

## Selection and Management of the Maiden Heifer



### FAST FACTS

- Rib Fat EBVs are indicators of genetic differences in rib fat depth (mm) if measured on a standard 300kg carcass
- Heifers with high Rib Fat EBV had higher pre-joining rib fat depth
- High Rib Fat EBV Angus heifers had higher conception rates than low Rib Fat EBV Angus heifers
- On average, Angus heifers with 4mm of rib fat at joining achieved 89% conception rate and genetically fatter heifers were more likely to achieve this fatness level
- Eye Muscle Area EBV was not associated with heifer conception rate
- Using an overall selection \$index identifies animals with high genetic value for a range of traits including reproductive rate and carcass quality

**Reproductive rate is critical for cow-calf producers because of its effect on efficiency and profitability of beef production. Beef CRC research indicates that ensuring heifers have sufficient energy reserves at first joining is important in achieving high conception rates.**

#### The importance of the maiden heifer

Replacement heifers represent the newest genetics within your herd. Therefore managing the maiden heifer has significant implications on herd profitability, productivity, herd age structure and overall herd genetic gain.

#### The research

As part of the Beef CRC Maternal Productivity research program, 391 Angus heifers specifically selected to be divergent in BRREDPLAN Rib Fat EBV were monitored for reproductive performance at two sites, Struan Research Centre, in the south east of South Australia, and Vasse Research Station in south west Western Australia.

The average Rib Fat EBV for the high Rib Fat EBV line of heifers was +1.0mm, compared with the average for the low Rib Fat EBV line of -1.3mm. Both lines were substantially different to the Angus breed average, which is -0.1 mm for 2010 born calves. They represent approximately the highest and lowest 10% of the Angus breed for Rib Fat EBV.

At both Struan and Vasse, the two heifer lines were managed together during mating and throughout the year to ensure they experienced the same nutritional and environmental conditions. Any differences in conception rates could therefore be attributed to genetic factors. Heifers were joined for 9 weeks with pre-joining weights of 360kg and 363kg for the high Rib Fat EBV and low Rib

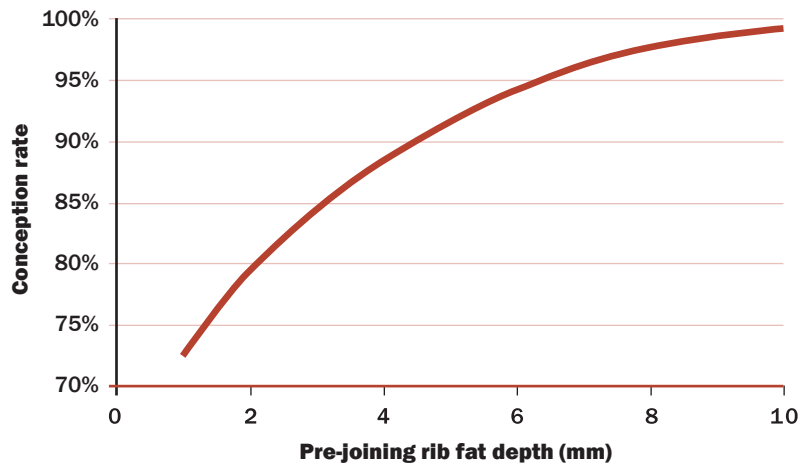
Fat EBV lines respectively (Table 1). Despite the lines being nearly identical in weight, the high Rib Fat EBV heifers had 0.9mm or 25% more rib fat (4.5mm vs. 3.6mm) as measured by ultrasound scanning.

**Table 1:** Age, weight, rib fat depth at joining and conception rate for high and low Rib Fat EBV heifers

Heifer group	Pre-mating Age (days)	Weight (kg)	Rib fat depth (mm)	Conception rate (%)
High Rib Fat EBV	475	360	4.5	91.2
Low Rib Fat EBV	461	363	3.6	83.0

#### Conception rate is highly correlated to rib fat depth

The high Rib Fat EBV line had an average conception rate of 91% compared with 83% for the low Rib Fat EBV line at the same age. As pre-joining rib fat depth increased, so did conception rates, although this was not a straight line relationship (Figure 1). The greatest increases in conception rate were observed at low levels of pre-joining rib fat depth. For example, an increase in pre-joining rib fat depth from 2mm to 3mm was associated with a 6% increase in conception (79% vs. 85%). In contrast, an increase in pre-joining rib fat depth from 8mm to 9mm was associated with less than a 1% increase in conception rate.



**Figure 1:** Conception rate at various levels of pre-joining rib fat depth



**Figure 2:** Heifers grazing at Sturan Research Centre.

### Ensure maiden heifers have sufficient energy reserves at first joining

For the first time, the Beef CRC studies clearly show that heifers with a very negative Rib Fat EBV (that is bottom 10% of the breed) have a greater likelihood of reduced conception at their first joining.

Ensuring maiden heifers have sufficient energy reserves prior to their first joining leads to higher conception rates. Beef producers therefore need to carefully think about the importance of fat in their own production system, particularly for heifers, and develop strategies to ensure that body energy reserves are adequate to achieve high conception rates.

### Breeding objectives and animal selection

With the availability of BREEDPLAN EBVs for a wide range of traits that impact on herd profitability, producers are faced with challenges to implement these tools in a balanced way to ensure selection is targeted at both pre- and post-farm gate profitability. For traits such as Rib Fat EBV, the challenge is to apply a breeding objective that is appropriate for both the target beef market and also the reproductive performance in the cow herd environment.

Importantly, an animal's genetic merit for Eye Muscle Area (EMA) as assessed using EMA EBVs was not related to heifer conception rate. This finding indicates that the differences observed in heifer conception rate were associated with reduced fat rather than genetic merit for EMA.

In terms of breeding, a practical strategy would be to seek bulls with high \$index values for a selection index that suits their current production system and the target market. Producers still need to focus on carcass traits, including retail beef yield, and not just adopt selection strategies that focus on Rib Fat EBV in isolation.

For seedstock producers, the message is to continue to use an overall selection index that incorporates weaning rate. This strategy allows for animals with the best combination of all traits to be identified, including animals that can sustain heifer calving under tight feed conditions.

### Summary

This research has demonstrated that genetically fatter heifers have higher conception rates. Data on mature cow reproductive rate, progeny performance and efficiency of production is still being analysed to determine whether this higher initial conception rate translates into higher long-term on-farm productivity and supply chain profitability.

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