John Vercoe Memorial Lecture

LEVELS OF PERFORMANCE RECORDING IN THE AUSTRALIAN BEEF INDUSTRY

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SUMMARY

The collection of quality performance data underpins genetic evaluation systems, including BREEDPLAN. This paper provides a snapshot of the current levels of performance recording in the Australian beef industry for a range of BREEDPLAN traits, including growth, carcase, birth and fertility. Levels of performance recording were found to vary depending on a number of factors that included trait, herd, location/breed and sex.

INTRODUCTION

The quantity and quality of performance information recorded by Australian beef producers is a key component influencing the accuracy of the Estimated Breeding Values (EBVs) calculated by BREEDPLAN (Nicol *et al.* 1985) and the level of genetic progress made in the industry. BREEDPLAN is the world's most widely used genetic evaluation system for beef cattle with over 80 breed associations from 12 countries utilising the service. Up to 25 EBVs are published in each BREEDPLAN genetic evaluation, using information from pedigree, performance and, in some instances, genotypes (e.g. Millen and Crook 2019, these proceedings). Southern (SBTS; Millen *et al.* 2018) and Tropical Beef Technology Services (TBTS) are partner projects that provide extension services to large sectors of the Australian beef industry and are joint initiatives of the Agricultural Business Research Institute (ABRI), Meat & Livestock Australia (MLA) and 21 breed associations.

This paper reviews the quantity of performance data that is submitted to BREEDPLAN for the purposes of calculating EBVs from breed associations that are stakeholders in the SBTS and TBTS projects.

MATERIALS AND METHODS

Data. The analysis contained in this paper was carried out on data from individual seedstock herds that were members of SBTS and TBTS stakeholder breed associations. According to the Australian Registered Cattle Breeders Association (2017), these breed associations represent approximately 67% of the total Australian seedstock industry. The beef cattle breeds represented in the SBTS and TBTS projects are:

- **SBTS:** Blonde d'Aquitane, Charolais, Devon, Gelbvieh, Hereford, Limousin, Murray Grey, Red Angus, Red Poll, Salers, Shorthorn, Simmental, Speckle Park and Wagyu.
- **TBTS:** Belmont Red, Brahman, Brangus, Droughtmaster, Santa Gertrudis, Senepol and Simbrah. Simbrah are registered with Simmental and thus included in the SBTS analysis.

Analysis. The BREEDPLAN "Completeness of Performance" (CoP) product (Millen *et al.* 2018) summarises the quantity of pedigree and performance information that has been submitted to BREEDPLAN into a report and a star rating. For participating societies, CoP reports are generated for individual herds when they submit data to BREEDPLAN and once a year for all herds enrolled in BREEDPLAN.

The CoP Report can also be produced for individual breed associations and for SBTS and TBTS stakeholder breed associations. In this paper, the average level of performance recording for the birth

years 2012 to 2016 is reported as a percentage of the total registrations received. Animals under two years of age when the report was generated (August 2018) are not included as those animals will not have been old enough to have had the opportunity to be fully recorded (e.g. 600d weight). Additionally, the performance recording trends from 2004 to 2016 are reported.

The CoP star rating for each herd is calculated based on the proportion of registered calves that have performance recorded for each trait in a five-year period. For this paper, 895 herds were included in the star rating analysis on the proviso that they had joined BREEDPLAN prior to 2016 and had calves registered in their herd between 2012 and 2016.

RESULTS AND DISCUSSION

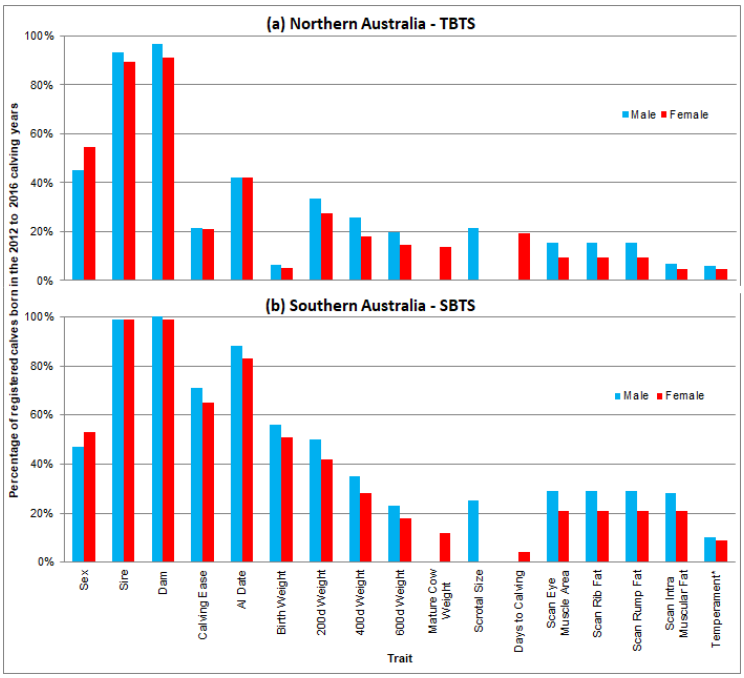
Between 2012 and 2016, there were 381,094 and 267,315 cattle born and registered with the SBTS and TBTS stakeholder breed associations, respectively. The levels of performance recording varied due to a number of factors including trait, herd, location (generalised to northern (TBTS) and southern (SBTS)) and sex. Breed was not specifically analysed as part of this paper but is acknowledged as a further source of variation (unpublished results) due to breed specific objectives and differences in which EBVs are reported for each breed.

The absence of particular EBVs for a given breed does not necessarily represent a lack of interest in the EBV but instead is often due to a lack of trait data for BREEDPLAN to analyse. This chicken and egg scenario - which comes first, the data or the EBV - is a common situation for a number of the smaller breeds. While the BREEDPLAN analysis needs data to analyse, breeders see limited value in recording a trait for which they don't receive an EBV. This situation also occurred with the accumulation of genotypes for the Hereford breed. The growth in the number of genotypes was slow leading up to the implementation of Single-Step BREEDPLAN but the number increased 3.8-fold in the following 17 months after implementation (Millen and Crook 2019, these proceedings).

Three performance recording trends are noticeable across both SBTS and TBTS breeds (Figure 1). The first is that there is a reduction in performance recording as animals get older. This is logical given that animals are removed from the herd for various reasons (e.g. death or sale) with age and thus are not available for recording. Additionally, a higher level of birth trait recording is expected as these traits can be submitted by non-BREEDPLAN members at the time of registration with their breed association. The second trend is that there are approximately 15% more females registered than males and this bias has been consistently observed since 2004. This suggests that some males are not being registered with their breed societies and may reflect a reluctance to register males that will be or have been castrated. The third trend is that the remaining males have higher levels of recording than females. For some traits this is unavoidable (scrotal size) but for other traits there are reasons why this is not ideal. For example, data from ultrasound carcase scanning (scan) of heifers can be more valuable for genetic evaluation than that from bulls. As heifers mature and lay down fat earlier than bulls, they typically have more variation in the scan traits which is valuable to the analysis. Secondly, heifers typically represent a better cross section of the herd as they are subject to less selection pressure than bulls. This reduces selection bias in the data submitted to BREEDPLAN. While Corrigan and Parnell (2006) also observed a reduction in performance recording with age, their results from a similar population (8 southern breeds including Angus but no Wagyu or smaller breeds) found a higher level of registration in males and a generally comparable rate of recording in males and females. One similarity was their observation of a 4% higher level of scan in males than females which is approximately half the difference between the sexes observed in this study.

The differentiation between (a) TBTS and (b) SBTS breeds seen in Figure 1 not only reflects breed type (predominately *Bos indicus* versus *Bos taurus* respectively*)*, but also location (Northern versus Southern Australia). In general, levels of performance recording are lower in TBTS breeds but this is

not true for every trait, for example Days to Calving (DtC). The higher level of DtC recording in the TBTS breeds reflects the desire to address the lower fertility levels typically observed in *Bos indicus* cattle. Birthweight (Bwt) is the trait where the biggest divergence between SBTS and TBTS breeds occurs. This is likely to be in part due to the extensive nature of the northern beef production system making collection of this trait difficult. The recording levels of some traits can also be evaluated in the context of other traits. For example, mature cow weight (MCW) and the 200-day weight (200d) of the progeny should be recorded at a similar time. Therefore, it is interesting that while SBTS breeds record 27% more 200d than TBTS breeds, the recording of MCW is similar (12% vs. 14% for SBTS and TBTS breeds respectively).



* Temperament measurements are flight time in the TBTS breeds and docility scoring in the SBTS breeds

Figure 1. Levels of performance recording in TBTS and SBTS breeds

Previously, Corrigan and Parnell (2006) reported higher levels of Bwt (+7%), 200d (+16%) and scan (+7%) recording than reported for SBTS breeds in this study. This is potentially explained by differences between the two populations in both breed composition and calving years analysed. Analysis of the SBTS breeds CoP trends in the decade subsequent to Corrigan and Parnell (2006) indicate that calving year is unlikely to be a major factor with both Bwt and scan recording increasing (0.9% and 0.5% per year respectively) while 200d weight decreased (0.4% per year).

Across all SBTS & TBTS breeds since 2004, the traits with the biggest increase in recording levels were calving ease (+1.1% per yr) and scrotal size (+0.7% per year). The biggest decrease was observed in DtC, with the TBTS breeds declining by 7% between 2009 and 2010, and SBTS breeds declining by 10% between 2010 and 2013. This decline corresponded with a change in DtC recording requirements to address incomplete recording observed in this trait at the time. While DtC recording in the TBTS breeds has now recovered to pre-2010 levels, the SBTS breeds have remained at 3% to

4% (Figure 1) since 2013. The recovery observed in the TBTS breeds likely reflects fertility being perceived as a larger issue in *Bos indicus* cattle while the lack of response by SBTS breeds may be partially attributed to an increase in the amount of artificial insemination being utilised (DtC records are only currently analysed for naturally mated cows). Increasing DtC recording remains a key extension focus for both SBTS and TBTS.

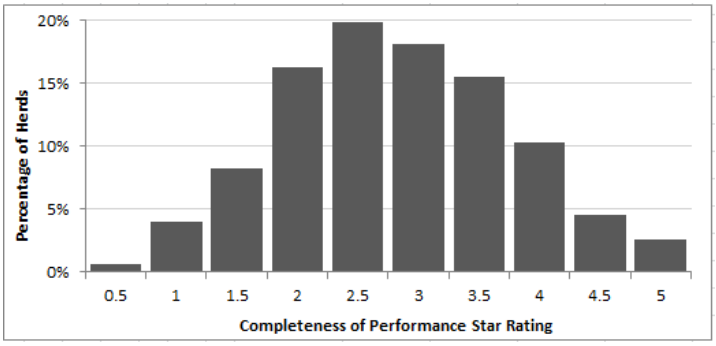


Figure 2. Distribution of individual herds for completeness of performance star rating

The distribution of star ratings (Figure 2) shows the variation in the levels of individual herd recording. While 70% of herds record a moderate level of data (between 2 and 3.5 stars), there are a small percentage of herds at each extreme. Herds do not have to record every trait on every animal to get a 4- or 5-star ratings as this is not always possible. However, these herds are still collecting a considerable amount of performance data across most traits for the majority of their animals. The distribution of star ratings is not breed or region specific; instead, it is observed across all SBTS and TBTS breeds.

CONCLUSIONS

While some herds are doing an exceptional job of collecting performance data, this study has identified that there is considerable room for improvement in the levels of performance recording by the Australian beef industry. The levels of recording were found to vary depending on a number of factors that included trait, herd, location/breed and sex. The recording trends highlighted several important traits, in particular DtC, that should be emphasised in extension messages to breeders.

ACKNOWLEDGEMENTS

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REFERENCES

Australian Registered Cattle Breeders Association. (2017) Annual Report. Armidale.

Corrigan L. and Parnell P.F. (2006) In 'Australian Beef The Leader, The Impact of Science on the Beef Industry', pp. 81-90, CRC for Beef Genetic Technologies, Armidale.

Millen C.A., Gudex B.W., Teseling C. and Skinner S. (2018) *Proc. Wld. Cong. Genet. Appl. Livest. Prod.* **11**:729

Millen C.A. and Crook B.J. (2019) *Proc. Assoc. Advmt. Anim. Breed. Genet.* **23**: *In Press*

Nicol D.C., Graser H-U., Tier B. and Hammond K. (1985) *Proc. Assoc. Advmt. Anim. Breed. Genet.* **5**: 151.