



Final report

Northern Beef Information Nucleus - Brian Pastures Phase 3

Project code: P.PSH.2131
Prepared by: John Croaker
Australian Brahman Breeders Assoc. Ltd
Date published: 30 June 2022

PUBLISHED BY
Meat & Livestock Australia Limited
PO Box 1961
NORTH SYDNEY NSW 2059

This is an MLA Donor Company funded project.

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

This publication is published by Meat & Livestock Australia Limited ABN 39 081 678 364 (MLA). Care is taken to ensure the accuracy of the information contained in this publication. However MLA cannot accept responsibility for the accuracy or completeness of the information or opinions contained in the publication. You should make your own enquiries before making decisions concerning your interests. Reproduction in whole or in part of this publication is prohibited without prior written consent of MLA.

Abstract

Genomic selection provides the potential to increase the accuracy of selection and genetic gain in beef cattle. To achieve this outcome a Reference Population of genotyped animals with phenotype data on the traits of interest is required.

This project adds value to the “Repronomics- Building and delivering effective genomic selection for northern Australian cattle” project by taking the Brahman, Droughtmaster and Santa Gertrudis steer progeny from Brian Pastures Research Station, Gayndah and collecting data on additional traits.

Additional weight, carcass, meat quality and structural soundness data is collected to expand and balance the traits available for selection with the female reproduction traits from the Repronomics project in the Reference Population of the participating breeds and contribute valuable data towards enabling the northern multi-breed project.

The project has enabled the introduction of the Single Step method of blending genomics into BREEDPLAN in the Brahman and Santa Gertrudis breeds and the Droughtmaster BREEDPLAN Single Step genetic evaluation is under development.

More data is needed in all three breeds to improve the accuracy and increase the genetic diversity of the Reference Populations.

Executive summary

Background

The project has continued to build capacity and broaden the genetic diversity of phenotypic carcass and meat quality traits in the Brahman, Droughtmaster and Santa Gertrudis breed Reference Population databases which are not yet at an optimum level for Single Step genetic evaluations. It is part of a longer running project for which a funding proposal until 30 June 2025 is being processed.

- Stud and commercial Brahman and Droughtmaster breeders will be able to use the technology to produce Genomic Breeding Values (GBV's) on animals being considered for selection in breeding programs without the need for collection of BREEDPLAN data.

Objectives

- Collect carcass and meat quality phenotypic measurements on the steer half sib male progeny of females measured in the female reproduction project (MLA B.NBP.0759) undertaken by Dr David Johnston.
- Contribute to the BREEDPLAN carcass data on Brahman, Droughtmaster, and Santa Gertrudis cattle by adding both to the number of records and diversity of sires.

Methodology

The Brahman, Droughtmaster and Santa Gertrudis steers bred at Brian Pastures Research Station, Gayndah and owned by the QLD Department of Agriculture and Fisheries are purchased by the Australian Brahman Breeders Assoc. (ABBA), Droughtmaster Stud Breeders (DSBS) and the Santa Gertrudis Research Herds group respectively after weaning. Each draft of steers is backgrounded at Warraka, Taroom and turned off before the oldest steers are about 32 months of age. Additional weight, carcass scan, direct carcass, meat quality and structural soundness data is collected, transferred to the Animal Genetics and Breeding Unit (AGBU) multi-breed database, and analysed in BREEDPLAN.

Results/key findings

During the 12 months period this project ran, 400-day weight data was collected on 47 Brahman, 40 Droughtmaster and 56 Santa Gertrudis No 21 steers. In addition, pre-slaughter weight and carcass scans as well as direct carcass data was collected on 55 Brahman, 40 Droughtmaster and 62 Santa Gertrudis No 20 steers ahead of schedule.

Benefits to industry

The benefits to industry are higher accuracy GBV's for carcass and meat quality traits for the Brahman, Droughtmaster, and Santa Gertrudis breeds from their Single Step BREEDPLAN genetic evaluations.

Future research and recommendations

Research as indicated about 4,000 records of the traits of interest are required in a Reference Population to provide GBV's with a reasonable level of accuracy. The Brahman, Droughtmaster and Santa Gertrudis Reference Populations are well short of the optimum number of records for the carcass and meat quality traits. A funding proposal to continue the project until 30 June 2025 to

allow the No 21, 22 and 23 drop Spyglass steers to be followed through to slaughter with relevant data collection is currently being processed

Table of contents

Executive summary	3
1. Background	6
2. Objectives.....	6
3. Methodology	7
4. Results	8
5. Conclusion	8
5.1 Key findings	8
5.2 Benefits to industry	8
6. Future research and recommendations.....	9
7. References	9

1. Background

Brahman, Droughtmaster, and Santa Gertrudis cattle represent a significant proportion of the Australian beef industry particularly in northern Australia. The key economic drivers for the northern industry are survival, reproduction, weight gain, carcass and product quality and market suitability. The project aims to use the steer progeny from a research project collecting data on reproduction and weight gain to collect data on carcass and product quality and market suitability and will provide data to balance the suite of traits relevant to the beef industry in northern Australia.

The project is an extension of the Australian Brahman Breeders Assoc LTD, Droughtmaster Stud Breeders Society LTD Beef Information Nucleus (Project P.PSH.0743).

The project will continue to build capacity and broaden the scope of phenotypic carcass and meat quality data in participating breeds which are not yet at an optimum level for Single Step genetic evaluations.

Research has indicated about 4000 genotyped animals with a phenotype record for each trait are required to give Genomic Breeding Values (GBV's) with a reasonable level of accuracy.

The current level of recording for the participating breeds with genotype and phenotype records particularly for carcass meat science traits are still well below the numbers required.

This proposal is closely linked to proposal "Northern Beef Information Nucleus (Spyglass) Phase 3 Extension – P.PSH.0743", the difference being, this proposal incorporates Brahman, Droughtmaster and Santa Gertrudis cattle and therefore different project partners.

2. Objectives

- Collect carcass and meat quality phenotype measurements on the steer half sib male progeny of females measured in the female reproduction project (MLA B.NBP.0759) undertaken by Dr David Johnston.
- Contribute to the BREEDPLAN carcass data on Brahman, Droughtmaster, and Santa Gertrudis cattle by adding both to the number of records and diversity of sires.
- Contribute to the BREEDPLAN carcass data resources for the validation of Beef CRC prediction equations and the Single Step method of incorporating genomics directly into BREEDPLAN.
- Contribute to the data necessary to undertake an across breed genetic evaluation with Brahman, Droughtmaster and Santa Gertrudis cattle or a multi breed evaluation involving Brahman, Droughtmaster, Santa Gertrudis and other breeds.
- Collect genomic data on Bos indicus content and tenderness markers that can be used to look at correlations between hump height and shear force with the genomic data
- Benchmark variations in Bos indicus content within the Droughtmaster breed
- Evaluate the relationship between Bos indicus content, hump height and shear force within the Droughtmaster breed.

3. Methodology

It is proposed the Brahman, Droughtmaster and Santa Gertrudis steers bred at Brian Pastures Research Station, Gayndah and owned by the QLD Department of Agriculture and Fisheries will be purchased by the Australian Brahman Breeders Assoc (ABBA), the Droughtmaster Stud Breeders Society (DSBS) and the Santa Gertrudis Research Herds group respectively.

Each draft of steers including the No 21's will be backgrounded at Warraka, Taroom and turned off before the oldest steers are about 32 months of age.

If possible, they will be finished on pasture, however if seasonal conditions are unfavourable and this strategy is likely to compromise data quality, they will be lot fed.

The ABBA have a long term agistment agreement with Trent and Anna Radel, Warraka, Taroom to take the three drops of steers on Agistment (subject to availability of feed).

The Brahman steers are by registered Brahman bulls, the Droughtmaster steers by registered Droughtmaster bulls and the Santa Gertrudis steers are by registered Santa Gertrudis bulls selected by Dr David Johnston, Principal Research Scientist, Animal Genetics and Breeding Unit (AGBU) to broaden the database of genotyped and phenotyped animals in the respective breeds.

The original Brahman cow herd was the CSIRO Belmont stud herd, and the Beef CRC cows, and the original Droughtmaster base herd was the Swans Lagoon herd. These cows have been joined to industry sires which have been recorded in the AGBU multi-breed database and analysed in BREEDPLAN.

There is therefore a significant amount of performance information behind the steers being evaluated and good linkage to the Beef CRC data.

The selection of influential sires with high accuracy phenotypic data will significantly improve the Single Step method of incorporating genomics into BREEDPLAN. The steers are therefore of high value to the project. The project is therefore a relatively inexpensive way of adding significant value to previously collected data.

Numbers involved are:

	Brahman	Droughtmaster	Santa Gertrudis
No 21	47	40	56
Total	47	40	56

Data collection includes:

- 400 Day weight
- 600 Day weight
- Scan EMA
- Scan P8 fat

- Scan red fat
- Scan IMF
- Direct carcass, EMA, Rump and Rib Fat, MSA grading
- Meat science. Shear force, objective meat colour, cooking loss and Intramuscular fat
- GGPLD Genomic profiling, Bos indicus content and tenderness markers
- Structural soundness
- Collect DEXA and other new objective carcass grading technological data, including the E + V Loin camera and E + V 3D whole carcass camera. (Subject to the availability of equipment).
- In an overlay project subject to a separate funding application grazing feed intake data that can be analysed with performance data to develop grazing feed efficiency EBV's

All data which can be analysed in BREEDPLAN will be submitted for analysis. Other traits will be analysed using least squares and reported. All raw data will be stored on ILR2 databases of both Brahman, Droughtmaster, and Santa Gertrudis breeds, and or the AGBU Multi breed database for future analysis.

4. Results

During the 12-month period this project ran, 400-day weight data was collected on 47 Brahman, 40 Droughtmaster and 56 Santa Gertrudis No 21 steers. In addition, pre-slaughter weight and carcass scans as well as direct carcass data was collected on 55 Brahman, 37 Droughtmaster and 62 Santa Gertrudis No 20 steers ahead of schedule.

A strip loin sample was taken from each carcass and transferred to UNE Meat Science lab to be used to collect meat science data.

5. Conclusion

The project has achieved its objectives of providing a continuation of data collection and funding as well as providing the opportunity to submit the next phase of the project to the December 2021 project call.

As such it is the end of a contract phase rather than the complete project.

5.1 Key findings

More data collection is required to produce a reference population for the Brahman, Droughtmaster and Santa Gertrudis breeds that will produce Single Step BREEDPLAN GBV's of an optimum accuracy.

5.2 Benefits to industry

Facilitate the use of genomic selection and an increased rate of genetic gain in the Brahman, Droughtmaster, and Santa Gertrudis breeds for the traits being recorded in the project.

6. Future research and recommendations

The project funding proposal to extended to Phase 4 and received MDC funding to June 30, 2025, to finish data collection on the Spyglass No 21, 22 and 23 drop steers is presently being processed by MLA

The benefits of the project will be commercialised through the Brahman, Droughtmaster, and Santa Gertrudis Single Step BREEDPLAN genetic evaluations.

Even with less-than-optimal accuracy levels, in the Brahman breed the percentage of bulls with reported EBV's in recent sale catalogues has increased to over 65%.

7. References

Bolormaa S, Pryce JE, Kemper K, Savin K, Hayes BJ, Barendse W, Zhang Y, Reich CM, Mason BA, Bunch RJ, Harrison BE, Reverter A, Herd RM, Tier B, Graser HU, Goddard ME. Accuracy of prediction of genomic breeding values for residual feed intake and carcass and meat quality traits in *Bos taurus*, *Bos indicus*, and composite beef cattle. *J Anim Sci.* 2013 Jul;91(7):3088-104

Hayes BJ, Bowman PJ, Chamberlain AJ, Goddard ME. Invited review: Genomic selection in dairy cattle: progress and challenges. *J Dairy Sci.* 2009 Feb;92(2):433-43.

Van Eenennaam AL, van der Werf JH, Goddard ME. The value of using DNA markers for beef bull selection in the seedstock sector. *J Anim Sci.* 2011 Feb;99(2):307-20.