

# Moora

The Moora farm was a total of 2500 ha arable area. Of that 1750 ha cropped (500 ha wheat, 500 ha barley, 500 ha canola, 250 ha forage oats). The remaining 750 ha was under pasture with a self-replacing merino flock run on it. Sheep were run at 7.0 DSE/ha with a total of 2280 ewes.

The soil was a shallow loamy duplex with a plant available water capacity of 201 mm in the top 120cm.

Crops were sown late April to late May with short season varieties as per district practice to set a baseline. There were three main comparisons against this baseline that will be discussed in the rest of the chapter:

- i. Crops were sown normally, ewes grazed oats, barley and canola.
- ii. Crops were sown early, hoggets grazed oats, barley and canola.
- iii. Crops were sown early, ewes grazed oats, barley and canola. This scenario was split into two, with one option being to keep the sheep flock the same make up of 60% of ewes bearing one lamb and 40% bearing two. The other option was to switch to an entirely twin bearing ewe flock.

Wheat was not able to be grazed early enough to avoid significant yield loss and there was adequate crop to sustain up to five weeks of grazing so it was not grazed. See appendix for more details on varieties and dates.

## 1. Grazing crops in the existing systems

### 1.1. Net farm profit

Grazing normally sown crops at Moora with young stock changed average whole farm profit by -14.8% (-\$92,548).



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) 98% of the time. On average the change in crop GM with grazing was  $-\$77.15/\text{ha}$  (figure 2).

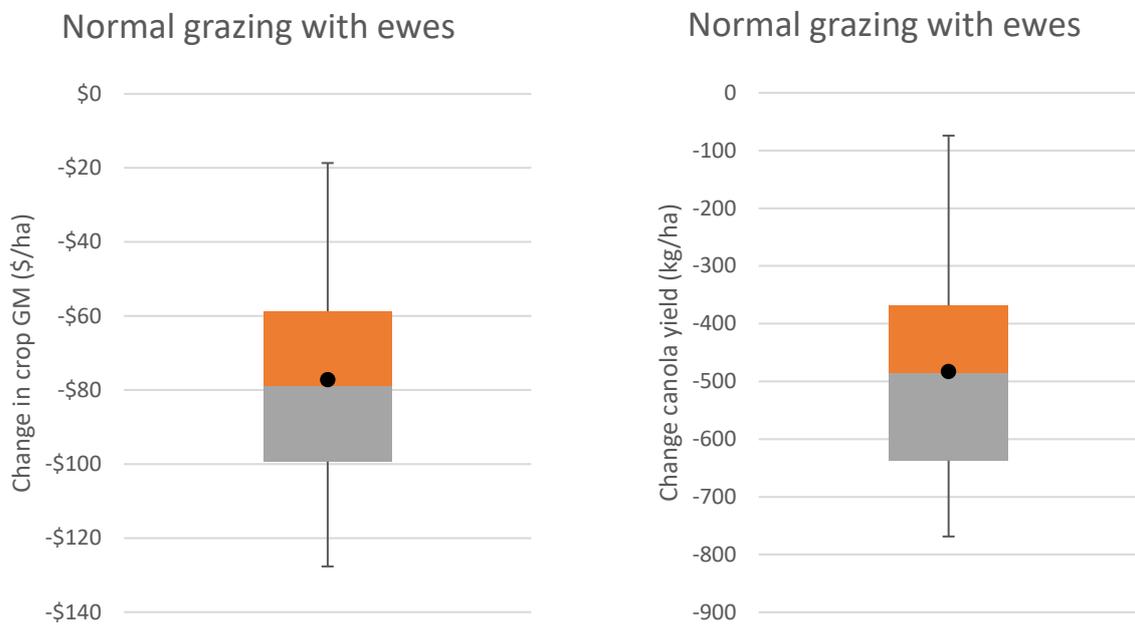


Figure 2. Change in crop GM (left) and canola yield (kg/ha) with grazing compared to the baseline of not grazing.

### 1.1. Livestock gross margins

Gross margin increased with grazing crops 100% of the time. On average the GM increased by  $\$57/\text{ha}$  (figure 3).

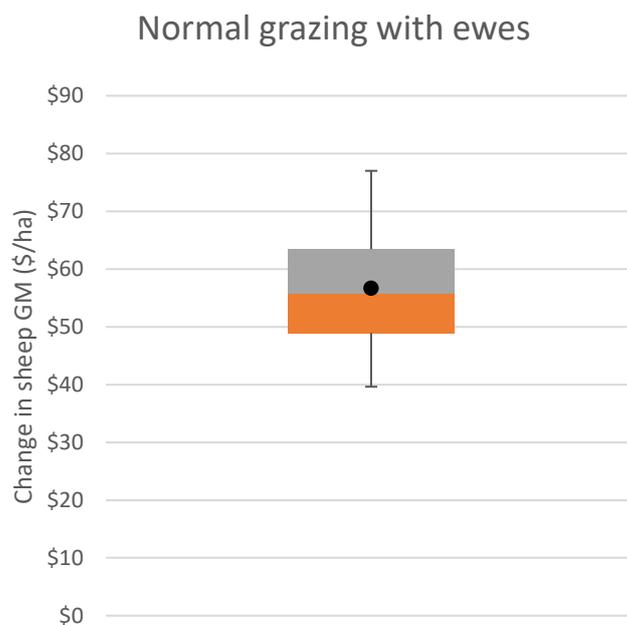


Figure 3. Change in livestock GM with grazing crops compared to a baseline of not grazing crops.

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

All changes to crop GM were caused by yield decline in the barley and oats. Wheat was unable to be grazed early enough to avoid yield penalties, and oats were purely for forage so there was no grain income from them.

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

#### Lambing percentage

Grazing crops significantly increased lambing percentage for merino ewes at Moora (average increase of 8.5%).

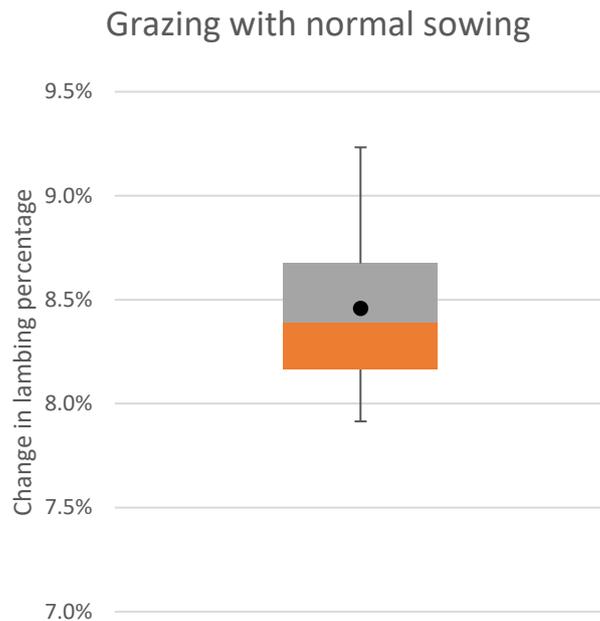


Figure 4. Change in lambing percentage with grazing crops compared to a baseline of not grazing crops.

Merino ewes grazed crop June 11 - July 16 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).

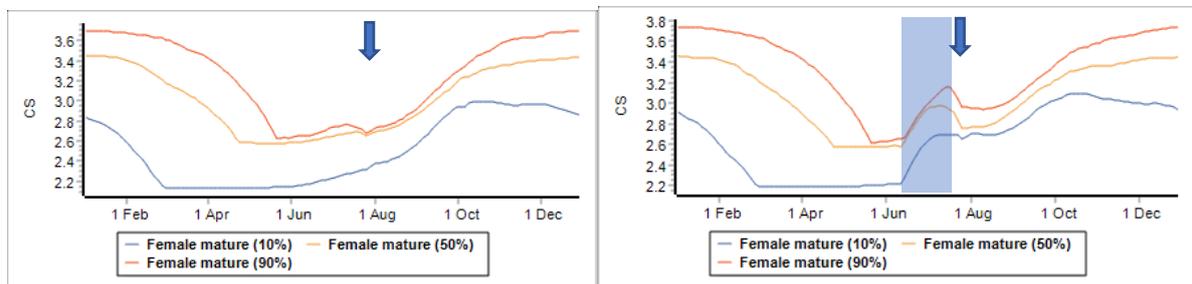


Figure 5. Ewe condition score<sup>1</sup> where crops are not grazed (left) and where they were grazed (right). Blue arrow shows lambing, shaded crop is crop grazing window.

<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.

## Sale weights

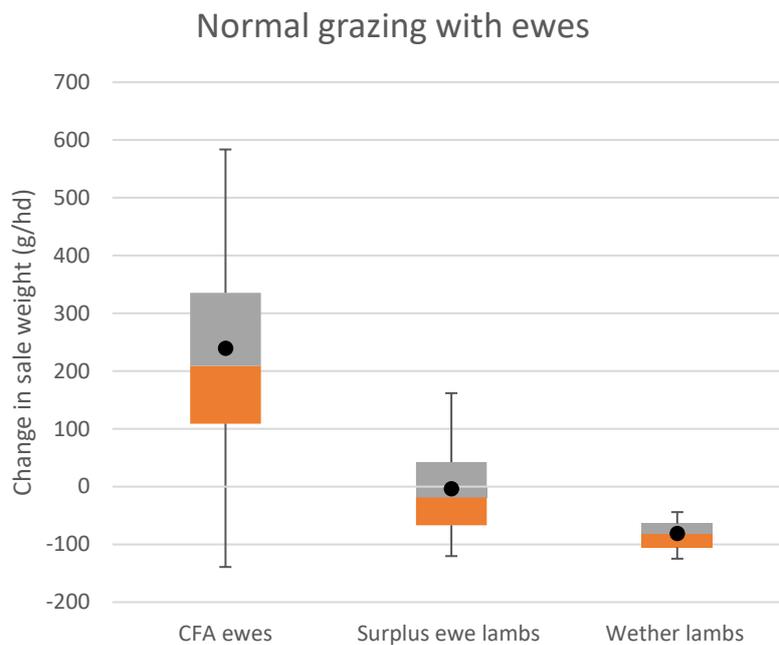


Figure 6. Change in sale weights CFA ewes and lambs with grazing crops

CFA ewe sale weights changed varying amounts, but averaged to be 240 g/hd heavier at sale (+\$0.24/hd).

Ewe lamb sale weights varied somewhat but averaged to be the same as whether crops were grazed or not. Wether lambs were sold as live exports with a per head price, so the slight decline in sale weight (-81 g/hd) did not impact income. This is likely a reflection of the higher lambing percentages with more pressure on feed supply from the increased number of young stock.

### Wool cut

Change to wool cut with grazing crops varied across the animal classes. lambs did not graze crops, so did not significantly change wool cut (average +5 g CFW/hd)

**Mature ewes:** Mean wool cut increased on average 49 g CFW/hd. At \$13.21/kg cIn it equated to +\$0.65/hd

**Hoggets:** Mean wool cut increased on average 67 g CFW/hd. At \$14.47/kg cIn it equated to +\$0.97/hd

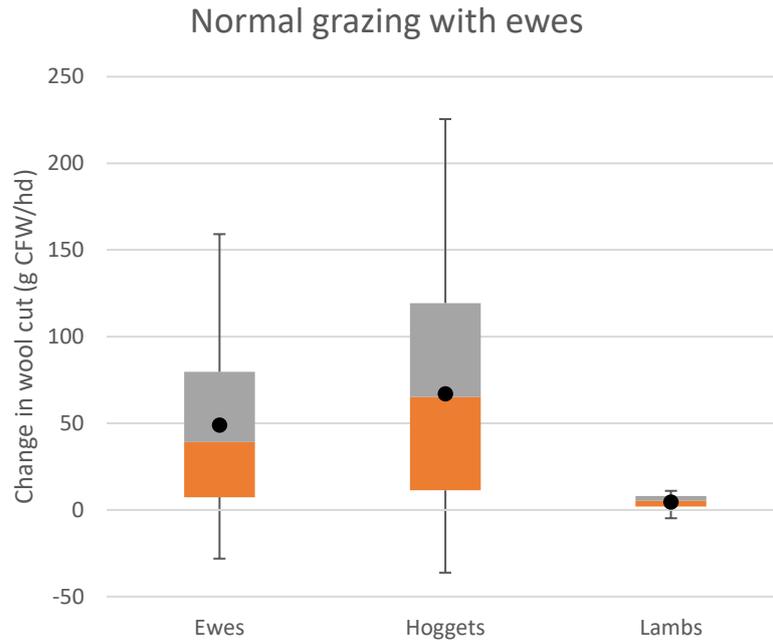


Figure 7. Change in wool cut with grazing crops

*Supplementary feeding*

Mature ewes were fed to maintain 2CS for most of the year, and 2.5CS during late pregnancy and early lactation (March 1 to August 1). Lambs grazed the oats to carry them through the summer (November 15 to April 15), and were finished on 300 g/hd of a barley-lupin mix (15 April to 15 June). The use of in situ feed (oats) meant the young stock never required feeding out to maintain them at  $\geq 2$ CS.



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

Supplementary feeding decreased 97% of the time with late grazing of crops. The main saving was in ewe maintenance feed.

The supplementary feed across the mob decreased on average 45.2 t (barley) which equated to \$10,671 across the mob on average.

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

Crops were only grazed when the extra fodder was needed. When total pasture FOO was <900 kg DM/ha animals were put on crop.

	Frequency of years	Crops grazed
Ewes graze normally sown crops	81%	Canola (11-24 June) Barley (25 June – 9 July) Oats (10 – 16 July)

## 2. Grazing early sown crops with young stock

### 2.1. Net farm profit

Grazing early sown crops at Moora with young stock changed average whole farm profit by -2.8% (-\$17,270). Farm profit declined 85% of the time with grazing early crops with young stock.

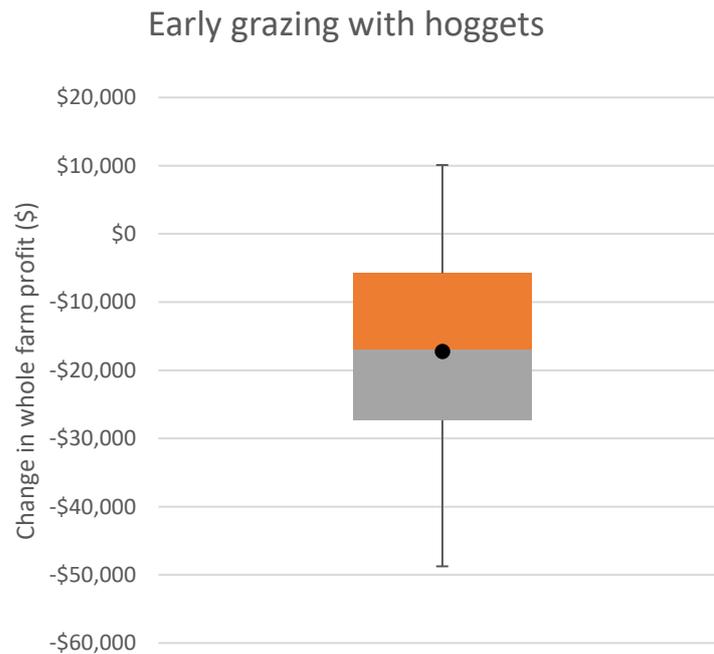


Figure 9. Change in whole farm profit with grazing crops compared to a baseline of not grazing

### 2.2. Crop gross margins

Grazing early sown crops resulted in decline in crop gross margin (GM) 97% of the time. The decline though consistent was fairly small; on average the change in crop GM with grazing was -\$15.70/ha (figure 10).

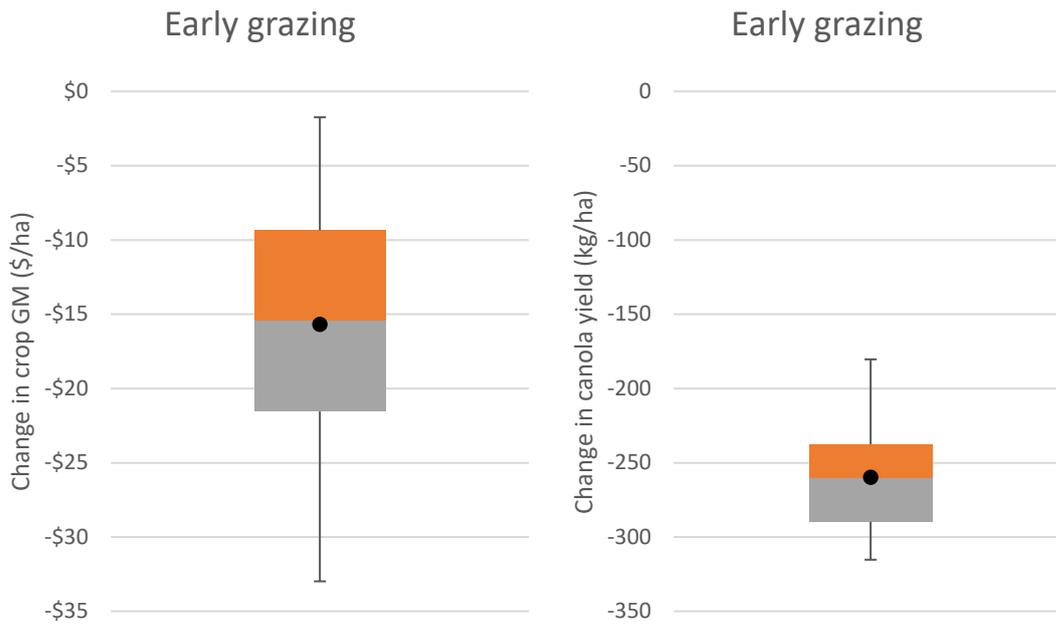


Figure 10. Change in crop GM (left) and canola yield (kg/ha) with grazing compared to the baseline of not grazing.

### 2.3. Livestock gross margins

Gross margin increased with grazing crops 100% of the time. On average the GM increased by \$13.70/ha (figure 11).

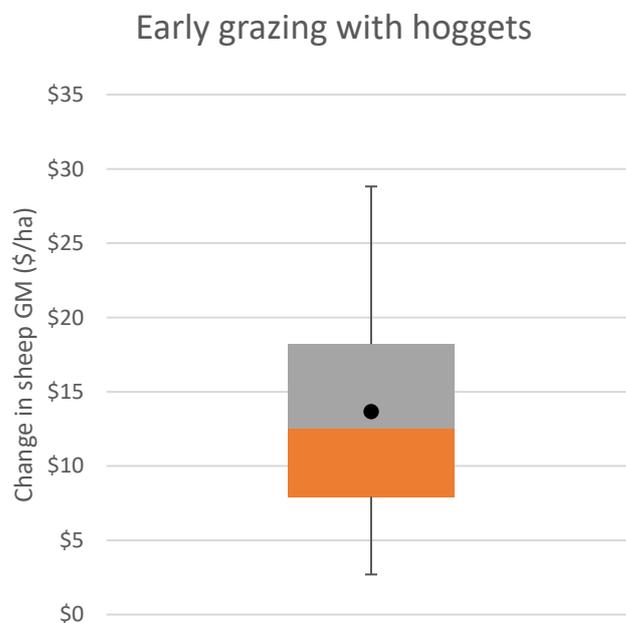


Figure 11. Change in livestock GM with grazing crops compared to a baseline of not grazing crops.

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

All changes to crop GM were caused by yield decline in the barley and canola. Wheat was unable to be grazed early enough to avoid yield penalties, and oats were purely for forage so there was no grain income from them.

As figure 10 showed, changes to early sown crop GM with grazing were quite minimal. This was partly due to smaller yield loss from grazing earlier, but also the higher yields from sowing earlier masked some of this yield penalty (figure 12).

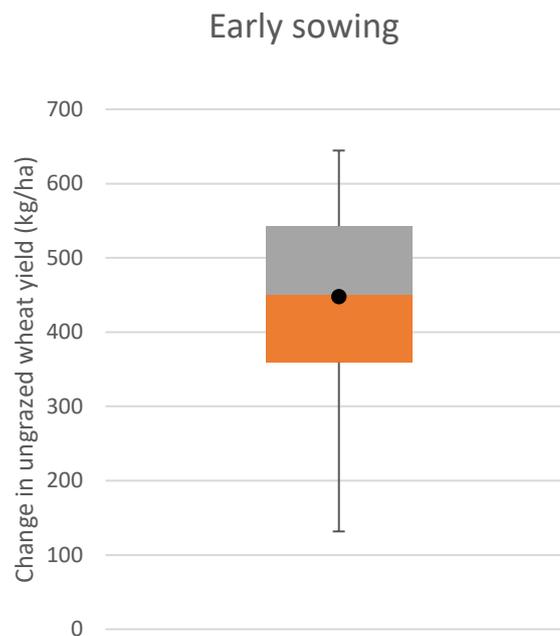


Figure 12. Change in wheat yield with earlier sowing compared to normal sowing without any grazing

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

##### *Lambing percentage*

Ewes did not graze crops and were the same body condition score at lambing whether young stock had grazed crops or not. Therefore there was no change in lambing percentage.

##### *Sale weights*

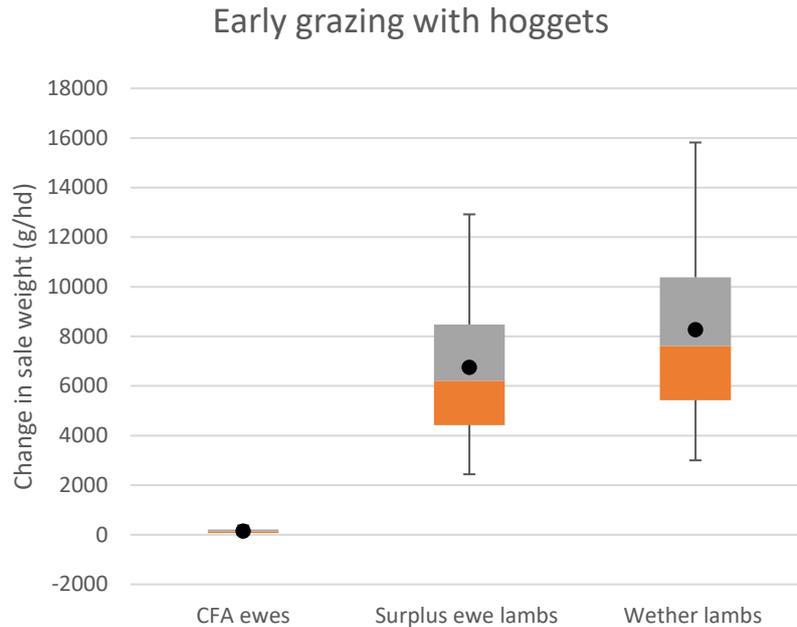


Figure 13. Change in sale weights CFA ewes and lambs with grazing crops

Grazing crops with young stock had a flow on affect to mature ewes, with CFA ewes selling 152 g/hd heavier (+\$0.15/hd).

Wether and ewe lamb sale weights increased significantly with grazing early sown crops. Young stock were sold straight off the crop, so sale weights indicate the additional weight gain from grazing crops.

Ewe lamb sale weights increased on average 6.76 kg/hd (+\$11.34/hd). Wether lambs increased on average 8.28 kg/hd.

#### Wool cut

There were not substantial changes to wool cut with grazing crops with young stock.

**Mature ewes:** Mean wool cut increased on average 2.8 g CFW/hd. At \$13.21/kg cln it equated to +\$0.04/hd

**Hoggets:** Mean wool cut increased on average 2.8 g CFW/hd. At \$14.47/kg cln it equated to +\$0.04/hd

**Lambs:** Mean wool cut increased on average 16.4 g CFW/hd. At \$15.91/kg cln it equated to +\$0.26/hd

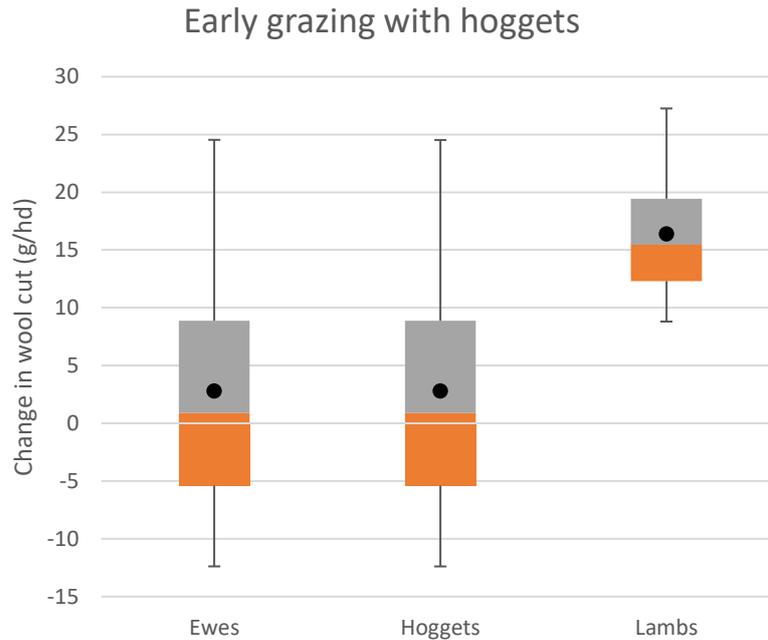


Figure 14. Change in wool cut with grazing crops

#### Supplementary feeding

While supplementary feeding decreased 74% of the time with young stock grazing crops, the change was very small as most of the feed bill came from the mature ewes which did not graze crops.

The supplementary feed across the mob decreased on average 0.64 t (barley) which equated to \$152 across the mob on average.

#### 2.6. How often were crops grazed?

Crops were only grazed when the extra fodder was needed. When total pasture FOO was <900 kg DM/ha animals were put on crop.

	Frequency of years	Crops grazed
Young stock graze early sown crops	85%	Canola (4 - 17 June) Barley (18 June – 2 July) Oats (3 – 9 July)

### 3. Grazing early sown crops with ewes

#### 3.1. Net farm profit

Two comparative merino systems were set up:

- i. A mix of single and twin bearing ewes (60% singles, 40% twins) (S+TB ewes)
- ii. All twin bearing ewes (TB ewes)

Both were compared to the same baseline of mixed single and twin ewes that did not graze crop.

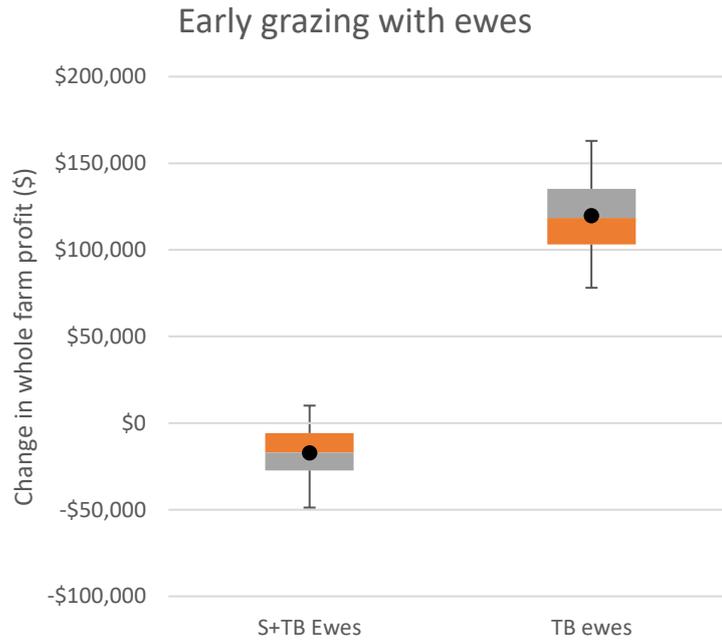


Figure 15. Change in whole farm profit with grazing crops compared to a baseline of not grazing.

The single and twin bearing ewes grazing early sown crop increased farm profit on average 1.4% (\$8,453).

The twin bearing ewes grazing early sown crop increased farm profit on average 19.2% (\$119,715).

### 3.2. Crop gross margins

Crops were grazed the same way for all the early sown and grazed systems. See section 2.2 for information on grazed early sown crop gross margins.

### 3.3. Livestock gross margins

Gross margin increased with early grazing of crops 100% of the time. On average the GM increased by \$47.97/ha for the S+TB ewes, and \$196.31/ha for the TB ewes (figure 12).



Figure 16. Change in livestock GM with early sowing and early grazing of crops compared to a baseline of not grazing crops.

3.4. What is changing the crop gross margin?

See section 2.4.

3.5. What is changing the livestock gross margin?

*Lambing percentage*

Early grazing of crops increased lambing percentage for the Merino ewes at Moora on average by 5.6% for the S+TB ewes. If the whole flock had been shifted to TB ewes and then grazed crops as well, the increase in lambing percentage above the baseline flock was 42% (figure 13)

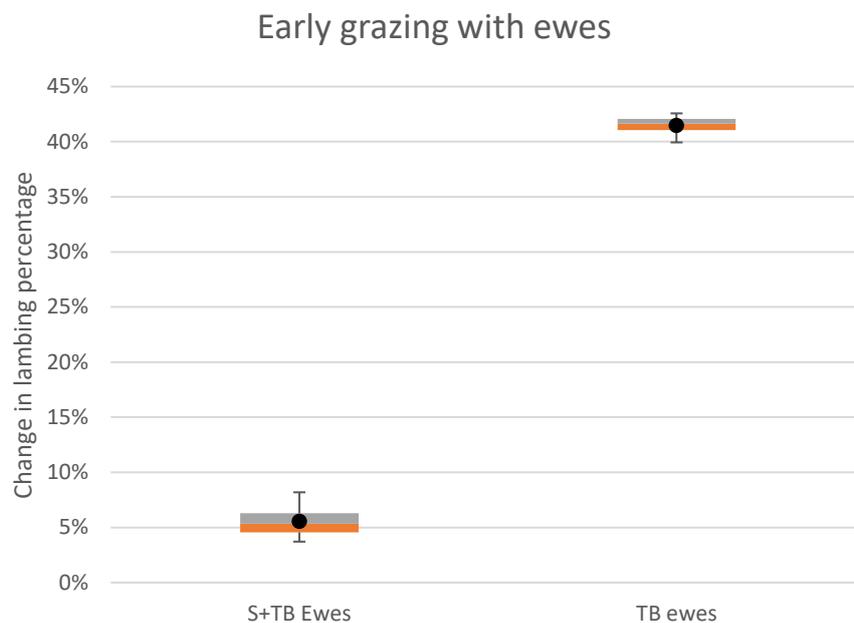


Figure 13. Change in lambing percentage with early grazing of early sown crops compared to a baseline of not grazing crops.

Ewes grazed crop June 4- July 9 and lambed on July 28. The S+TB ewes were 0.15 CS higher at lambing than if they had not been on crop (figure 14). The TB ewes were 0.15 CS lower at lambing than if they were a mix of S+TB ewes and had not been on crop.

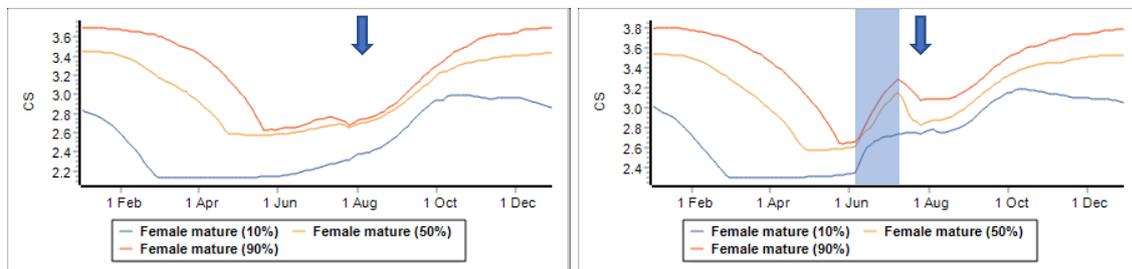


Figure 14. Ewe condition score<sup>2</sup> where crops are not grazed (left) and where they were grazed early with S+TB ewes (right). Blue arrow shows lambing, shaded crop is crop grazing window.

<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.

## Sale weights

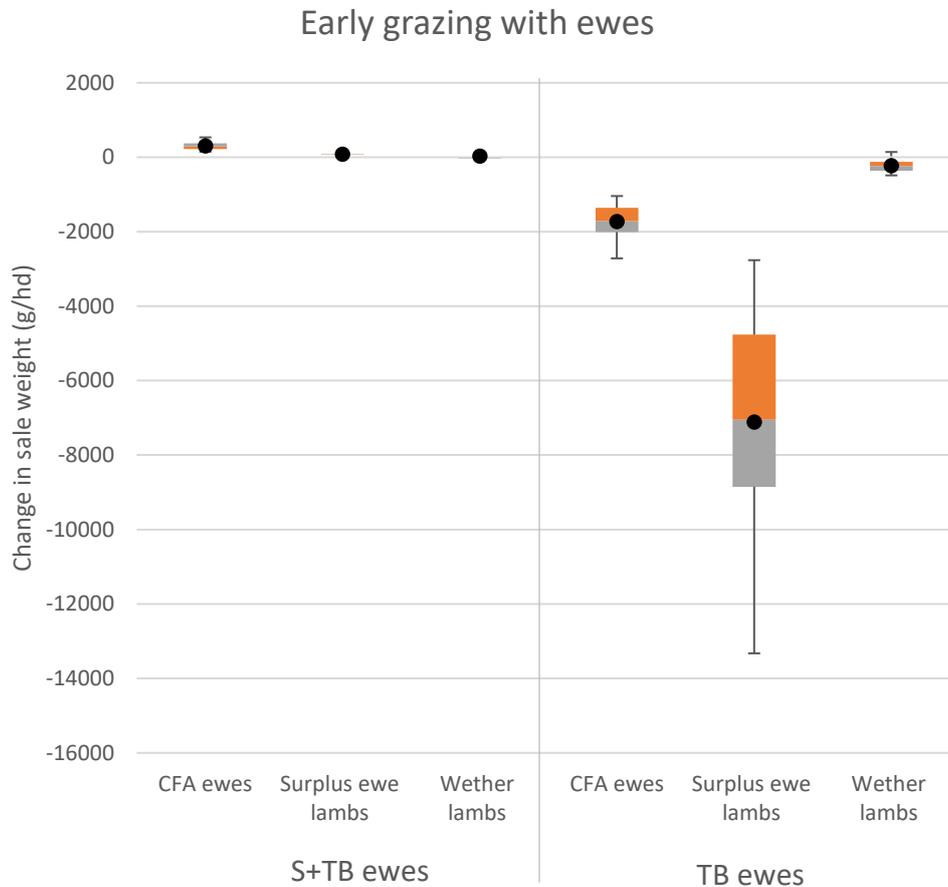


Figure 15. Change in sale weights of CFA ewes, surplus ewe lambs and wether lambs with early grazing of early sown crops stubbles.

The stand out thing about figure 15 is the weight decline in ewe lambs from TB ewes (average -7.11 kg/hd) with the extra births feed demand also increased. Lambs were in good condition coming off the oats in mid-April, but by sale on July 10 they had lost much of this weight. Sale date was kept at July 10 to ensure young stock could graze crops for the full grazing period (see section 2), but for this system it would have been better to have sold them in mid-April. It's unclear why there was such disparity between the ewe and wether lambs.

### *S+TB ewes:*

CFA ewes sold on average 308 g/hd heavier (+\$0.30/hd)

Ewe lambs sold on average 81 g/hd heavier (+\$ 0.14/hd)

Wether lambs sold on average 27 g/hd heavier

### *TB ewes:*

CFA ewes sold on average 1,731 g/hd lighter (-\$1.71/hd)

Ewe lambs sold on average 7,113 g/hd lighter (-\$11.93/hd)

Wether lambs sold on average 228 g/hd lighter

### Wool cut

Ewes and hoggets had the largest response in wool cut to grazing winter crops (figure 16).

#### S+TB ewes:

Ewe wool cut increased on average 87 g CFW/hd. At \$13.21/kg cln it equated to +\$1.15/hd

Hogget wool cut increased on average 78 g CFW/hd. At \$14.45/kg cln it equated to +\$1.13/hd

Lamb wool cut increased on average 10 g CFW/hd. At \$15.91/kg cln it equated to +\$0.16/hd

#### TB ewes:

Ewe wool cut increased on average 128 g CFW/hd. At \$13.21/kg cln it equated to +\$1.69/hd

Hogget wool cut increased on average 89 g CFW/hd. At \$14.45/kg cln it equated to +\$1.29/hd

Lamb wool cut decreased on average 5 g CFW/hd. At \$15.91/kg cln it equated to +\$0.08/hd

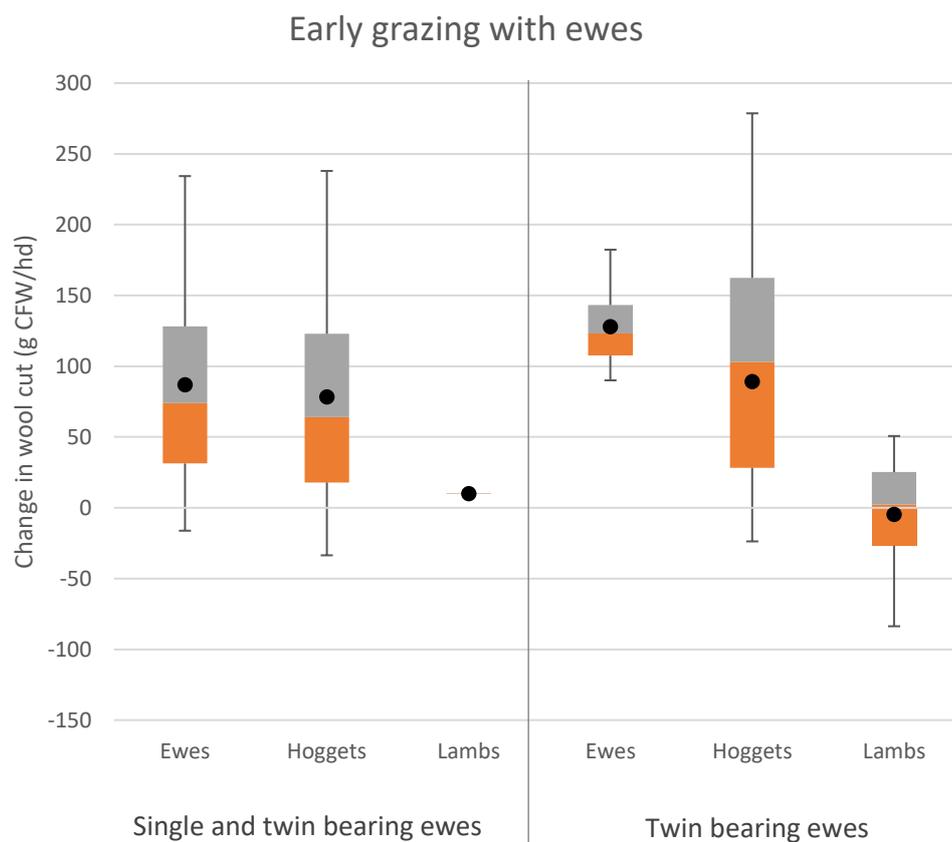


Figure 16. Change in wool cut with early grazing of early sown crops

### Supplementary feeding

Mature ewes were fed to maintain 2CS for most of the year, and 2.5CS during late pregnancy and early lactation (March 1 to August 1). Lambs grazed the oats to carry them through the summer (November 15 to April 15), and were finished on 300 g/hd of a barley-lupin mix (15 April to 15 June). The use of in situ feed (oats) meant the young stock never required feeding out to maintain them at  $\geq 2$ CS.

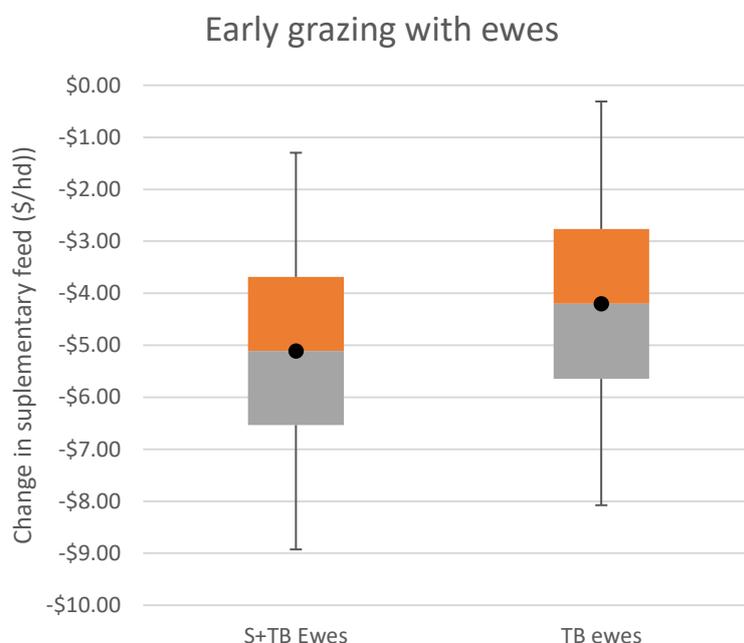


Figure 17. Change in supplementary feeding for the whole flock divided by the number of ewes in the flock where early sown crops were grazed.

Both ewe flocks had modest feed savings from grazing crops. Not surprisingly, the TB ewes required slightly more feeding than the S+TB ewes.

On average, the S+TB ewes saved 49.3 t feed (barley) which equated to \$11,645. Grazing early sown crops with S+TB ewes reduced feeding in 98% of years.

On average, the TB ewes saved 40.6 t feed (barley) which equated to \$9,580. Grazing early sown crops with the TB ewes reduced feeding in 96% of years.

### 3.6. How often were crops grazed?

Crops were only grazed when the extra fodder was needed. When green pasture FOO was <900 kg DM/ha animals were put on crop. First cross lambs grazed stubble every year.

Merino x Suffolk (terminal ewes)		
	Frequency of years	Crops grazed
S+TB ewes graze early sown crops	85%	Canola (4 - 17 June) Barley (18 June – 2 July) Oats (3 – 9 July)
TB ewes graze early sown crops	88%	

## Appendix – Moora farm system

### Soil type

Grazing land - Loamy sand (Wongan Hills No400); PAW 140 mm

Cropped land – Yellow-brown shallow loamy duplex (Badgingarra No 902); PAW 201 mm

### Grazed area

750 ha improved pasture and some annual grass weeds with 2280 Merino ewes.

### Cropped area

500 ha wheat; 500 ha barley; 500 ha canola; 250 ha forage oats

### Varieties and sowing dates

Crops were sown when there was at least 10 mm over 2 days and a minimum 30 mm soil water.

Crop	Normal sowing date and variety		Early sowing date and variety*	
	Canola	Stingray	April 30 – May 5	Hyola 650TT
Wheat	Mace	May 15-21	Trojan	May 1-21
Barley	Hindmarsh	May 15-30	Commander	May 1-20
Oats	Mitika	May 15-30	Echidna	April 15 – May 16

### Crop grazing

		Merino x Suffolk (terminal ewes)	
		Frequency of years	Crops grazed
	No grazing, normal sowing	Never	-
Section 1	Ewes graze normally sown crops	81%	Canola (11-24 June) Barley (25 June – 9 July) Oats (10 – 16 July)
Section 2	Young stock graze early sown crops	85%	Canola (4 - 17 June) Barley (18 June – 2 July) Oats (3 – 9 July)
Section 3	Ewes* graze early sown crops	85%	
	Twin bearing ewes# graze early sown crops	88%	

\*Ewes were a mix of twin and single bearers: 60% single, 40% twin

#Ewes were all twin bearers