Selecting on heifer puberty

Large variations were observed in age and weight at puberty for the heifers involved in the project (Table 1). Importantly, both age and weight at puberty have moderate to high heritability meaning selection for genetic improvement is possible.

How to determine which heifers reach puberty early?

By implementing a routine management practice of pregnancy testing and recording lactation status, producers can determine when conception occurs in the mating period and identify heifers that were pubertal at the start of mating. For commercial herds that “over-mate” and join more two year old heifers than are required as replacements, heifers that fail to raise a calf to weaning should be culled.

Selecting for shorter post partum anoestrus interval

Post partum anoestrus interval (PPAI) is the time between calving and cycling and is one of the biggest factors affecting annual calf

<table>
<thead>
<tr>
<th>Trait</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at puberty (months)</td>
<td>23</td>
<td>11-40</td>
</tr>
<tr>
<td>Weight at puberty (kg)</td>
<td>332</td>
<td>196-485</td>
</tr>
</tbody>
</table>

FAST FACTS

- Heifer age and weight at puberty are heritable and genetically correlated to female reproductive rate
- Post partum anoestrus interval (PPAI) is the time between calving and resumption of oestrus and is a heritable trait that affects calving rate
- Conducting pregnancy testing and recording lactation status each year can be used to identify non productive breeders
- Identifying and retaining females with favourable performance for age at puberty and PPAI will generate genetic progress
- Genetic progress will be greater when sires are selected with traits that are correlated with age of puberty and PPAI in their daughters

There is a substantial opportunity to improve reproductive performance in northern Australia. This fact sheet details the steps commercial producers can take to identify and select females with superior reproductive performance.

Achieving genetic progress for reproductive rate

Research conducted by the Beef CRC in Brahman and Tropical Composites has shown that key component traits of female reproductive rate have substantial variation between females and are heritable, meaning that genetic progress can be achieved.

Breeding females that conceive early in their first two mating periods, successfully rear their calves to weaning, and continue to consistently produce weaners within a 365 day calving interval have superior reproductive performance. These cows should be identified and retained in the herd. This can be done by pregnancy testing and recording lactation status to identify and remove non-pregnant cows, or those not having reared a calf. Daughters from cows with favourable reproductive performance should be identified and used as replacement heifers provided other important selection criteria such as temperament, structural soundness and growth are met.

The research

Over the last 12 years, the Beef CRC’s Lifetime Reproductive Performance Program has tracked the reproductive performance of heifers from birth to their sixth opportunity to wean a calf. The project involved 1027 Brahman heifers by 54 sires and 1132 Tropical Composite heifers by 51 sires.
Identifying and Selecting Female Cattle for Genetically Improved Reproductive Performance

**Summary**

There are substantial opportunities to genetically improve the reproductive performance of Brahman and Tropical Composite cattle. Management practices such as pregnancy testing and recording lactation status provide an opportunity to apply selection pressure to output in northern Australia. PPAI for first lactation heifers is highly heritable, particularly in Brahmans. Importantly, a favourable genetic correlation exists between heifer age at puberty and PPAI, meaning heifers which reach puberty early are likely to have shorter PPAI and tend to conceive earlier in the second and subsequent mating periods. Cows that conceive in their second joining whilst lactating for the first time have shorter PPAI than cows that fail to conceive. At this point (second joining) PPAI is more heritable than PPAI in older cows. Identifying and retaining first calf cows that can become pregnant whilst lactating will mean desirable genetics are passed on. Conversely, first lactation heifers with a long PPAI will pass on the undesirable genetics for this trait if kept in the herd and perpetuate the problem. Therefore, it is important to identify and retain first lactation heifers that conceive early in the subsequent joining period whilst lactating.

**Using Days to Calving EBVs**

BREEDPLAN Days to Calving (DC) Estimated Breeding Values (EBVs) are estimates of genetics differences for the time (days) from start of joining (bull-in date) to calving for an individual cow. In forming the DC EBV, cows that fail to calve receive a penalty. Most variation in days to calving occurs between start of joining and conception date, although there is also variation in gestation length (a separate EBV). Younger age at puberty and shorter PPAI is associated with shorter, more favourable days to calving.

To calculate the DC EBV requires an accurate birth date for each calf and start of joining details on all cows. It is strongly recommended that seedstock herds supply DC EBVs with sale bulls and females, and that bull buyers request DC EBVs. This will enable beef producers to select animals with superior merit for reproductive rate.

**Identifying and selecting superior females**

- Individual animal identification and recording allows tracking of reproductive history over time enabling more informed selection decisions
- Seasonal mating allows for easier identification of reproductive status of each cow. Without seasonal mating, one years’ calf crop may blend into the next and there is potential to keep heavier weaners (i.e. older at weaning) from cows that are skipping a year, thereby perpetuating poor genetics.
- Pregnancy testing and recording lactation status can be used to identify heifers with younger age at puberty and shorter PPAI
- In bull breeding herds recording information on reproductive rate allows BREEDPLAN EBVs for Days to Calving (DC) and Scrotal Size (SS) to be generated

**Contact Details**

Felicity Hamlyn-Hill  
Beef Enterprise Advisory Services  
Nebo Qld 4742  
Ph: 0428113732  
Email: felicityhamlyn-hill@bigpond.com

John Bertram  
Beef Management and Production Advisor  
Ph: 07 5462 6412  
Email: commpark8@skymesh.com.au