazing with early sowing and more stock

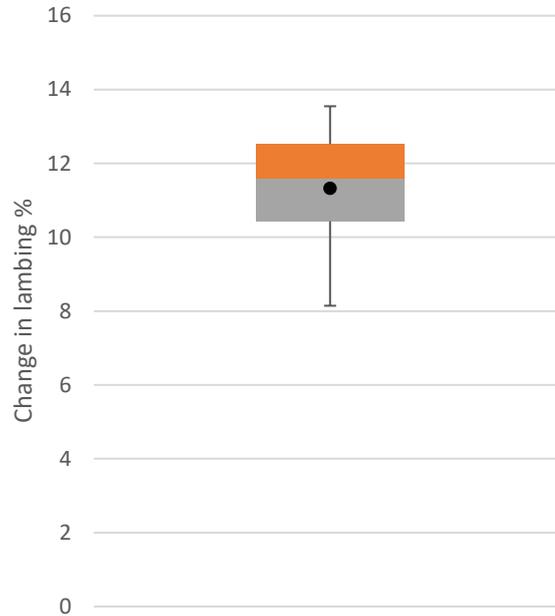


Figure 20. Change in lambing percentage for the prime lamb mob with early grazing of early sown crops compared to a baseline of not grazing crops.

Ewes grazed crop June 18- July 16 and lambed on June 12. They were 0.2 CS higher at lambing than if they had not been on crop.

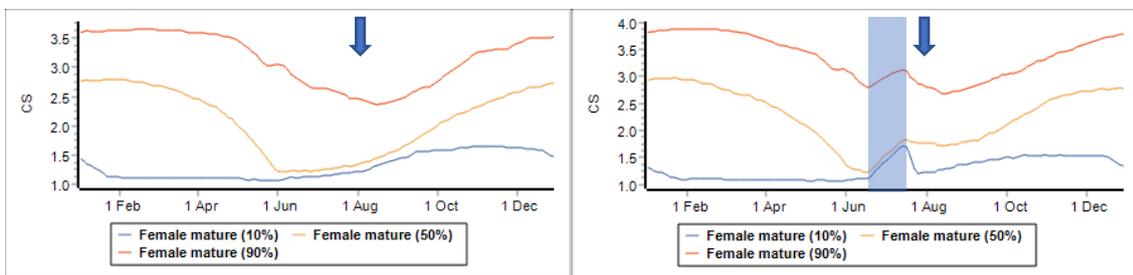


Figure 21. Ewe condition score<sup>3</sup> where crops are not grazed (left) and where they were grazed early at a normal stocking rate (right). Blue arrow shows lambing, shaded crop is crop grazing window.

### Sale weights

<sup>3</sup> 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.) 50<sup>th</sup> percentile ewe CS for that day from the 35 years of the model.

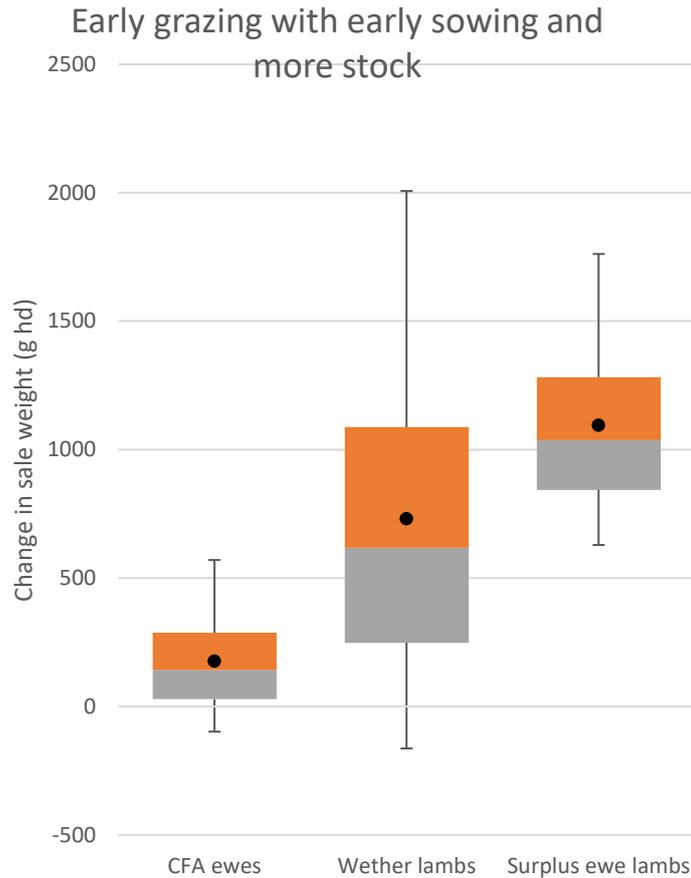


Figure 22. Change in sale weights of CFA ewes, surplus ewe lambs and wether lambs with early grazing of early sown crops stubbles.

CFA ewe sold slightly heavier, with an average increase of 177 g/hd (\$0.21/hd)

Wether lamb sale weights increased 731 g/hd (+\$0.93/hd) with grazing crops and stubbles, while surplus ewe lamb sale weights increased 1096 g/hd (+\$1.52/hd). Grazing stubbles decreased the margin between wether and ewe lamb sale weights. Without grazing, there was 5.0 kg/hd difference between ewe and wether lamb sale weights. With grazing the difference was reduced to 4.4 kg/hd. It is likely because the wether lambs were closer to target weight (50kg) already, whereas ewe lambs were selling slightly lighter with grazing stubbles bringing them closer to the target weight.

#### Wool cut

Change to wool cut with grazing crops varied across the animal classes. Young stock did not graze crops, so the gains were from grazing stubbles over summer.

**Mature ewes:** Mean wool cut changed +3.9% for mature ewes (177 g CFW/hd). At \$13.21/kg cln it equated to +\$2.34/hd

**Hoggets:** Mean wool cut changed +9.6% for hoggets (303 g CFW/hd). At \$14.45/kg cln it equated to +\$4.37/hd

**Lambs:** Mean wool cut changed +11.9% for lambs (264 g CFW/hd). At \$15.91/kg cln it equated to +\$4.20/hd

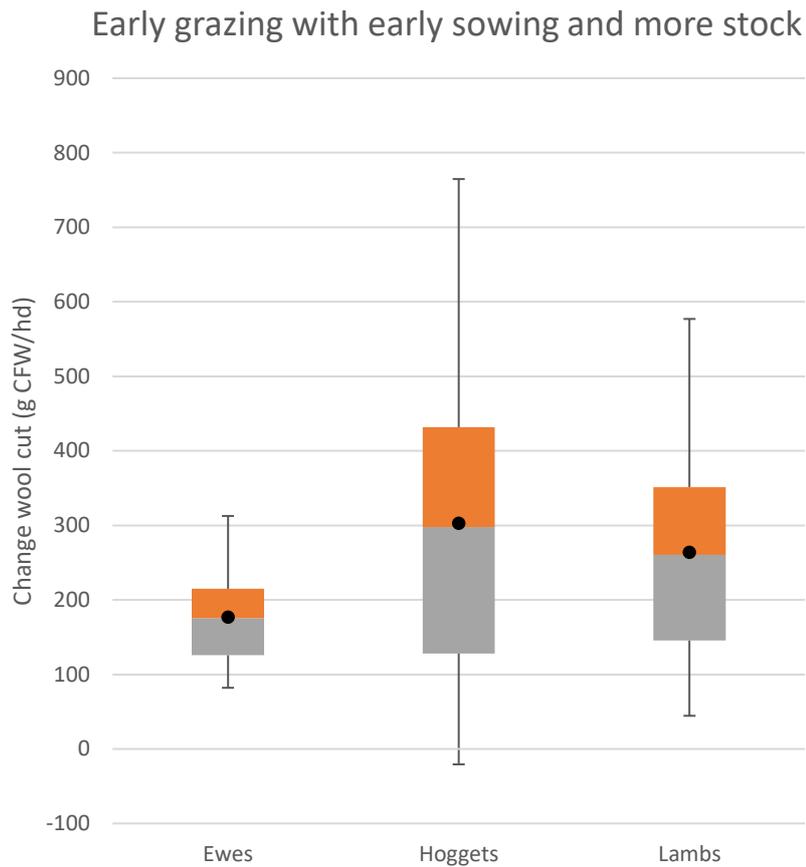


Figure 23. Change in wool cut from merino ewes and first cross lambs with early grazing of early sown crops

#### *Supplementary feeding*

Supplementary feeding was kept to a minimum at Minnipa, with feeding to maintain the thinnest animals at 1CS. At the end of summer and early autumn before the break, ewes were fed to maintain 1.5CS as it's a time of year most growers would be supplementary feeding animals

### Early grazing with normal sowing and more stock

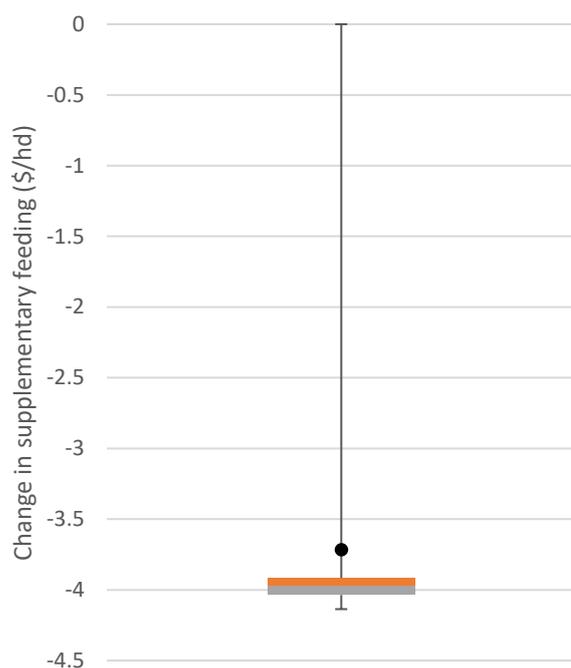


Figure 24. Change in supplementary feeding for the whole flock divided by the number of ewes in the flock where early sown crops were grazed with more stock.

Supplementary feeding was strongly skewed, with a median saving of \$4.00/hd and average of \$3.70/hd. The main feed savings were in ewe maintenance, with the slight increases in lambing feeding (discussed in section 1.3) being outweighed by the ewe savings. Feeding out decreased on average 2.8 t across the mob, equating to \$655.

Crops were grazed 92% of the time so the 8% when they were not grazed explains why the upper whisker is so long.

#### 3.6. How often are crops grazed?

Crops were only grazed when the extra fodder was needed. When green pasture FOO was <800 kg DM/ha animals were put on crop. First cross lambs grazed stubble every year.

	Frequency of years	Crops grazed
Early grazing with early sowing and more stock	92%	Canola (18-1 June) Wheat (2-9July)

## Appendix – Minnipa farm system

### Soil type

Grazing land - Red sandy loam (Minnipa No 362); PAW 262 mm

Cropped land – Red sandy clay loam (Minnipa No 310); PAW 222 mm

### Grazed area

440 ha medic pasture and some annual grass weeds with 779 Merino ewes.

**Cropped area**

850 ha wheat; 340 ha canola; 110 ha field peas

**Varieties and sowing dates**

Crops were sown when there was at least 5 mm rain on 2 consecutive days.

<b>Crop</b>	<b>Normal sowing date and variety</b>		<b>Early sowing date and variety*</b>	
Canola	Stingray	April 24 - May 5	Hyola 650TT	April 10 – May 5
Wheat	Mace	April 25 – May 30	Trojan	April 10 – May 30
Peas	Twilight	May 20-30	Kapstan	May 10 - 30

\*Early sowing had a longer sowing window, with the last day for sowing being the same as the later sowing. This reduced the number of crop failures from dry sowing.

**Crop grazing**

	<b>Merino x Suffolk (terminal ewes)</b>	
	<b>Frequency of years</b>	<b>Crops grazed</b>
1. No grazing, normal sowing	Never	-
2. No grazing, early sowing	Never	-
3. Late grazing, normal sowing	86%	Wheat (16-31 July)
4. Early grazing (normal SR), normal sowing	89%	Canola (18-1 June) Wheat (2-9July)
5. Early grazing (high SR), normal sowing	92%	Canola (18-1 June) Wheat (2-9July)