

Katanning

The Katanning farm was a total of 2500 ha arable area. Of that 1500 ha cropped (450 ha wheat, 450 ha barley, 450 ha canola, 150 ha forage oats). The remaining 1000 ha was under pasture with a self-replacing merino flock containing 2400 ewes. The oats and stubbles were used to finish lambs on from November to March.

The grazed country was on a sandy duplex over light clay with a plant available water capacity of 92 mm in the top 100cm. The cropped land was on a sandy clay over clay with a plant available water capacity of 113 mm in the top 100 cm.

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 graze wheat, oats, barley and canola.
- ii. Crops were sown early, ewes grazed oats and barley only.
- iii. Crops were sown early, ewes graze wheat, 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 a single lamb and 40% bearing twins (S+TB). The other option was to switch to an entirely twin bearing ewe flock (TB).

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 Katanning changed average whole farm profit by 0.7% (\$3,293.80). Farm profit increased 60% of the time when grazing all crops compared to the baseline.

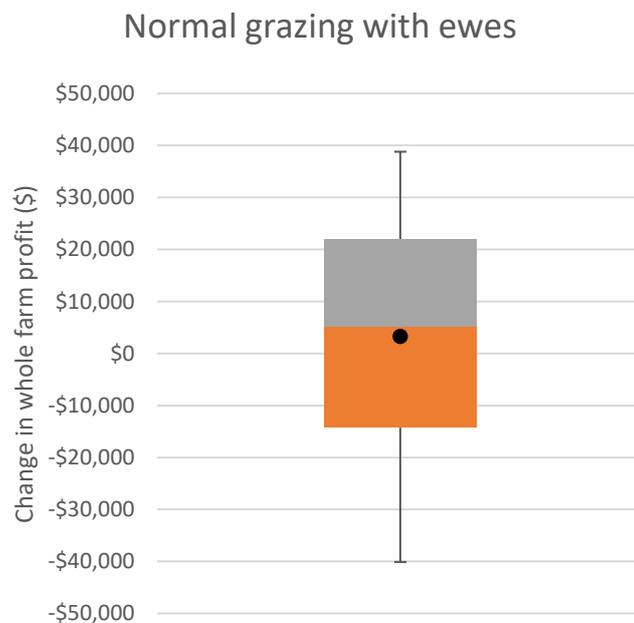


Figure 1. Change in whole farm profit with grazing crops compared to a baseline of not grazing

1.2. Crop gross margins

Grazing crops that were sown on a standard date resulted in decline in crop gross margin (GM) 100% of the time. On average the change in crop GM with grazing was -\$31.70/ha (figure 2).

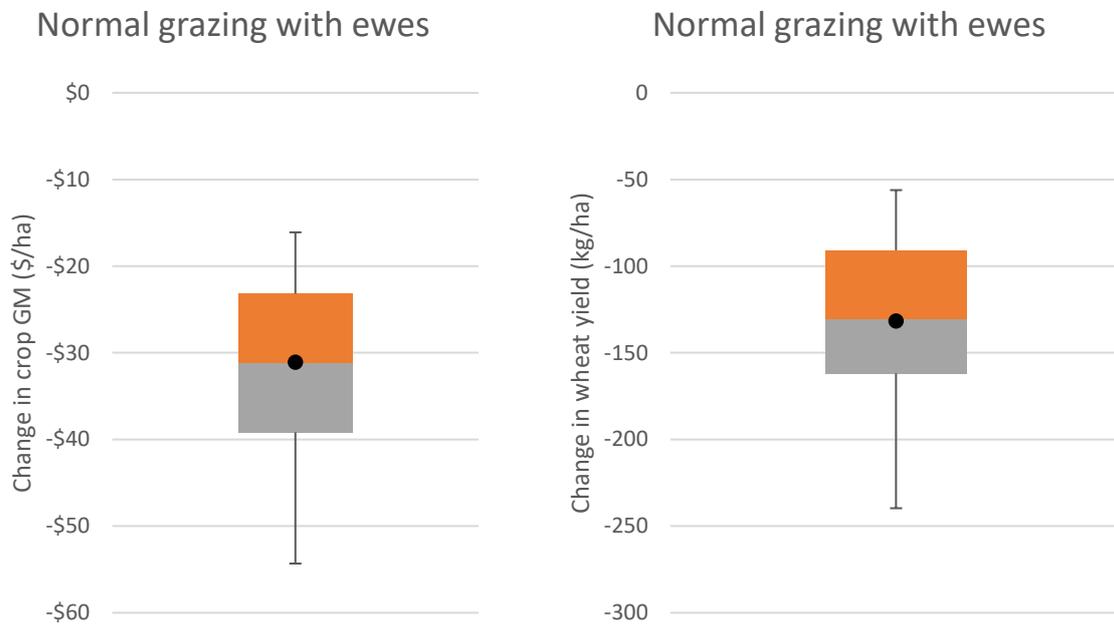


Figure 2. Change in crop GM (left) and wheat yield (kg/ha) with grazing compared to the baseline of not grazing.

1.1. Livestock gross margins

Gross margin increased with grazing crops 99.4% of the time. On average the GM increased by \$49.95/ha (figure 3).

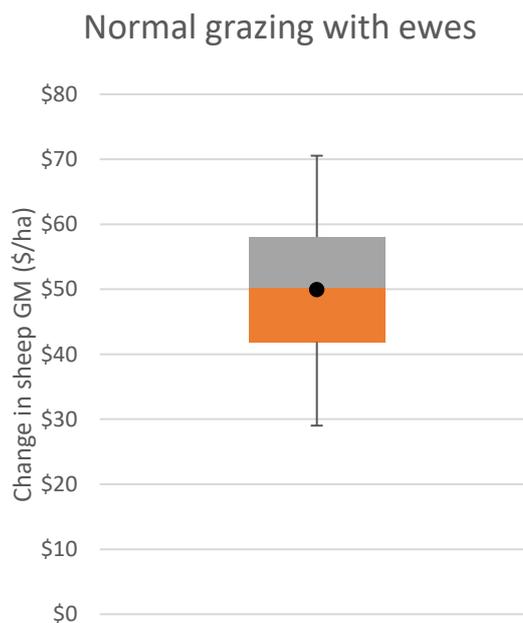


Figure 3. Change in livestock GM with grazing crops compared to a baseline of not grazing crops.

1.2. What is changing the crop GM?

All changes to crop GM were caused by yield decline in the wheat, barley and canola from grazing. Oats did not impact crop gross margin as they were sown for fodder and not harvested.

1.3. What is changing the livestock GM?

Lambing percentage

Grazing crops significantly increased lambing percentage for merino ewes at Katanning (average increase of 14.2%). The effect of increased ewe production and stocking rate is picked up in the following sections on sale weights and wool cut.

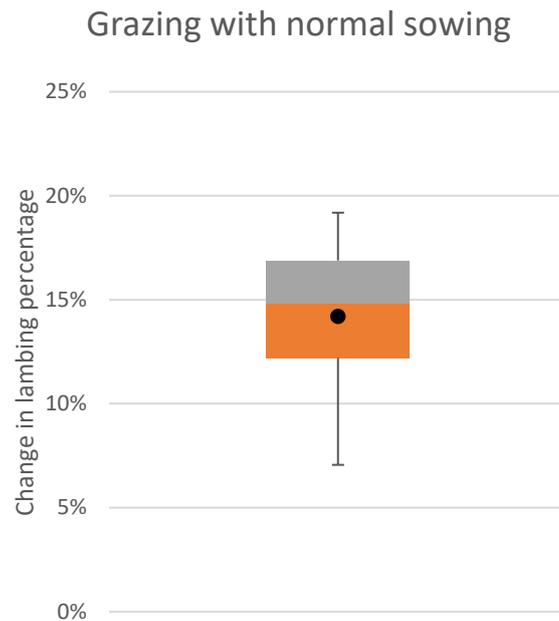


Figure 4. Change in lambing percentage with grazing crops compared to a baseline of not grazing crops.

Merino ewes grazed crop June 11 - July 23 and lambed July 28. When grazing crop, they were 0.5 CS higher at lambing than if they had not been on crop (figure 5).

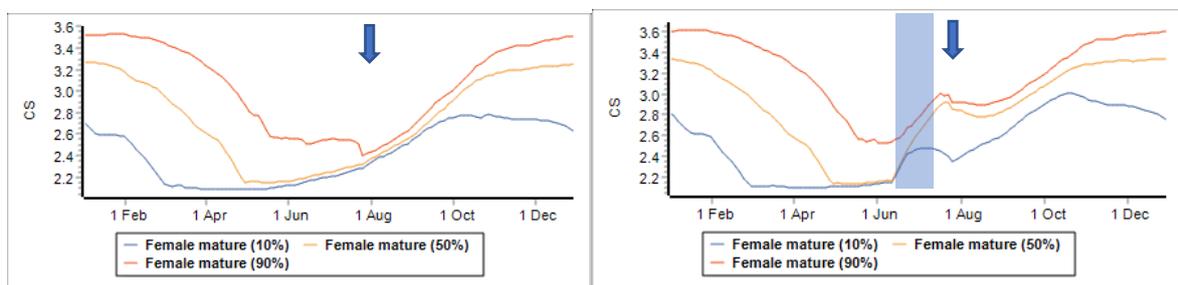


Figure 5. Ewe condition score¹ where crops are not grazed (left) and where they were grazed (right). Blue arrow shows lambing, shaded crop is crop grazing window.

¹ 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.

Sale weights

CFA ewes sold on average 369 g/hd heavier (+\$0.13/hd). Lambs sold slightly lighter, likely a reflection of the increased incidence of twin lambs and increased pressure on feed. Ewe lambs sold on average 99.5 g/hd lighter (-\$0.17/hd) and wether lambs sold on average 63 g/hd lighter (-\$0.13/hd)

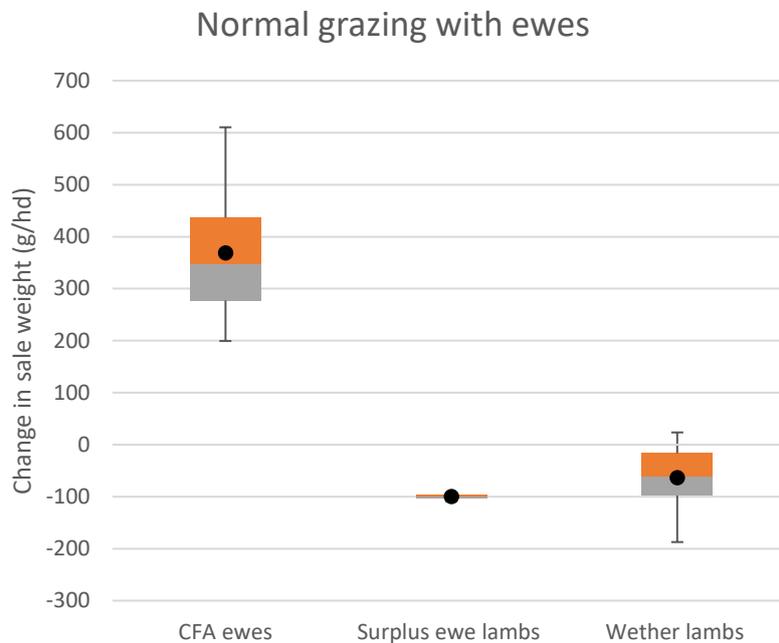


Figure 6. Change in sale weights CFA ewes and lambs with grazing crops

Wool cut

Change to wool cut with grazing crops varied across the animal classes.

Mature ewes: Wool cut increased on average 143 g CFW/hd. At \$12.88/kg cln it equated to +\$1.84/hd

Hoggets: There was some variability by the mean wool cut only changed -9 g/hd. At \$14.18/kg cln it equated to -\$0.13/hd.

Lambs: Wool cut decreased on average 37 g CFW/hd. At \$15.83/kg cln it equated to -\$0.59/hd

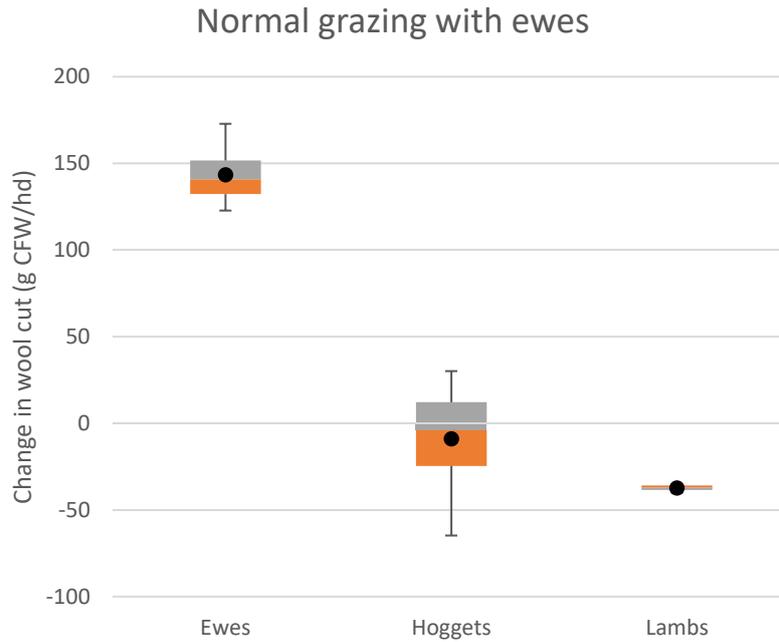


Figure 7. Change in wool cut with grazing crops

Supplementary feeding

Mature ewes were fed to maintain the thinnest animals at 2CS. Lambs grazed the oats to carry them through the summer (November 15 to March 15) before being sold in early autumn.

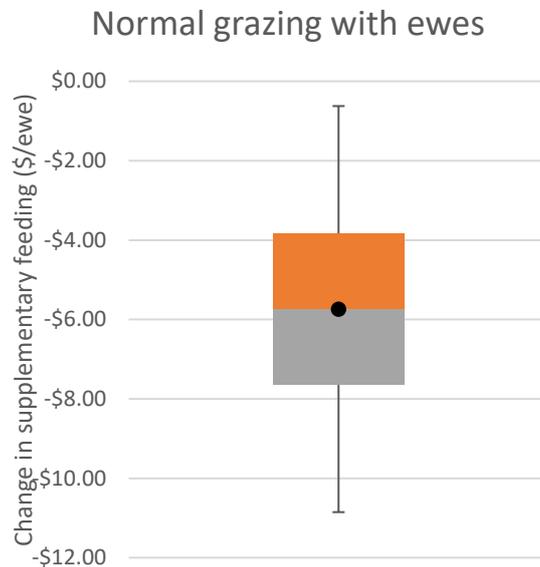


Figure 8. Change in supplementary feeding costs for the whole flock divided by the number of ewes.

Supplementary feeding decreased 96% of the time with late grazing of crops. The main saving was in ewe maintenance feed, with an average saving of -\$5.74/ewe (figure 8).

The supplementary feed across the mob decreased on average 58.4 t (barley) which equated to \$13,775 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 <600 kg DM/ha animals were put on crop.

| | Frequency of years | Crops grazed |
|--------------------------------|--------------------|--|
| Ewes graze normally sown crops | 83% | Canola (11-24 June) Oats (25 June – 1 July) Barley (2 – 15 July) Wheat (16 – 23 July) |

2. Grazing early sown barley and oats

2.1. Net farm profit

Sowing early and grazing barley and oats crops at Katanning increased average whole farm profit by 54% (\$260,332). Farm profit increased 99% of the time with early sowing and grazing barley and oats.

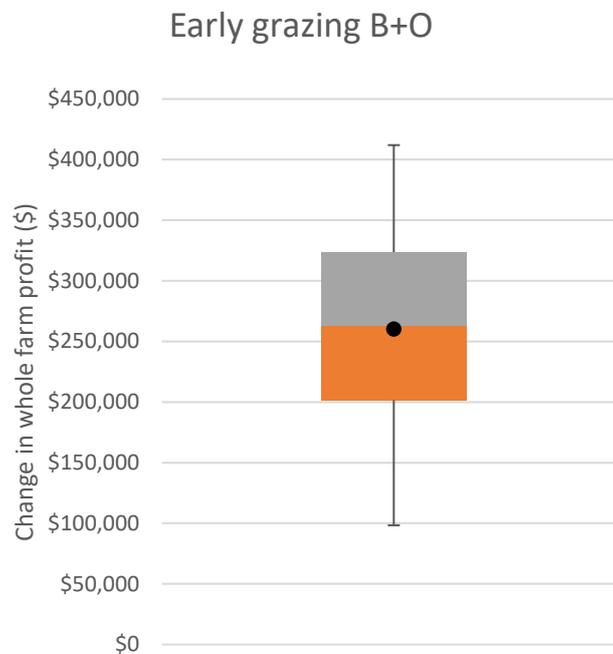


Figure 9. Change in whole farm profit with early sowing and grazing barley and oats compared to a baseline of not grazing.

2.2. Crop gross margins

Grazing early sown crops resulted in increase in crop gross margin (GM) 98% of the time. On average the change in crop GM with grazing was \$153.30/ha (figure 10).

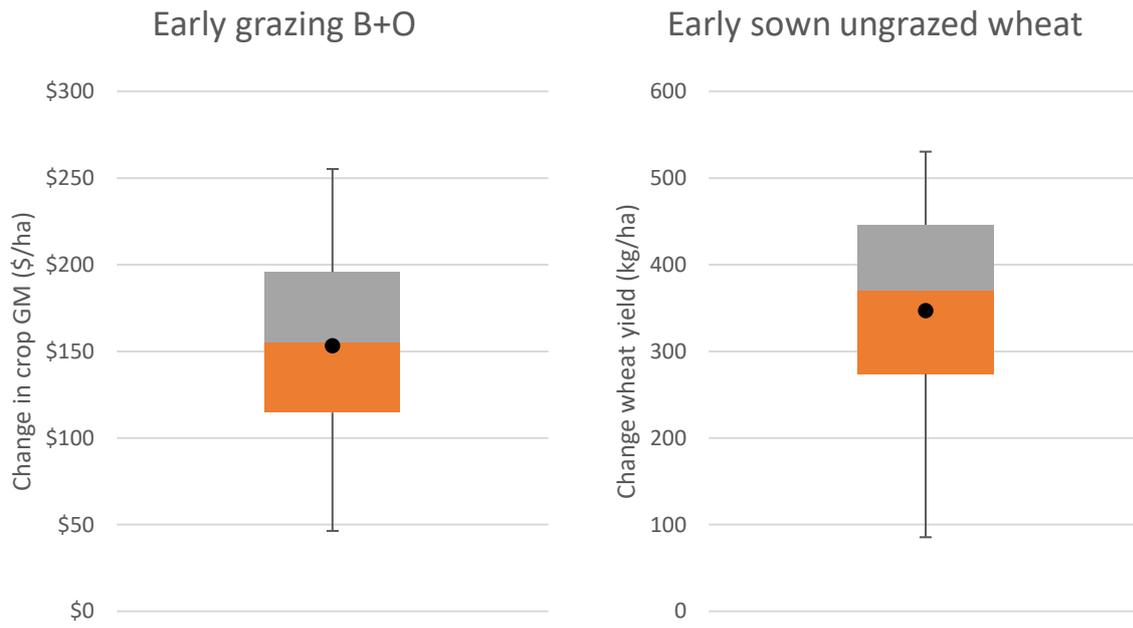


Figure 10. Change in crop GM (left) with early sowing and grazing of barley and oats. Change in wheat yield (kg/ha) with early sowing and no grazing.

2.3. Livestock gross margins

Gross margin increased with grazing crops 99.4% of the time. On average the GM increased by \$30.40/ha (figure 11).

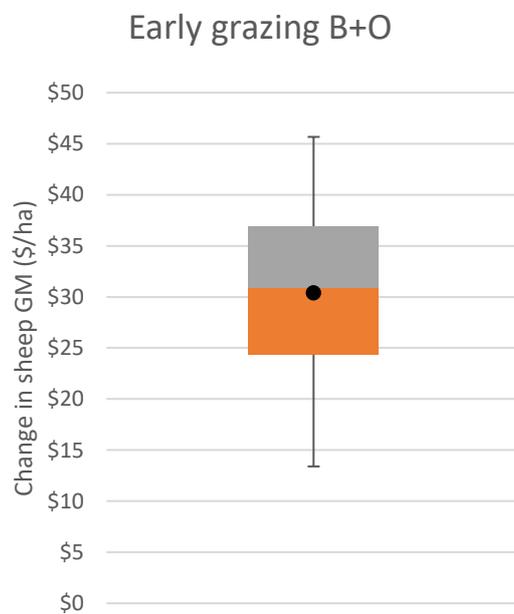


Figure 11. Change in livestock GM with grazing early sown barley and oats compared to a baseline of not grazing crops.

2.4. What is changing the crop GM?

Crop yields increased with the earlier sowing. Yield increases across wheat, barley and canola from early sowing outweighed the slight yield penalty in the barley from grazing. Oats were not harvested so grazing did not decrease income from that paddock.

2.5. What is changing the livestock GM?

Lambing percentage

Grazing crops saw reasonable increase in lambing percentage for merino ewes at Katanning (average increase of 7.6%).

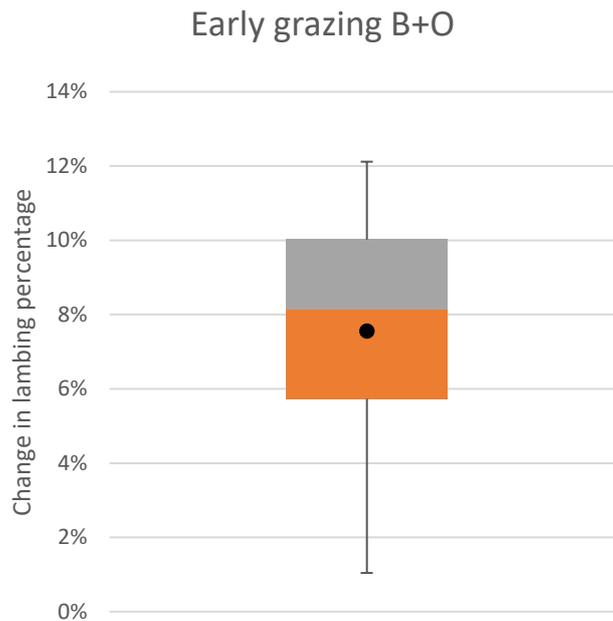


Figure 12. Change in lambing percentage with grazing early sown barley and oats compared to a baseline of not grazing crops.

Merino ewes grazed crop June 11 - July 16 and lambed July 28. When grazing crop, they were 0.2 CS higher at lambing than if they had not been on crop (figure 13).

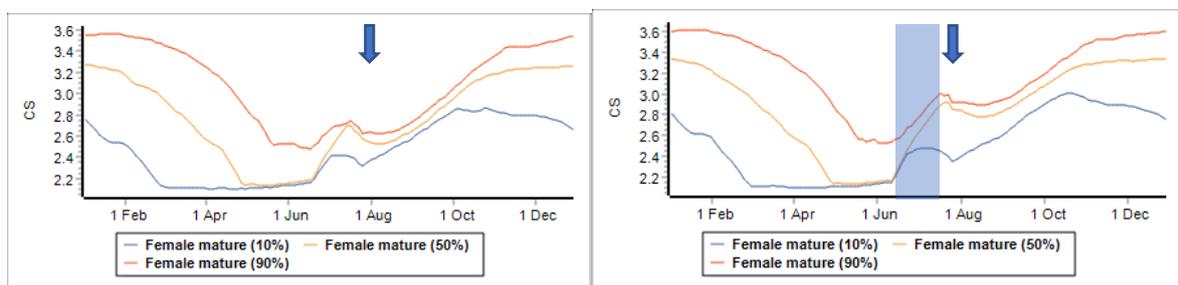


Figure 13. Ewe condition score² where crops are not grazed (left) and where they were grazed (right). Blue arrow shows lambing, shaded crop is crop grazing window.

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.

Sale weights

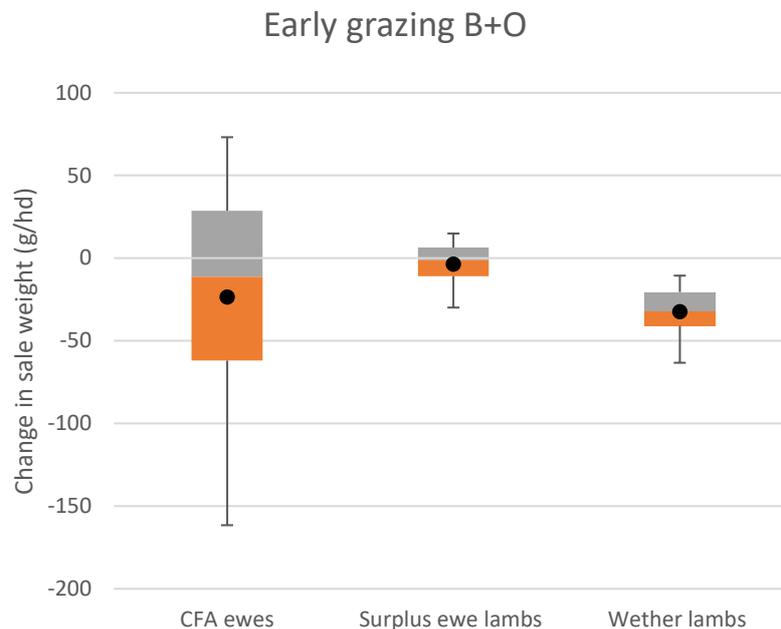


Figure 14. Change in sale weights CFA ewes and lambs with grazing crops

There was no real change in sale weights across the animal classes. CFA ewes were sold February 2, by which time the weight gained while grazing crops had been lost and they sold 23 g lighter. Ewe lambs sold 4 g lighter and wether lambs 32 g lighter.

Wool cut

Mature ewes had the greatest increase in wool cut in response to grazing crops. Young stock did not graze crops, and the higher stocking rate from increased lambing percentage meant higher feed demand and a slight decline in production.

Mature ewes: Mean wool cut increased on average 116.3 g CFW/hd. At \$12.88/kg cln it equated to +\$1.50/hd

Hoggets: Mean wool cut decreased on average 7.0 g CFW/hd. At \$14.18/kg cln it equated to +\$0.043/hd

Lambs: Mean wool cut decreased on average 26.9 g CFW/hd. At \$15.83/kg cln it equated to +\$0.10/hd

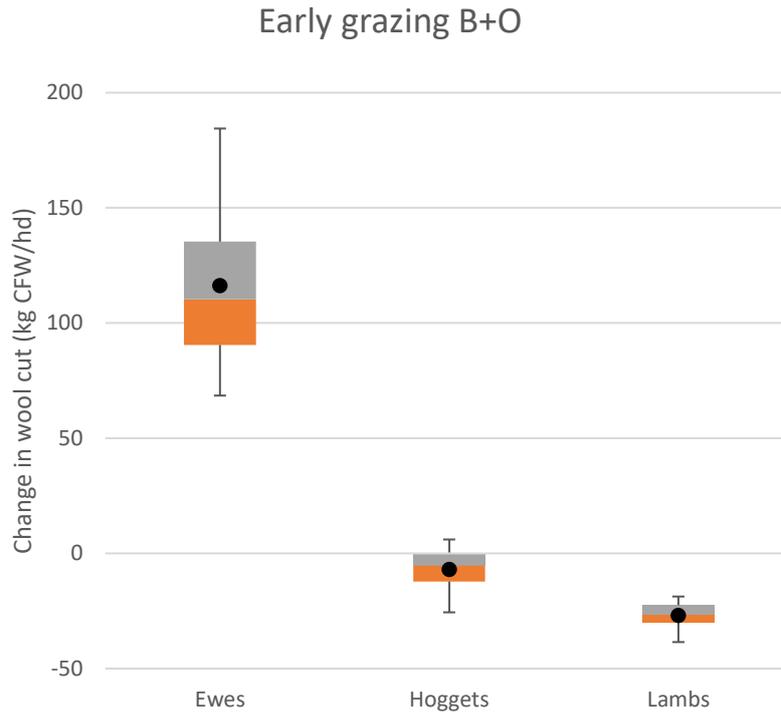


Figure 15. Change in wool cut with grazing early sown barley and oat crops

Supplementary feeding

Supplementary feeding decreased 97% of the time with grazing crops. The supplementary feed across the mob decreased on average 42.9 t (barley) which equated to a saving of \$10,120.

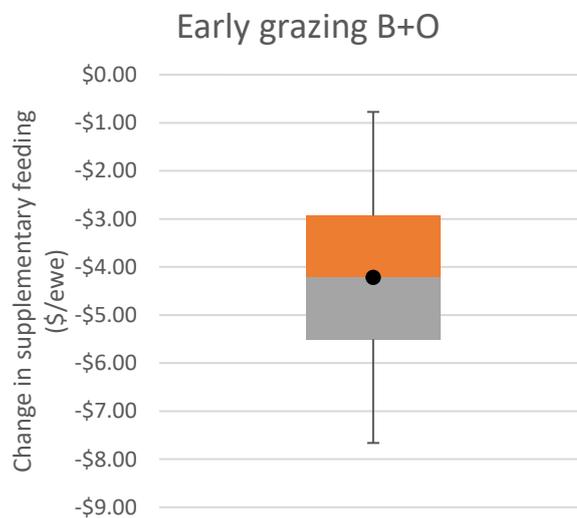


Figure 16. Change in supplementary feeding for the whole flock divided by the number of ewes in the flock where early sown barley and oat crops were grazed.

2.6. How often were crops grazed?

Crops were only grazed when the extra fodder was needed. When green pasture FOO was <600 kg DM/ha animals were put on crop.

| | Frequency of years | Crops grazed |
|---------------------------------------|--------------------|---|
| Ewes graze early sown barley and oats | 78% | Barley (18 June – 1 July) Oats (2 – 16 July) |

3. Grazing early sown crops with ewes

3.1. Net farm profit

Earlier sowing allowed earlier grazing and stock removal. Two comparative merino systems were set up where ewes grazed all early sown crops.

- 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 17. Change in whole farm profit with grazing crops compared to a baseline of not grazing.

The single and twin bearing ewes grazing early sown crops increased farm profit on average 51% (\$244,427).

The twin bearing ewes grazing early sown crops increased farm profit on average 62% (\$297,133).

3.2. Crop gross margins

Grazing early sown crops still saw an increase in crop gross margin (GM) 97% of the time. On average the change in crop GM with grazing was \$125/ha (figure 17).



Figure 18. Change in crop GM (left) with early sowing and grazing of barley and oats. Change in wheat yield (kg/ha) with early sowing and no grazing

3.3. Livestock gross margins

Gross margin increased with early grazing of crops 100% of the time for both ewe flocks. On average the GM increased by \$55.51/ha for the S+TB ewes, and \$111.26/ha for the TB ewes (figure 19).

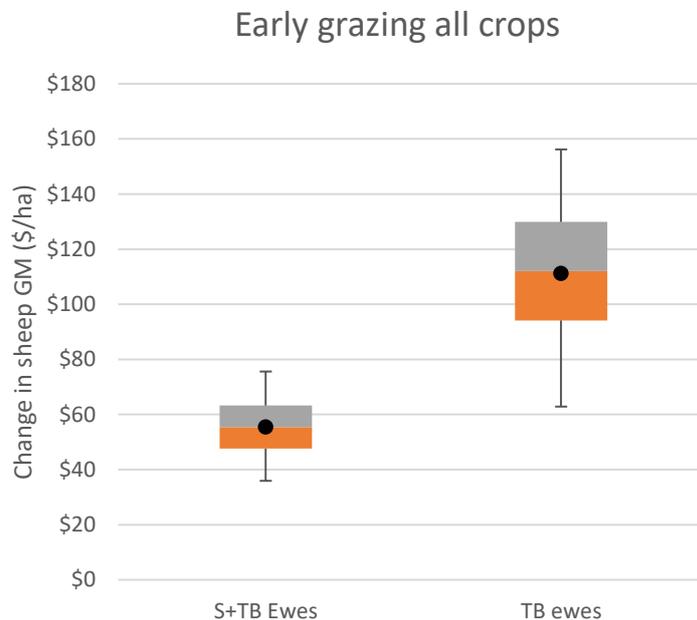


Figure 19. Change in livestock GM with early sowing and early grazing of crops compared to a baseline of not grazing crops.

3.4. What is changing the crop gross margin?

Crop yields increased with the earlier sowing. Yield increases from early sowing outweighed the yield penalties from grazing, resulting in an overall increase in crop GM.

By sowing earlier, crops could be grazed earlier allowing increased recovery time before flowering. Wheat was the most notable, with early sowing enabling it to be grazed a month earlier.

3.5. What is changing the livestock gross margin?

Lambing percentage

Early grazing of crops increased lambing percentage for the Merino ewes at Katanning on average by 16% 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 53% (figure 20).



Figure 20. 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 23 and lambed on July 28. The S+TB ewes were 0.6 CS higher at lambing than if they had not been on crop (figure 21). The TB ewes were 0.3 CS higher at lambing than if they were a mix of S+TB ewes and had not been on crop.

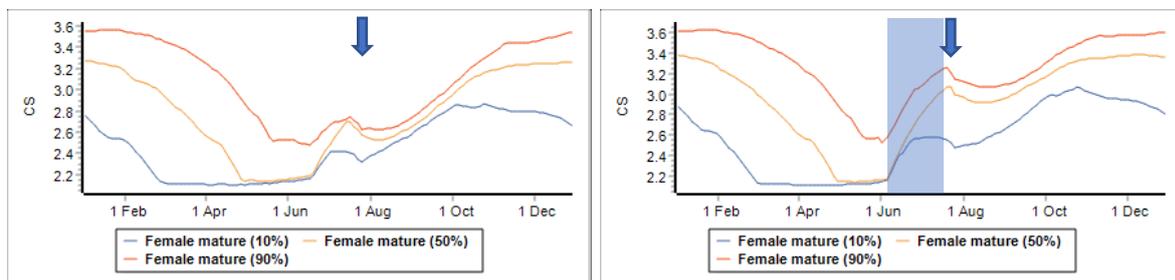


Figure 21. Ewe condition score³ where crops are not grazed (left) and where they were grazed early with S+TB ewes (right). Blue arrow shows lambing, shaded crop is crop grazing window.

³ 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

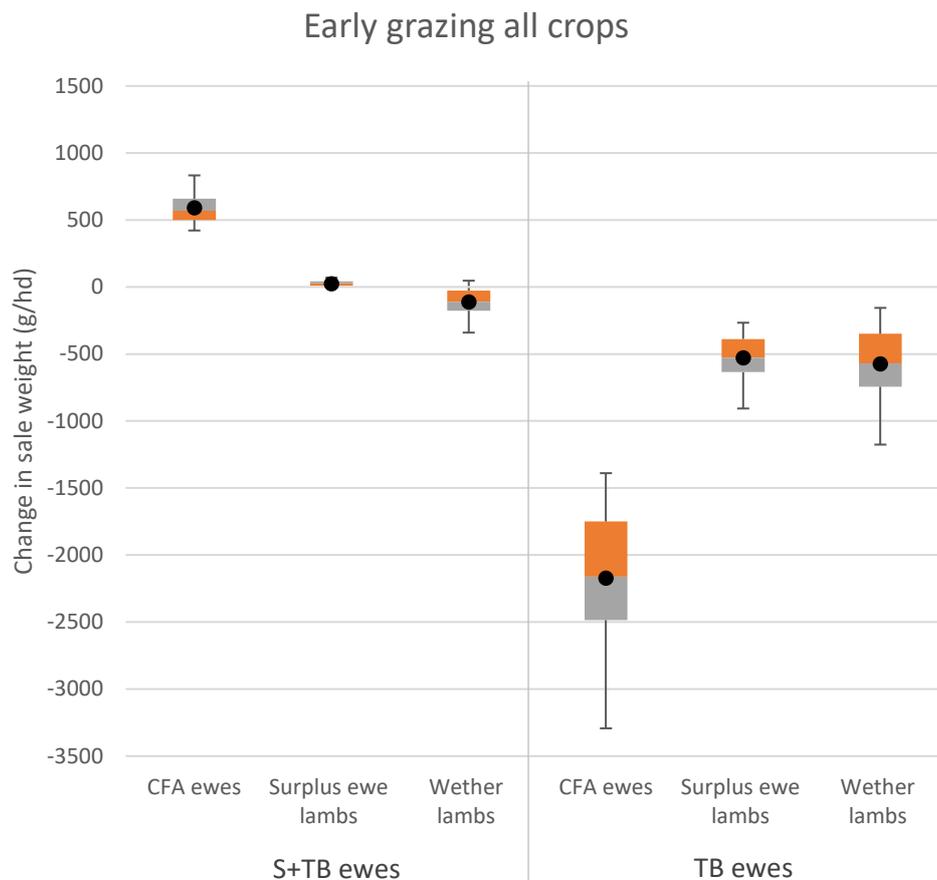


Figure 22. Change in sale weights of CFA ewes, surplus ewe lambs and wether lambs with early grazing of early sown crops.

Where S+TB ewes grazed crops, ewes sold slightly heavier, ewe lambs sold about the same weight and wether lambs sell slightly lighter. Where TB ewes grazed crops, sale weights decreased across the board. This reflects the higher lamb production that places extra stress on ewes and increases feed demand for lambs.

S+TB ewes:

CFA ewes sold on average 591 g/hd heavier (+\$0.59/hd)

Ewe lambs sold on average 23 g/hd heavier (+\$0.04/hd)

Wether lambs sold on average 123 g/hd lighter (+\$0.25/hd)

TB ewes:

CFA ewes sold on average 2,173 g/hd lighter (-\$2.15/hd)

Ewe lambs sold on average 530 g/hd lighter (-\$0.89/hd)

Wether lambs sold on average 576 g/hd lighter (-\$1.16/hd)

Wool cut

Ewes and hoggets had the largest response in wool cut to grazing winter crops (figure 23).

S+TB ewes:

Ewe wool cut increased on average 165 g CFW/hd. At \$12.88/kg cln it equated to +\$2.13/hd

Hogget wool cut decreased on average 14 g CFW/hd. At \$14.18/kg cln it equated to +\$0.66/hd

Lamb wool cut decreased on average 42 g CFW/hd. At \$15.83/kg cln it equated to +\$0.22/hd

TB ewes:

Ewe wool cut increased on average 131 g CFW/hd. At \$12.88/kg cln it equated to +\$1.69/hd

Hogget wool cut decreased on average 44 g CFW/hd. At \$14.18/kg cln it equated to +\$1.84/hd

Lamb wool cut decreased on average 116 g CFW/hd. At \$15.83/kg cln it equated to +\$0.62/hd

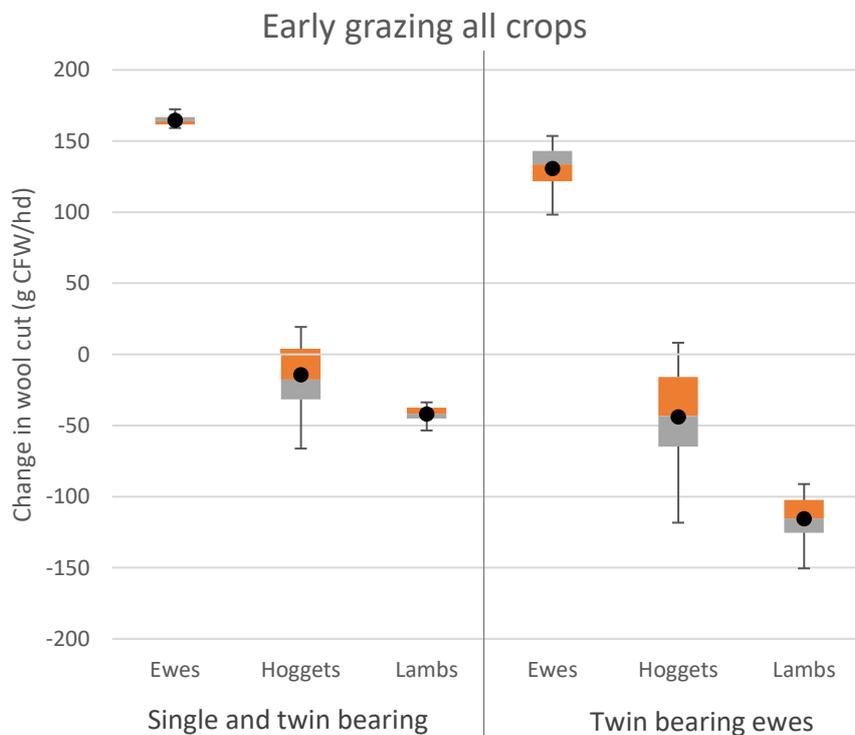


Figure 23. Change in wool cut with early grazing of early sown crops

Supplementary feeding

When grazing crops with S+TB ewes, supplementary feeding decreased 96% of the time. Grazing crops saw supplementary feeding across the flock decreased on average 62.5 t (-\$14,747).

When grazing crops with TB ewes, supplementary feeding decreased 25% of the time. Grazing crops saw supplementary feeding across the flock increased on average 10.4 t (+\$2,444).



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.

The TB ewe flock had a higher feed requirement than the baseline to maintain condition due to their higher production. Grazing crops meant that their supplementary feed requirement was lower than if they had not been on crops, but the feed bill was slightly higher than if they had been S+TB ewes.

3.6. How often were crops grazed?

Crops were only grazed when the extra fodder was needed. When green pasture FOO was <600 kg DM/ha animals were put on crop.

| | Frequency of years | Crops grazed |
|---|--------------------|---|
| Ewes* graze early sown crops | 86% | Canola (4-17 June) Wheat (18 - 24 June) Barley (25 June – 8 July) Oats (9 – 23 July) |
| Twin bearing ewes# graze early sown crops | 86% | |

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

#Ewes were all twin bearers

Appendix – Katanning farm system

Soil type

Grazing land - Sandy duplex over light clay (No. 403); PAW 92 mm

Cropped land – Rubbly Fine Sandy Clay Loam over Clay (CI907) (Stockport No263); PAW 113 mm

Grazed area

100 ha improved pasture and some annual grass weeds with 2400 Merino ewes.

Cropped area

450 ha wheat; 450 ha barley; 450 ha canola; 150 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 | April 10 – May 5 |
| Wheat | Mace | May 21-30 | Trojan | April 20 – May 15 |
| Barley | Bass | May 20-30 | Oxford | April 25 – May 15 |
| Oats | Mitika | May 15-20 | Echidna | April 25 – May 10 |

Crop grazing

| | | Self-replacing merinos | |
|-----------|---|-------------------------------|--|
| | | Frequency of years | Crops grazed |
| | No grazing, normal sowing | Never | - |
| Section 1 | Ewes graze normally sown crops | 83% | Canola (11-24 June) Oats (25 June – 1 July) Barley (2 – 15 July) Wheat (16 – 23 July) |
| Section 2 | Ewes graze early sown barley and oats | 78% | Barley (18 June – 1 July) Oats (2 – 16 July) |
| Section 3 | Ewes* graze early sown crops | 86% | Canola (4-17 June) Wheat (18 - 24 June) Barley (25 June – 8 July) Oats (9 – 23 July) |
| | Twin bearing ewes# graze early sown crops | 86% | |

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

#Ewes were all twin bearers