FACT SHEET
RAPID HERD RECOVERY
NORTHERN NSW
2023-25

Rapid Herd Recovery

Combining genomic and reproductive technologies for beef resilience and productivity after drought

The Rapid Herd Recovery project evaluated the potential impact of combining current and emerging technologies to accelerate breeding herd capacity through genomic selection, FTAI joining of heifers and increasing the female-to-male ratio of calves.

WHAT IS THE ISSUE WITH CURRENT PRACTICES?

Returning to optimum herd productivity and capacity remains one of the key challenges after drought. When favourable conditions return, producers seek to increase breeder numbers, often at record high prices, which can delay restocking and therefore cash flow and business recovery.

Producers at the end of a drought face significant decisions with regards to herd rebuilding. Regaining breeding herd numbers and performance after drought (or other significant climatic events) is key to cashflow for all beef producers. There are two options that producers can use to increase breeding herd numbers.

- Breed and retain more females. This comes at a cost with loss of immediate cash flow (not selling animals) and a potential reduction in genetic selection pressure.
- Purchase in breeding females. This has inherited risks associated with biosecurity and disease management and the fact that purchased females may not have the desirable genetic profile required for the herd. Furthermore, the value of breeding females appears to be the most volatile during and after drought.

The limitations of both these recovery strategies suggested technologies that could increase the female:male ratio in a cohort, while ensuring that calves born meet an optimal genetic profile, would be worth exploring for drought recovery and resilience. Optimising reproduction in yearling heifers also offers greater opportunity to breed from the best genetics in the herd, increasing genetic gain rates.

In 2023 and 2024, the Rapid Herd Recovery project completed a proof-of-concept demonstration and economic analysis of linking three (3) commercially available technologies to assist rapid beef herd recovery after drought.

The technologies trialled were genomic profiling of replacement heifers, Fixed Time Artificial Insemination (FTAI), using frozen female sexed semen.

A benefit cost analysis was undertaken to assist beef producers applying advanced breeding technologies to accelerate the breeding potential and production capacity of the herd, specifically after periods of drought (or extreme weather events such as fire and flood) when cash flow and financial decisions are paramount.

THE PROJECT

This producer demonstration trial was initiated by the University of New England-hosted Armidale Node of the SQNNSW Innovation Hub, funded by the Australian Government's Future Drought Fund, to quantify the potential of combining technologies to accelerate breeding herd capacity through effective selection and joining of heifers.

The project is being conducted on four (4) properties in the Northern NSW region that have self-replacing Angus herds focused on building herd capacity.

On each property, the trial compared the performance of 100 genotyped heifers joined via FTAI to high merit bulls with female semen, with 100 heifers naturally mated on farm.

The heifers were selected with the assistance of genomic selection using the HeiferSELECT DNA test provided by Zoetis and Angus Australia. All heifers mated in the trial and the resulting female calves from the female sexed semen and backup bulls were genotyped to provide genomic analysis and to ensure sire verification.

The Rapid Herd Recovery project was hosted by the Armidale Node of the SQNNSW Innovation Hub, with events and activities supported by NSW Local Land Services and Rural Aid.

Australian Government
Department of Agriculture, Fisheries and Forestry
Future Drought Fund
University of Southern Queensland
une University of New England
RURAL aid
NSW GOVERNMENT
SQNNSW Innovation Hub

The SQNNSW Innovation Hub receives funding from the Australian Government's Future Drought Fund.

DEMONSTRATION SITES | RESULTS

FTAI and frozen female sexed semen were successfully used to introduce new genetics and stimulate a greater ratio of female calves in all four herds, although a small proportion of male calves were born in each herd from the AI cohort. Semen companies are working (as at early 2026) to guarantee 95% female calves from use of female sexed semen in future.

Despite additional costs, the benefit cost per head when compared against the genetic merit of the heifers produced, suggest that it is a viable option. Notably while female sexed semen offers benefits, its use in beef heifers is limited when reduced conception rates occur.

Genomic tools like HeiferSELECT were shown to be useful in predicting the genetic merit of heifers prior to joining, allowing effective mating to the most appropriate bulls. The potential economic impact of genomic selection is significant, with large differences in profitability between the highest and lowest performing heifers.

The project provided important knowledge for producers attempting to rebuild herd capacity, effective breeding cow numbers and cash flow after drought. The key bottom line is that commercial producers must way up the benefits of increased heifer numbers and selection intensity against increased calf costs associated with FTAI and female sexed semen.

Given there was a unilaterally common empty rate of approximately 20% across all four well managed herds and across the two seasons (after accounting for AI and backups), further research and development (R&D) should be considered to determine what additional factors (outside of genetic parameters and body weight) may be limiting conception rates of heifers in beef herds.

In Australia, the National Herd Improvement Association of Australia (NHIA) publishes recommended protocols for use in dairy heifers and cows, and for sexed and conventional semen.

Those protocols are continuing to evolve as new R&D emerges, particularly with respect to female sexed semen (both frozen and the recently available option of fresh sexed semen). Commercial breeders that are using or considering the use of female sexed semen (and male) should discuss the relative merits of current recommendations and work with AI practitioners to ensure that those protocols deliver the best results.

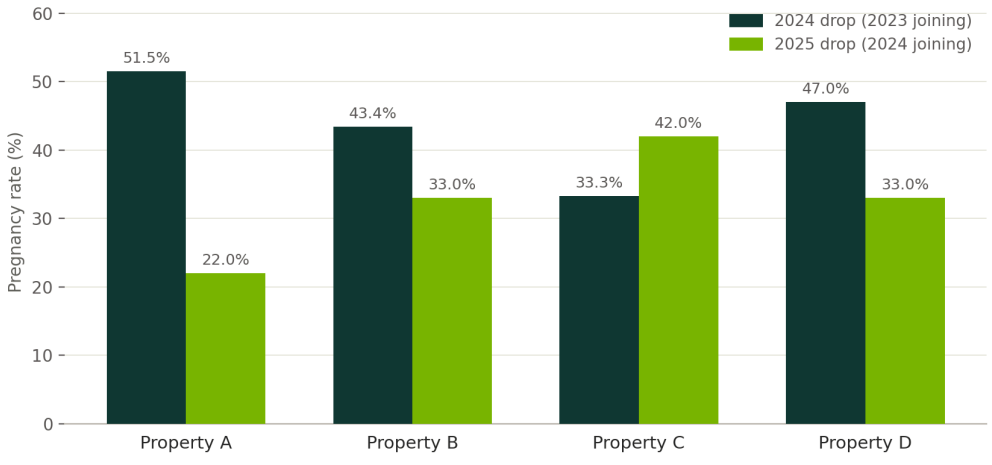
This project was undertaken in well managed Angus herds in NSW. The application of female sexed semen in Northern environments may require greater management and planning but should still be considered as a viable option for herd recovery after natural disasters (including fire and floods).

CONCEPTION RATES | FEMALE SEXED SEMEN IN AI

Figure 1

Conception rates from frozen female sexed semen by property and season

Ultrasound-confirmed pregnancy rates (%) — AI cohort only



Note: The 2024/25 season saw above-average rainfall and significant clover growth, likely reducing conception rates across most properties. Property C's improvement was attributed to a change in AI protocol.

The season in 2024-25 was significantly different to the previous one, with well above average rainfall and a spring that promoted significant clover growth. Consensus at the March 2025 field day on the Cobbadah NSW demonstration site suggested that the reduced conception rates may have been due to excessive clover (protein) in pastures.

The increase in conception rates for property C was attributed by the manager to a change in AI protocol.

DEMONSTRATING IMPACT

To demonstrate the impact of sexed semen, a case study was developed for a 400-cow herd that had been reduced by 60% to 240 cows during drought. An analysis shows that if female sexed semen was used in available heifers (100), herd recovery would be achieved in three years compared to four years if using natural mating.

The results from the project indicate the following:

- There is still a significant difference in pregnancy rates when using conventional and frozen female sexed semen
- Joining older cows resulted in higher conception rates when using AI
- The protocols used for AI are varied across AI practitioners and it is important that producers considering AI programs work diligently with their practitioners to achieve the best result
- Seasonal influences on nutritional profiles both prior to AI and after AI do have an impact on success of conception. Managing those profiles is important
- There are significant sire differences in conception rates within and across herds that indicate success is affected by differences in protocols and viability of the semen
- Live weight at joining did not appear to have a significant impact on conception rate (either AI or backup), which suggests that there are other factors influencing fertility in heifers
- Predicting AI success with female sexed semen is not possible.

IMPACT ON HEIFER DYSTOCIA

Anecdotally all four property owners/managers believed that first calving heifers having heifer calves reduced the prevalence of dystocia in the herd.

Further results from recent scanning in 2025/26 suggests that heifers that rear heifer calves are more likely to conceive to AI or join in the first two cycles in subsequent joinings.

BENEFIT COSTS ANALYSIS | FROZEN FEMALE SEXED SEMEN AND AI

Notably the costs of each AI program varied due to the practitioner, the protocols and the semen used. Indicative prices for each of the components of the program were used in the analysis.

The cost of a female AI calf on the ground was $268.89 AUD compared to the cost of a natural mated calf at $173.61 (with bulls valued at $12,500).

The weighted average cost of an AI/backup calf is $227.20 compared to the natural mate of $173.61, equating to a $53.59 cost difference. Noting that there is the potential to reduce this difference if back up bull requirements are reduced further than the 50% assumption used in this analysis.

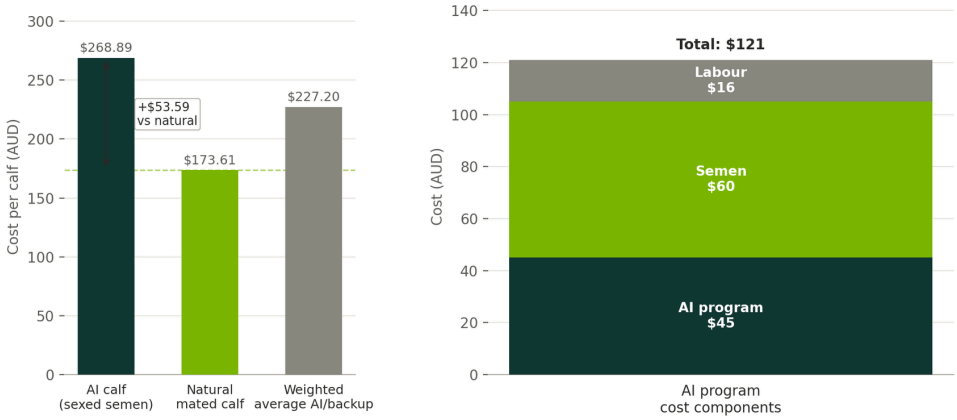
For comparative purposes, if a female sexed semen AI calf cost $53.59 more to produce, then using AI sires in the top 5%, relative to breed average, would recoup the additional cost through increased production, based on the current differentials for the Angus $ index (July 2025)[1].

If that cost was reduced to a difference of $21.04 by using fresh female sexed semen (with assumed higher conception rates), the sire differential would only have to be top 25% relative to breed average to recoup the additional costs associated with AI and female sexed semen.

Figure 2

Cost per calf on the ground — AI with female sexed semen vs natural mating

Indicative AUD costs per head (bulls valued at $12,500, joining rate 30:1)



Note: Using fresh sexed semen (higher assumed conception rates) could reduce the cost difference to ~$21.04, requiring only top-25% sire genetics to recoup the additional investment.

[1] Percentile bands for Angus-bred calves, updated fortnightly at https://angus.tech/enquiry/animal/ebv-percs

GENOMIC SELECTION AND HEIFERSELECT

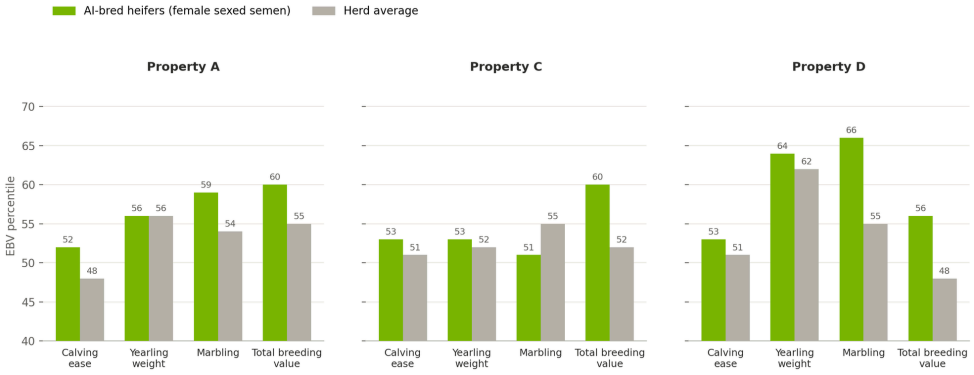
In three herds, performance of female sexed semen sired heifers relative to herd performance was higher for all key traits and the index (except marbling in C). This suggests that not only did each herd achieve the goal of producing more heifers, but they were also genetically better than the herd average and therefore have a higher potential to be retained in the herd.

Based on the genetic effects table for HeiferSELECT a difference of 5 units in TBV equates to a difference of $18.90 per year or $151.16 over an 8-year expected breeding lifetime. This project estimates that a female sexed semen AI calf cost an additional $53.59, therefore achieving a 2.8:1 return on investment.

Figure 4

Genetic merit of AI-bred heifers vs herd average — key traits

Mean EBV percentile scores for calving ease (CE), yearling weight (YW), marbling (MB) and total breeding value (TBV). Higher = better.



Note: AI-bred heifers outperformed herd averages across most key traits in all three properties. A 5-unit TBV difference = est. $151.16 advantage over 8-year breeding lifetime. Against an additional cost of $53.59/AI calf, this represents a 2.8:1 return on investment.

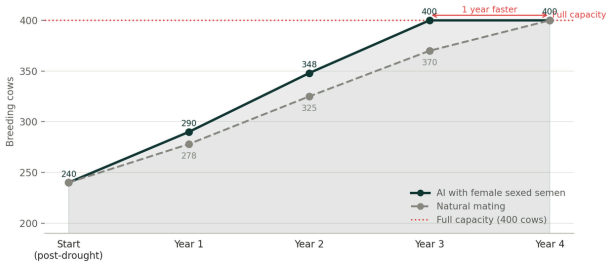
TAKE HOME MESSAGES | WHAT TO CONSIDER ON YOUR FARM

- There are many factors that affect the success rate of female sexed semen in AI programs. Working with experienced AI practitioners, using multiple bulls, ensuring compliance with chosen protocols and managing nutritional profiles both prior to and after AI are key steps to ensure success.
- This trial was undertaken with frozen female sexed semen. Recent technology developments suggest that the use of fresh female sexed semen may result in higher conception rates.
- The use of sexed female semen has the potential to reduce dystocia in beef heifers. That reduction should be considered when evaluating the benefits of female sexed semen.
- Addressing the causes of a 20% empty rate in well managed beef heifers requires further research.
- Commercial breeders should consider the benefits of increasing heifer numbers and selection intensity against increased calf costs associated with AI and female sexed semen. If recovery from drought is a key driver for the business, then female sexed semen is a viable option.

Figure 3

Herd recovery trajectory after drought — AI vs natural mating

Modelled on a 400-cow herd reduced to 240 cows (60%) during drought



Using female sexed semen via AI achieves full herd recovery in 3 years — one year faster than natural mating.

- Genomic tools such as HeiferSELECT offer opportunities for selection of higher merit heifers before joining and allocation to the most appropriate sires.
- Breeders selecting bulls for use in AI should be aware of their own herds performance to ensure that the genetic introductions are complementary and will provide a return on investment.

MORE INFORMATION

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MORE RESOURCES

Case studies
https://bit.ly/rhr2026