



Technology Access Centre for Livestock Production (TACLP)

Four-Year Study (2019-2022): Evaluating Sire-Progeny Links, Breeding Plans & Information Management in Multi-Sire Breeding Scenarios on Commercial Herds

The Technology Access Centre for Livestock Production (TACLP) completed a four-year research project evaluating sire-progeny links, breeding plans and information management in multi-sire breeding scenarios.

INTRODUCTION

Herd bulls are a critical piece to every breeding management plan given their direct influence on the performance of their progeny. Commercial herds in Alberta will often run multiple bulls in a single pasture with cows. Knowing which bulls sired specific offspring can help producers understand sires' current and future contribution to performance, profitability and sustainability – and track offspring data to make informed breeding decisions.

The TACLP completed a four-year research project alongside Blindman Beef and Bison in Bluffton, Alta. where 1,021 calves and 23 reference sires were evaluated. Economically-important production and herd management records were collected. The TACLP also collected tissue samples for DNA analysis in order to link the records back to individual bull performance.

OBJECTIVES

- Evaluate sire-progeny links through DNA paternity testing and collecting production records in order to demonstrate the value of knowing sire parentage.
- Evaluate DNA tool for identifying bulls' progeny in multi-sire commercial breeding scenarios, linking sire-progeny information to breeding practices, and defining methods for producers to estimate short and long-term cost recovery and payback.
- Demonstrate value of sire and dam performance information in a systematic breeding plan.
- Demonstrate the use of production and genetic records in defining on-going herd performance measures and goals, and performance records in sire and replacement heifer selection.
- Estimate direct and indirect economic benefits of using animal production records, performance measures and sire-progeny link tools (growth performance indicators and bull purchase prices).

STUDY DETAILS

- Olds College served as one of three research groups on this project, each implementing the same experimental design but at different locations across Alberta.
 - In total, 2,265 calves (born between 2019-2022), 69 reference bulls and 2,109 cows were involved in this study over four collection years and across six collection sites.
- Olds College study was in collaboration with Blindman Beef and Bison in Bluffton with 23 sires and 1,021 calves.

Methodology

- Multiple bulls were placed with a single breeding group each year between mid-July to mid-September.
- Calving started in late March of the next year and finished in late June. The total calves born were 278 (year 1), 249 (year 2), 244 (year 3) and 250 (year 4).
- A total of 23 sires were used over the four years with bull amounts of 14 (year 1), 17 (year 2), 14 (year 3), and 15 (year 4).
- Each year of the study, DNA samples were collected from reference sires and offspring at the collaborating producer site during scheduled processing events (spring or fall calf vaccinations).
- The Q-Link QGI tagger and tags (Quantum Genetix, Saskatoon, Sask.) was used to collect tissue samples for genetic evaluations.

Laboratory Analysis

- Tissue samples collected for sire verification were shipped to Quantum Genetix for evaluation under the Q-Link Test Kit and were compared to the reference sire database for paternity analysis.





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STUDY DETAILS *(continued)*

Measurements

- Producer collected production records following regularly scheduled processing events.
- Calf birth weights were recorded within 24 hours of birth, and management information was observed and recorded for each calf at the same time.
- Prior to breeding, all bulls were evaluated for breeding soundness and tested for *Trichostrongylus axei* foetus and *Campylobacter fetus*.
- Following the grazing season, calf weaning weights were collected on the day of weaning and cow weights were recorded within 60 days of weaning.
- All information was inputted into Herdtrax® herd management software, which allowed for easy retrieval and consistent summaries to be made year over year by TACLP researchers.
- Calving data collected consecutively (2019-2022).

RESULTS

- The variation in bull progeny and differences in average weaning weights of their offspring varied significantly between sires year-over-year.
- The collection of tissue samples and subsequent shipment to a commercial laboratory for DNA analysis was a simple and cost-effective process for the producer to adopt.
- Researchers were able to differentiate high-performance bulls from under-performing bulls based on prolificacy, incidences of dystocia and average calf weaning weight.
- On average over the four years, each bull sired 16.4 calves; the most calves sired from one bull was a total of 85 and the least was a single calf.
- The top four bulls sired more than half of the calves; the percentage of calves from the top bull ranged from 18.94 - 22.04% each year.
- Bull age had a significant effect on the number of calves with yearling bulls on average having less than one calf. There were no significant differences between bulls of other ages despite bull ages exceeding eight years having numerically lower values, but variation in the number of calves increased with bull age.
- Producers should have over two thirds of their calves born in the first three weeks of the calving season for benefits of heavier weaning weights, more uniform calves and easier management.

- Producer site had a late calving peak at week six, therefore improvements to the breeding plan can result in higher returns.
- The year of study, calf gender and effect of sire had significant impacts on birth weights and day 205 weaning weights.

CONCLUSIONS

The project successfully demonstrated the use and benefits of sire verification in a multi-sire pasture setting. Tools available for producers to collect tissue samples are easy to use, and the process for submitting samples to laboratories is simple, although some service providers may be better suited than others in terms of sample preservation and results turnaround time. In terms of return on investment, the potential benefits realized through sire verification each year exceeded the annual testing costs.

The data gathered enabled researchers to identify trends, individual sire performance, and opportunities for production improvement based on industry benchmarks – which highlights the benefits of simply maintaining accurate and consistent herd records.

Economic benefits from enhanced breeding plans after sire verification are considerable. Producers can develop informed breeding management approaches that utilize production records and incorporate sire-verification in order to enhance productivity while reducing the influence of underperformers.

Specific to the results of this project, the variability of sire prolificacy in a given year was significant and emphasized differences in bulls (such as age plus other contributing factors). The variability of offspring produced by individual bulls year-over-year was interesting and suggests further research into possible influencing factors.

Future opportunities that include carcass grading information or other traits of interest could be added to this breeding management approach to take advantage of increased calf revenue and further herd production improvements.



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