“Swans Lagoon” – Benchmarking and Herd Improvement using GROUP BREEDPLAN

Introduction
Swans Lagoon Research Station is owned and operated by the Queensland Department of Primary Industries and Fisheries (DPI&F). It is located South-West of Ayr, in the harsh ‘dry tropics’, speargrass region of North Queensland. Until recently, the breeder herd has been comprised of a ‘nucleus herd’ of approximately 150 breeders and a commercial research herd of approximately 1500 mated breeders.

The Swans Lagoon herd had been closed to outside ‘genetics’ for approximately 30 years. Past research on the property has focused on traits that had not required the importation of new ‘genetics’.

In 2004, the DPI&F decided it would be beneficial to (1) benchmark the herd against a similar Industry breed, and (2) objectively improve production traits in the herd. During discussions with Tropical Beef Technology Services (TBTS) and the Droughtmaster Breed Society, it was decided that the Swans Lagoon herd should join Droughtmaster GROUP BREEDPLAN to accomplish this goal. Droughtmasters are the closest comparable genotype to the Swans Lagoon genotype and it was therefore most appropriate to commence a genetic analysis with that society.

Weight performance data for 8 calf drops (1997 to 2004) was included in the 2004 Droughtmaster GROUP BREEDPLAN analysis. The resultant EBVs were considered within-herd only as the Swans Lagoon herd had no genetic linkage to existing Droughtmaster BREEDPLAN herds.

To produce the required genetic linkage, an artificial insemination (AI) program has been undertaken with sires that have been used in other Droughtmaster GROUP BREEDPLAN herds. In the first year, approximately 200 females were inseminated to existing Swans Lagoon sires and “select” Droughtmaster sires. Existing Swans Lagoon sires were used so direct comparisons could be made between their progeny and the progeny of outside Droughtmaster sires. An additional 200 Swans Lagoon breeders were single sire mated to either Swans Lagoon or Droughtmaster sires in the first year.

The Droughtmaster AI sires were selected with input from DPI&F staff, Droughtmaster breeders and TBTS. The selection criteria for the bulls were:

- Top 25 % and higher for growth and Scrotal Size EBVs;
- High accuracy in EBVs;
- Also to be used in at least 1 other herd producing progeny with EBVs;
• Tidy Sheath;
• Scrotal size above 34 cm at 2 years of age, (depending on nutrition);
• Dam fertility records (emphasis on earlier age at 1st calf and shorter calving interval);
• Pass a bull breeding soundness evaluation (BBSE); and
• Adapted to the harsh North Queensland tropical environment.

Initial Results
One of the main objectives of this activity was to improve the growth performance of the overall Swans Lagoon herd through the BREEDPLAN genetic improvement program. Progress was achieved in the first drop of calves by sourcing and using high growth sires based on Droughtmaster GROUP BREEDPLAN weight EBVs as well as using existing Swans Lagoon sires which were selected for high growth based on within-herd weight EBVs. The impact of using high growth genetics based on EBVs is shown in the Swans Lagoon genetic trend for 600 day weight, below.

![Graph showing genetic trends for 600 day weight](image)

**Figure 1. 600 day weight genetic trends comparing Swans Lagoon and the Droughtmaster Breed.**

The progeny of high growth sires are represented in the 2006 drop calves (2006 Calving Year). The use of these sires has changed the genetic trend of the Swans Lagoon herd from being consistently and significantly below the Droughtmaster breed average for 600 day weight to above the breed average, in one calf drop.

The production gains achieved from using high growth sires selected on EBV performance information can also be observed by comparing the average progeny weights from high growth and low growth (divergent) sires. One high growth Droughtmaster sire used was
WS69977M, with a 600 day weight EBV of +43 kg. The lowest growth Swans Lagoon sire used was PID030002M, with a 600 day weight EBV of +2 kg.

<table>
<thead>
<tr>
<th>Sire</th>
<th>Number of 2006 drop progeny weighed at 600 days</th>
<th>Av. Adjusted 600 day weight of progeny*</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS69977M</td>
<td>16</td>
<td>416 kg</td>
</tr>
<tr>
<td>PID030002M</td>
<td>11</td>
<td>378 kg</td>
</tr>
<tr>
<td>Difference</td>
<td></td>
<td>38 kg</td>
</tr>
</tbody>
</table>

*Weights are adjusted for age at measure (to a standard 600 days) and for age of dam.

The EBVs predict WS69977M will have heavier progeny at 600 days compared to the progeny of PID030002M. This is reflected in the actual progeny difference (Table 1) with progeny of WS69937M weighing, on average, 38kg heavier than progeny from PID030002M.

The actual progeny difference of 38kg is greater than the expected progeny difference of 20.5kg \((43-2)/2 = 20.5\) kg which can be calculated based on simple EBV principles. Over a larger sample of progeny the actual progeny difference would likely move closer to the expected difference predicted by EBVs (ie. 20.5kg). In addition, the genetic contribution of dams is assumed to be equal in the calculation of expected progeny differences, when in practice in the Swans Lagoon herd, there was variation in genetic merit amongst the females. However, the important point to note is that the progeny of the high growth sire outperformed the progeny of the low growth sire based on average 600 day weights, which demonstrates the utility of EBVs in selecting for increased production.

This initiative demonstrates the benefits of applying EBVs as part of the selection criteria to improve economically important production traits such as growth.

TBTS and the Queensland DPI&F will continue to monitor the Swans Lagoon herd to observe the effect of selection on all economically important traits including weight, fertility, temperament and carcase quality. This is in accordance with the QDPI&F mission “to maximise the economic potential of Queensland primary industries on a sustainable basis”. In this situation it is occurring through the use of genetics selection.
Figure 2. The 2006 drop Swans Lagoon calves shortly after weaning.