



The impact of changing joining rates on the Western Australian sheep flock

Executive Summary

Given the poor seasonal conditions and low prices experienced in 2023/24, the Western Australian (WA) sheep industry is experiencing a period of very poor industry sentiment often compared to that seen in the 1990's following the collapse of the wool reserve price scheme.

These difficult times mean producers have had to make production decisions for their businesses which may have flow on effects for the entire state flock. One commonly discussed option by industry and consultants was to join less ewes to reduce the feed burden on farm and help mitigate losses due to low prices. This computer modelling aimed to investigate the impact of reduced joining rates on the WA flock over three years.

The results ranged from a 12% flock reduction from 11.96 million sheep to 10.52 million sheep over three years when the joining rate declined from 91% to 85% for one year, to a 35% reduction to 7.79 million sheep if the joining rate was reduced to 70% for all three years modelled.

This modelling found that the longer and more severe the reduction in ewe joining rates, the more severe the impacts on the state flock. This is also likely to occur simultaneously with a period of high turn-off and high loss rates which will exacerbate the impacts on the flock and make it very difficult for the flock to recover. This will have long lasting ramifications on the sheep industry and will impact all segments of the industry as well as supporting industries and regional communities in the long term.

When making joining decisions for the year ahead, producers have considered current seasonal conditions including their feed, water and cashflow availability, as well as the implications for their own flock structure which will, in turn, impact turn-off and the ability to re-build in future.

Introduction

The 2023 year has been challenging for the WA sheep industry, with conditions continuing so far in 2024. With the announcement by the Australian Government to phase out live sheep exports coinciding with poor seasonal conditions in many regions; difficulty in getting sheep to processors due to lack of kill space and very poor prices; industry sentiment and confidence is very low.

Some consultants and producers considered not mating all or part of their ewe flock for 2023 – 2024 in response to the market and seasonal conditions. This may have longer term ramifications than just for the 2024 lamb drop as it can affect the state flock's ability to self-replace with less lambs born. It will also impact the wider industry with less animals for processing and exporting, and less wool produced, as well as impacting secondary industries such as shearing, transport and feed providers.

This computer modelling investigates the impact of reduced ewe joining rates on the flock size over the short term, between 2023-24 and the end of 2025-26.

Scenarios

To investigate the impact of reduced rates of ewe joining, multiple scenarios were run with different joining rates and for varying lengths of time. A baseline model was created to compare the results with.

In addition to changing joining rates, the length of time they were altered for was adjusted under the following scenarios:

- Scenario 1 – the joining rate was altered for one year (2023-24) then returned to 91%.
- Scenario 2 – the joining rate was altered for two years (2023-24 and 2024-25) then returned to 91% for the following year.
- Scenario 3 – the joining rate was altered for all three years (2023-24 to 2025-26).
- Scenario 4 – the joining rate was altered for two years, then returned to 91% for 2025-26, along with an increased loss rate in 2023-24 of 7% to account for the possibility of sheep being euthanised on farm.

The proportion of ewes joined was calculated by dividing the number of ewes joined by the number of ewes on hand. The joining rate was then altered in 5% increments as listed below. Each of these joining rates was examined for each scenario:

- Baseline model – joining rate 91% for all three years.
- Joining rate 85%
- Joining rate 80%
- Joining rate 75%
- Joining rate 70%

Assumptions

- 2022-23 is a projection in order to estimate an opening flock number for the modelling (official data not yet released), while the modelling is for the years 2023-24 to 2025-26 inclusive.
- The percentage of breeding ewes in the flock stays at 54% of the total flock for each year. This equates with ABS figures for 2021-22 as well as the 5-year average.
- The baseline model used a joining rate of 91% for both the 2022-23 projection and the three years modelled. This was the ABS 5-year average.
- The marking rate was 92% for the 2022-23 projection based on good seasonal conditions and high scanning rates but reduced to 90% for the years modelled (2023-24 to 2025-26).
- Total turn-off in 2023-24 was a projection based on year-on-year change using the available published data (July – September).
- Total turn-off in 2024-25 and 2025-26 was 40% of opening number which was the 5-year average using ABS figures.
- Loss rate set at 4% for each year.

Results

Baseline model

For the baseline model in the 2022-23 projection, a 91% joining rate was used as this was the ABS 5-year average and this was carried forward into the three years modelled (Table 1). A marking rate of 92% was used as the ewes were joined following good seasonal conditions and scanning rates were high, however, no official figures have been released. This delivered approximately 5.6 million lambs.

Total turn-off came to 5.58 million head and consisted of lamb slaughter, sheep slaughter, live export and the interstate transfer of sheep. This was 45% of the opening flock size of 12.4 million and 5% higher than the 5-year average turn-off to opening number which implies a selldown of the WA flock occurred. Similar rates of turn-off occurred in 2010-11 and 2019-20. In both cases the flock declined over the course of the year, by 8.5% and 5% respectively.

With a loss rate of 4%, the closing number was 11.96 million head, a decline of 3.7% over the course of the year from 12.4 million. This projection was the base used for each of the scenarios modelled thereafter so each of the scenarios start with the opening number of 11.96 million as of July 2023.

In the baseline model, the flock declined from 11.96 million in the beginning of 2023-24 to 10.85 million at the end of 2025-26, a fall of 9% (Table 1).

Table 1: Baseline model results

	2023-24	2024-25	2025-26
Opening number	11.96	10.94	10.89
Percentage ewes joined	91%	91%	91%
Marking rate	90%	90%	90%
Lambs marked	5.29	4.84	4.82
Turn-off	5.84	4.44	4.42
Losses 4%	0.47	0.45	0.45
Closing number	10.94	10.89	10.85

The largest decline was in 2023-24, as seen in Figure 1, when the flock declined 8.5% from 11.96 million to 10.94 million largely due to a high level of turn-off. The turn-off was estimated based on year-on-year change in the first three months of 2023-24 compared to the year prior and was projected to be 5.84 million. This is likely to change as the year progresses as it was projected on limited data.

Both 2024-25 and 2025-26 declined by 0.4% over the course of the year so were relatively stable with a 40% turn-off to opening number. Lifting the marking rate from 90% to 91% allowed the flock to break even between July 2024 and June 2026 at 11.22 million.

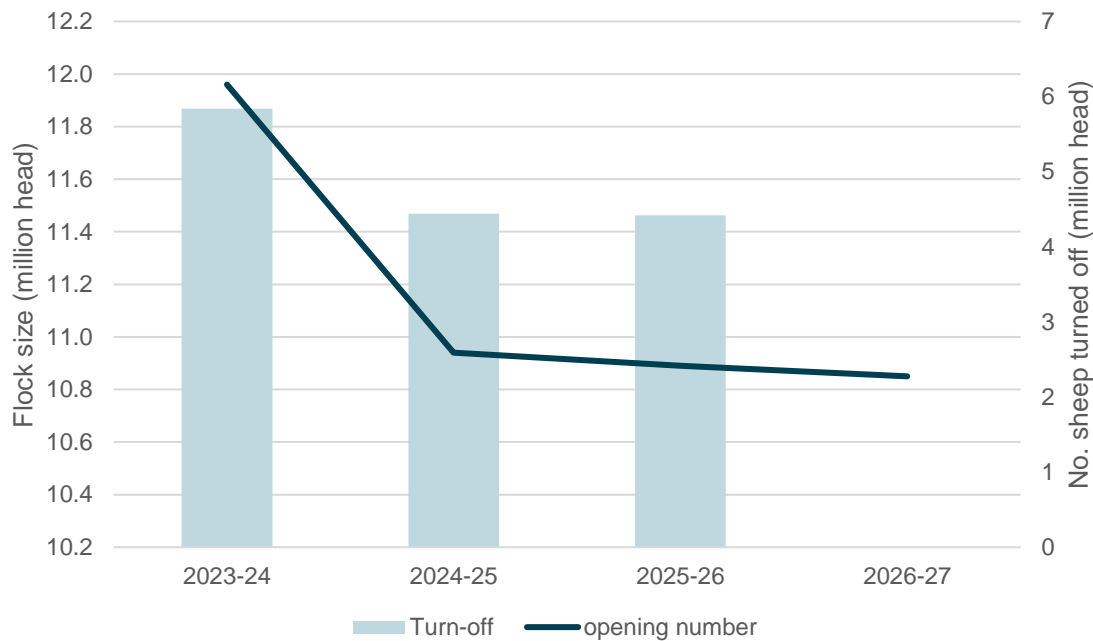


Figure 1: Flock size and turn-off in baseline model in million head.

Scenario 1 – The joining rate was altered in 2023-24 then returned to 91%

In Scenario 1, the joining rate was altered in 2023-24, but then returned to 91% for the following two years. No other changes were made to the model to isolate the impact of the changing joining rate. Seasonal conditions and prices may improve later in 2024 giving producers more confidence and they may return to normal joining rates.

As expected, as the joining rate reduced, the flock size fell more rapidly. When the joining rate fell from 91% to 85% for one year, the flock declined 12% over three years declining to 10.52 million sheep compared to 9% when joining stayed at 91%. When the joining rate fell from 91% to 80% for one year the flock declined 14% to 10.23 million sheep, but when reduced to 70% for one year the flock fell 19% over the three years as illustrated below in Figure 2. A 70% joining rate resulted in a closing number of 9.65 million sheep, bringing sheep numbers back to numbers seen in the 1930's. This would have significant ramifications for the wider industry and regional communities and would put the sheep industry at risk of becoming a boutique industry.

As the model returned to a joining rate of 91% in 2024-25 and 2025-26, there was minimal change in flock size during those years, similar to the baseline model. The flock decline was driven by the decreased joining rate in 2023-24, coupled with the high turn-off that year. Under all joining rates investigated, once it returned to 91% and the turn-off returned to 40% of the opening number, the flock only declined 0.04 million sheep per year (Figure 2).

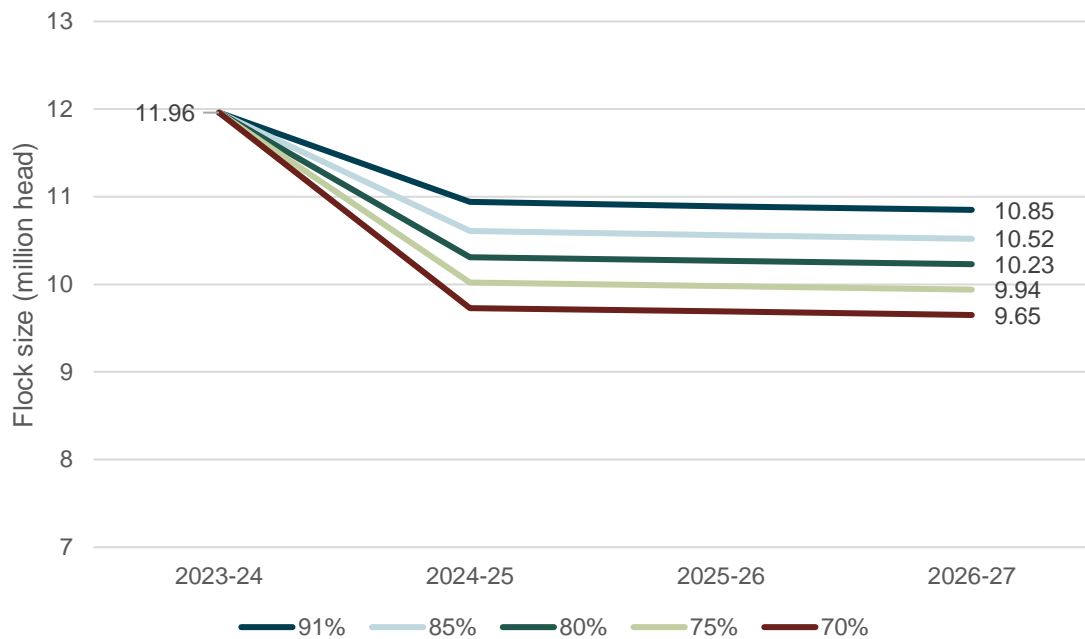


Figure 2: Flock size changes under different joining rates in Scenario 1

A large reason that 2023-24 had the largest flock decline was due to higher turn-off that year. In 2024-25 and 2025-26, turn-off was 40% of the opening number, which was the 5-year average. However, in 2023-24 it was based on year-to-year change as three months of data was available to give direction on what it may look like. The projected turn-off was 49% of the opening number so markedly higher, and also proportionally higher than any time in the last 13 years, indicating a significant destock if it comes to fruition.

Even though the joining rate returns to baseline after one year, unless other changes are made (increased marking rates, less turn-off) the flock is unable to recover. However, if conditions improve along with better price signals, producers may reduce turn-off and begin to rebuild their flocks.

Looking closer at 2023-24 alone, when both the turn-off was high, and the joining rate reduced there was a marked flock decline. When the joining rate was reduced to 85%, the flock declined from 11.96 million to 10.61 million over the course of the year. When it was reduced to 80% the flock declined to 10.31 million (Table 2). For every 5% reduction in the proportion of ewes joined the flock fell by another 0.29 million sheep in 2023-24.

Table 2: WA state flock opening and closing numbers (million head) for 2023-24 at different ewe joining rates.

	91%	85%	80%	75%	70%
2023-24 opening number	11.96	11.96	11.96	11.96	11.96
2023-24 closing number	10.94	10.61	10.31	10.02	9.73
Flock change percentage	-8%	-11%	-14%	-16%	-19%
Flock decline (millions)	-1.01	-1.35	-1.64	-1.93	-2.22

Scenario 2 – the joining rate was altered for two years but returned to 91% in 2025-26

In Scenario 2, the joining rate remained at reduced levels for two years (2023-24 and 2024-25) before returning to 91%, which was the baseline, in 2025-26.

This resulted in a flock decline of between 15% and 27% over the three years if the joining rate was 85% and 70% respectively, compared to the baseline model where the flock declined 9% over that time. Under this scenario, for every 5% decline in joining rate, there was an additional 4% decline in the flock over the three years. For example, when the joining rate was 85% the flock declined 15% to 10.22 million sheep over three years, when decreased to 80% the flock declined 19% to 9.69 million sheep and when the joining rate was further reduced to 75%, the flock declined 23% to 9.17 million by the end of by 2025-26. This resulted in closing flock numbers varying from 10.22 million sheep if reduced to 85% to 8.67 million sheep if reduced to 70% (Figure 3).

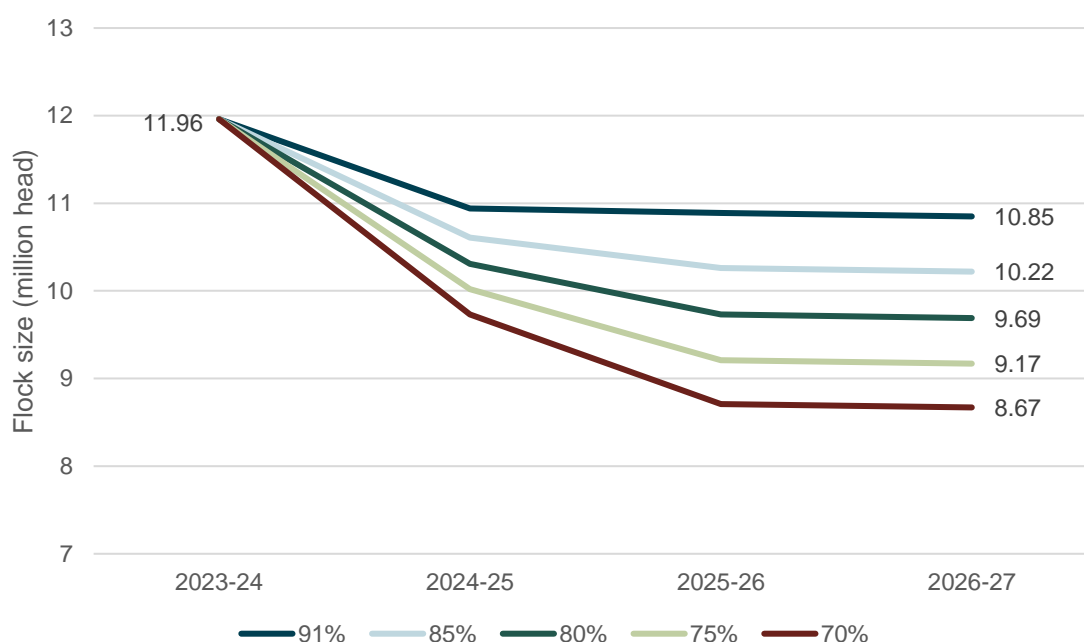


Figure 3: Flock size changes under different joining rates in Scenario 2

Scenario 3 – the joining rate was altered for all three years.

In Scenario 3, the joining rate was altered for each of the years 2023-24 to 2025-26.

In the original model the flock fell 9% between July 2023 and June 2026. Over the same time period, when the joining rate was 85% for all three years, it declined 17% from 11.96 million to 9.93 million head. With a joining rate of 80% the flock declined 23% to 9.18 million, with a joining rate of 75% the flock declined 29% to 8.47 million and at a 70% joining rate it declined 35% to 7.79 million. So, for each 5% reduction in joining rate over the three years modelled, the flock declined a further 6% (Figure 4).

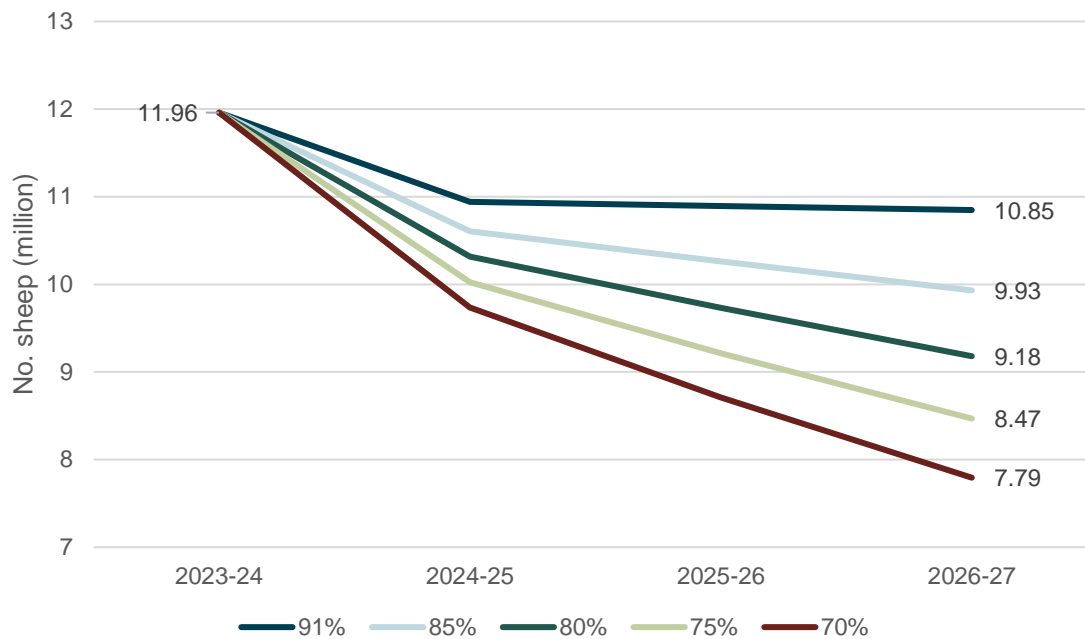


Figure 4: Flock size changes under different joining rates in Scenario 3

Scenario 4 – the joining rate was reduced for two years before returning to 91% in 2025-26 and the loss rate in 2023-24 was increased to 7%

In the final scenario, the joining rate was reduced for the first two years before increasing to the baseline figure of 91% in 2025-26 as in Scenario 2, but the loss rate was increased from 4% to 7% in 2023-24 to account for the possibility of animals being humanely euthanised on farm. This technique is employed as a destocking tool when the price for sheep is low enough that producers would incur a cost by selling as the fee to transport to sale would be higher than the price received for the animal. It is only used in extreme circumstances, however, has been considered by producers given current seasonal conditions and pricing.

As illustrated in Figure 5, this caused the change in flock size at the end of 2025-26 to fall a further 2-3% when compared to the results of Scenario 2.

At a joining rate of 85% for two years before returning to 91%, the flock declined from 11.96 million to 10.22 million (a fall of 15%) in Scenario 2. When the increased loss rate was factored in, the flock fell to 9.87 million, a decline of 17% or 2.08 million head over three years. At a joining rate of 70% in Scenario 2 the flock declined to 8.67 million, a decline of 27%, however that increased to a decline of 30% and closing number of 8.35 million when the loss rate was changed in this scenario to 7%.

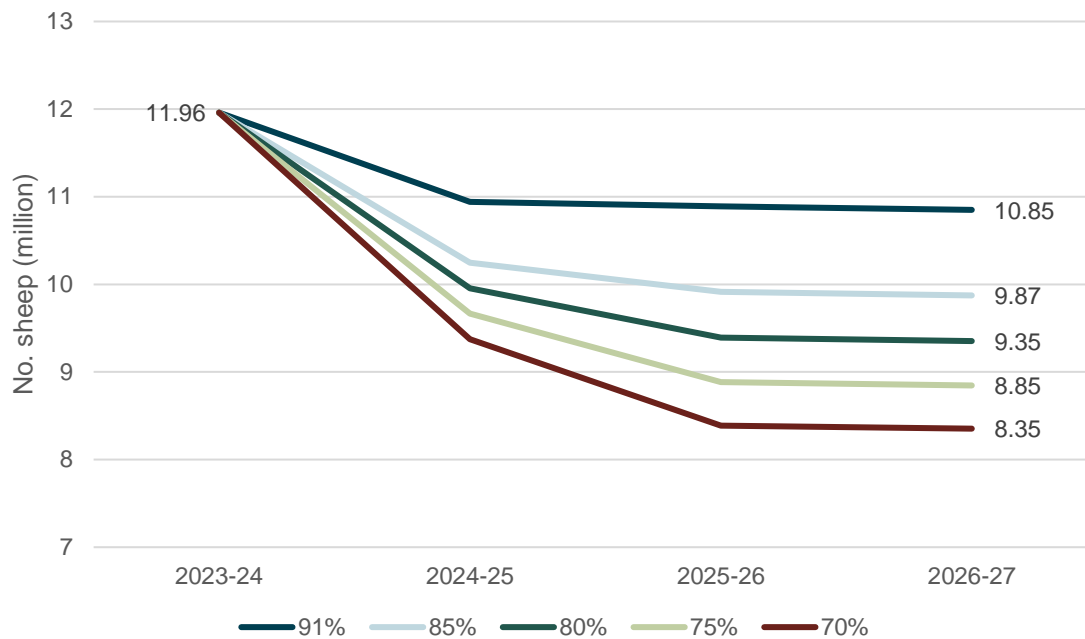


Figure 5: Flock size changes under different joining rates in Scenario 4

Scenario comparison

As the joining rate declined, the impact on the flock increased, becoming more pronounced the longer it occurred. In comparison to the baseline scenario where the joining rate was unchanged at 91%, Scenario 1 had the smallest impact on flock size going forward. When the joining rate only declined for one year before returning to normal, the flock declined 12% from 11.96 to 10.52 million over the three years under an 85% joining rate (Figure 6).

In comparison, when the reduced joining occurred for two consecutive years (Scenario 2) the flock declined 15% from 11.96 million to 10.22 million by the end of 2025-26 under 85% ewe joining, and when the joining rate was reduced for all three years in Scenario 3 the flock declined 17% from 11.96 million to 9.93 million over that time under 85% joining. When the loss rate was increased from 4% to 7% in 2023-24 while the joining rate was reduced from 91% to 85% for one year in Scenario 4, the results were quite similar to Scenario 3 with the flock declining 17% to 9.87 million sheep.

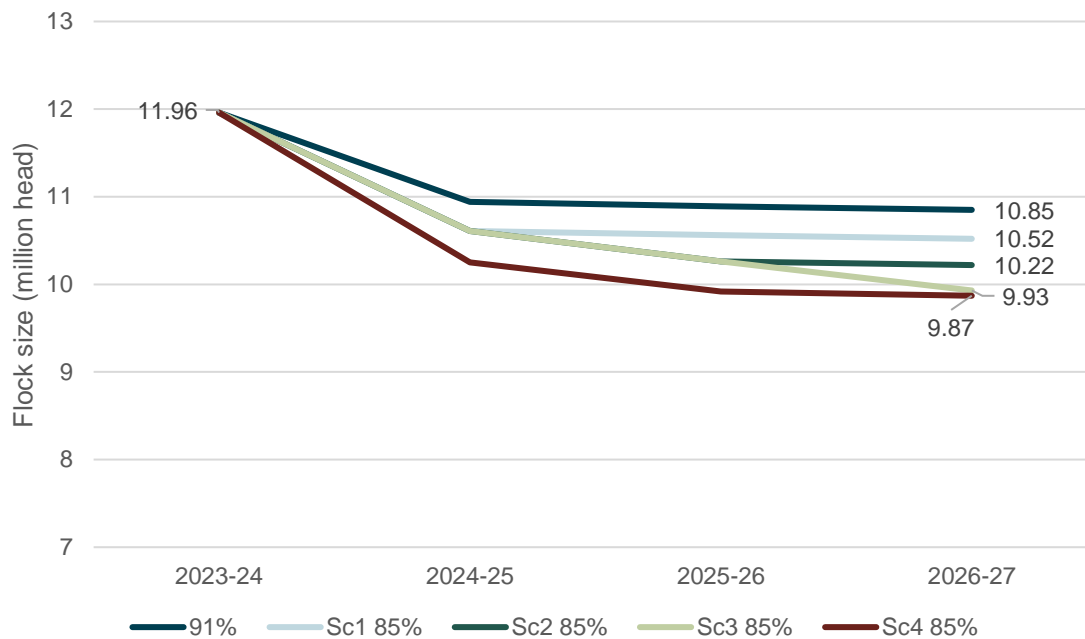


Figure 6: Comparison of the flock size of the baseline (91%) to each of the scenarios (Sc) at an 85% ewe joining rate.

As illustrated in Figure 7, the results become more extreme when the joining rate is reduced further, to 70%.

In Scenario 1 the flock declined 19% from 11.96 million to 9.65 million sheep over the three years under a 70% joining rate. Scenario 2, where the joining rate was reduced to 70% for an extra year, resulted in the flock declining 27% to 8.67 million, whilst Scenario 3, where the joining rate was reduced to 70% for all three years, resulted in the flock falling 35% from 11.96 million to 7.79 million.

The extra year of reduced joining also had a more detrimental effect than increasing the loss rate from 4% to 7% in the first year combined with two years of reduced joining (Scenario 4) at a 70% joining rate. In that instance, the flock declined from 11.96 million to 8.35 million, a fall of 30% rather than 35% which was seen when the joining rate stayed low for all three years (Figure 7). This was because in Scenario 4 the joining rate returned to 91% in 2025-26 allowing the flock to plateau, whereas in Scenario 3 it didn't get this opportunity as the joining rate stayed at 70% for the final year modelled.

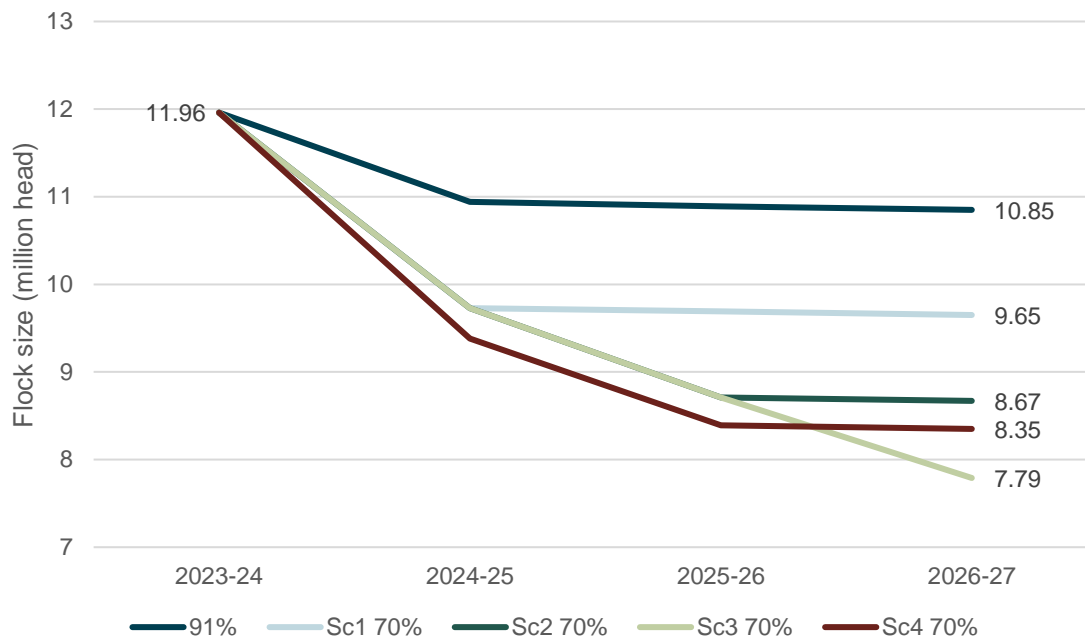


Figure 7: Comparison of the flock size of the baseline (91%) to each of the Scenarios at a 70% ewe joining rate.

Conclusion

This modelling investigated the impact of reduced ewe joining rates on the WA sheep flock over the short term, between 2023-24 and 2025-26. The longer the reduced rate of ewe joining occurred and the lower the rate of joining, the more severe the impact on the state flock. This was compounded by high turn-off rates and high loss rates which made it very difficult for the flock to recover. At best, when the joining rate declined for one year to 85% before returning to baseline, the flock declined 12% from 11.96 to 10.52 million over the three years modelled. The worst-case scenario occurred when the joining rate was reduced for all three years to 70% rather than 91%, which resulted in a 35% flock decline from 11.96 million sheep to 7.79 million sheep by the end of 2025-26.

Despite the pessimism in the industry currently, it is likely that after 1 – 2 years of reduced ewe joining rates and high levels of turn-off, producers may start looking to rebuild flocks. Seasonal and market conditions may have improved, allowing producers to feel more confidence in the industry. It is also likely that producers who intended to exit the industry would have done so by this time.

Possible avenues to grow the flock include increasing joining rates and reducing turn-off by either keeping older ewes that would normally be sold, keeping more ewe lambs/hoggets and/or keeping more wethers.

Regrowing flocks when conditions improve may be a slow process due to the loss of replacement ewes in the short term, and may also involve reduced income if producers need to reduce the number of animals turned off. This is on top of the reduced turn-off they may experience whilst reducing joining rates due to a declining flock. Our [Sheep Flock Composition Calculator](#) can help producers determine the effects of reduced ewe joining on their flock structure to help plan for the longer term.

The decision whether to reduce joining rates is highly dependent on the individual enterprise. While this modelling provides indications of possible sheep numbers going forward under various scenarios at the state level, enterprises will have considered their

individual circumstances including feed and water supplies at hand, cashflow constraints and long term objectives in the decision-making process.

Further information for producers relating to seasonal management of sheep can be found in the [Livestock Management 2023-24](#) report, along with a collection of resources on our [Season 2024 webpage](#).

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