Investigating the Use of Genomics Testing to Select Replacement Heifers in Georgia Beef Herds

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Introduction

Reproductive efficiency is essential for beef herd success and profitability. It begins with replacement heifer selection. Traditional heifer selection depends on evaluating several physical traits such as age and body weight at weaning and age at puberty. The key traits that impact reproductive performance are fertility, longevity, calving ease, amount of milk, docility, mature weight, and growth to weaning and/or yearling endpoints.

Genetic tools are available to help farmers consistently identify heifers with desired traits. This study was conducted to answer the question: Does genomic testing in beef replacement heifer selection have value for the average Georgia beef herd owner? Few producers currently use genomic testing in Georgia. This study investigated the practical application and feasibility of genomic testing for selecting commercial beef heifers by comparing Neogen Igenity Beef genomic testing with phenotypic selection traits.

Materials and Methods

In this study, we compared Neogen Igenity Beef genomic testing with phenotypic selection traits. Three commercial beef herds were evaluated. The first (Herd 1) consisted of 27 heifers, the second (Herd 2) consisted of 20 heifers, and the third (Herd 3) consisted of 52 heifers. Heifers from Herd 1 and Herd 2 were selected from a herd on the UGA Coastal Plain Experiment Station Beef Unit in Alapaha, Georgia. Heifers in Herd 3 were commercial heifers consigned by producers from all over the state to the UGA Heifer Evaluation and Reproductive Development (HERD) program in Irwinville, Georgia. Herd 1 heifers were weighed and Igentity samples were pulled on May 29th, 2019. Weights were re-checked and pregnancy checks were performed on August 22nd, 2019. Herd 2 was checked August 20th, 2020, for first calf pregnancy. Herd 3 heifers were sampled on October 5th, 2020, and pregnancy checked on March 17th, 2020.

Pregnancy checks were conducted by Dr. Lee Jones with the University of Georgia Diagnostic Lab in Tifton, Georgia. Gestational age was determined using skull measurements and overall calf size via ultrasound.

Neogen Igenity Beef was chosen as the company to use for genetic testing. Neogen Igenity beef profiles include maternal and performance traits. For cow-calf producers, the important traits include birth weight, calving ease, stayability (longevity), heifer pregnancy, docility, and milk (measured by calf weaning weight). Neogen reported the results as a quartile ranking for each heifer with the best being a 4-star rank and the lowest as a 1-star rank. An example of the Neogen report is shown in Image B.

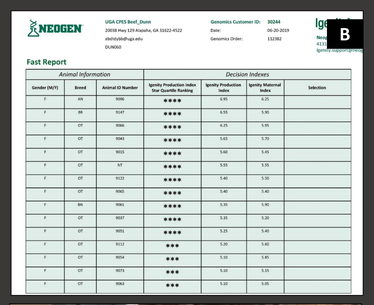


Image A. Process of taking the Neogen Igenity sample using a sample gun.
Image B. Neogen Score sheet that is sent to producers following testing.
Image C. Dr. Lee Jones performing pregnancy checks on a heifer in the program.
Image D. Dr. Jones indicating the calf on the screen. Days bred can be estimated using calf measurements.

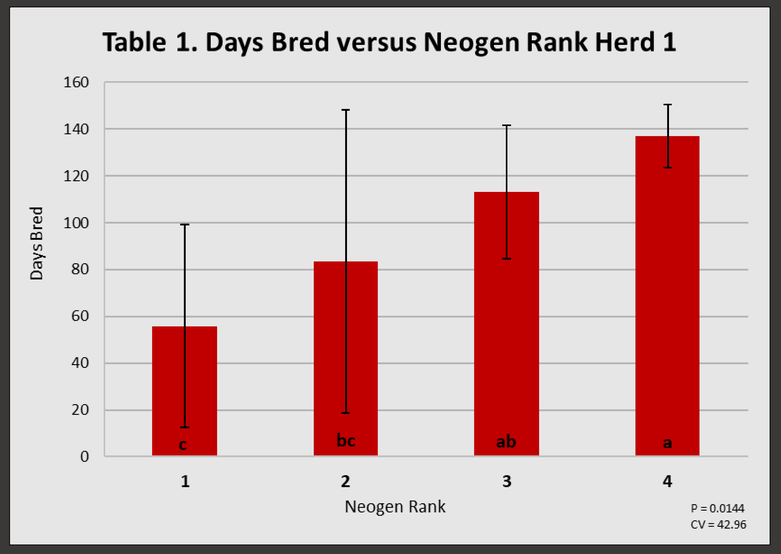
Results and Discussion

Herd 1 pregnancy checks were conducted 143 days after the first day of bull exposure and 58 days after the bull was pulled. Heifers that were open on exam day were given a numerical score of 0. The average days bred of the 4-star heifers versus 1-star heifers was 137 and 56 days, respectively.

Herd 2 pregnancy checks were performed 130 days after the first day of bull exposure. The average days bred of the 4-star heifers versus 1-star heifers was 100 and 113 day, with the 1-star heifers breeding earlier than 4-star.

Herd 3 pregnancy checks were performed 93 days after artificial insemination. A week after artificial insemination, bulls are put in with heifers to breed any that did not settle with artificial insemination. The average days bred of the 4-star heifers versus 1-star heifers was 68 and 56 days, respectively.

There was a statistical difference between days bred using Neogen rankings in Herd 1 as shown in Table 1. Heifers with 4-star ratings were statistically better than 2- or 1-star heifers. Heifers with 3-star ratings were also statistically better than the 1-star heifers. There was no statistical difference between days bred and Neogen ranking for any other herd (Table 2 & Table 3).



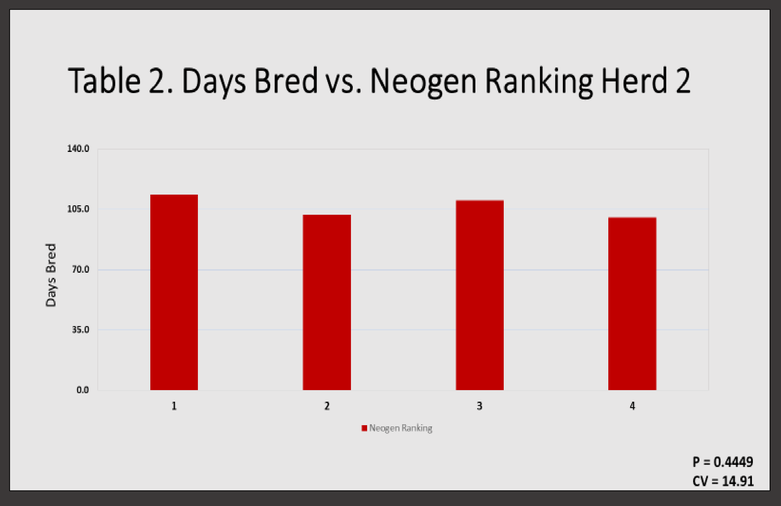
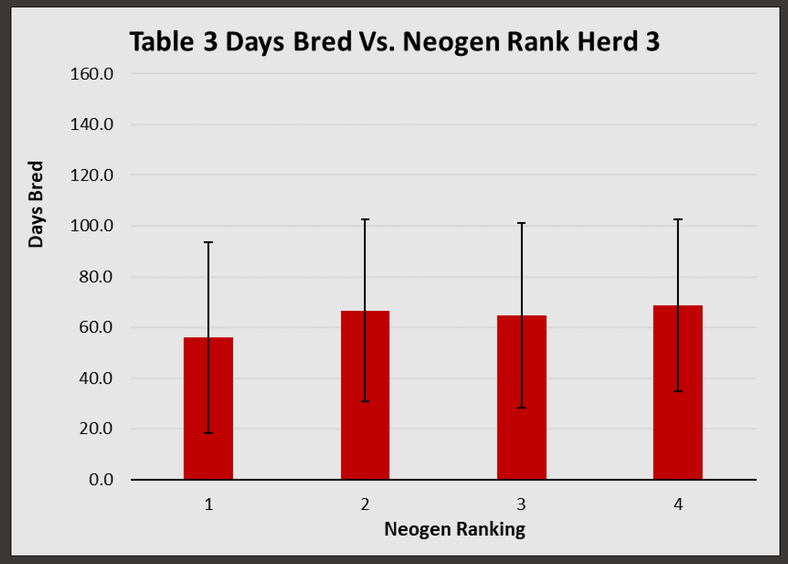


Image E. Heifers from Alapaha beef unit that represented Herd 1 in this study.



Conclusion

Genomic tools may be useful for farmers to select high quality heifers prior to breeding and save time and development costs. Heifer fertility is highly correlated to lifetime productivity and efficiency. The study design was to answer the question: Does genomic testing in beef replacement heifer selection have value for the average Georgia beef herd owner? More research will need to be conducted to be able to answer this question efficiently.

Using the quartile star ranking that Neogen implements in their fast report may not be useful in selecting replacement heifers. Neogen also sorts heifers based on a maternal index. Igenity Maternal index places emphasis on fertility, reproduction, and weaning weight, with a negative emphasis on yearling weight. This is an attempt to control mature cow size in heifers chosen as replacements. Looking at this index in comparison with pregnancy rates and stayability may have better results in replacement heifer selection for producers.

In this study, heifers that were ranked the highest genomically were also the same heifers that bred earliest in Herd 1. Herd 2 and 3 showed no difference in genetic ranking using the star quartile method versus breeding early. Currently few producers in Georgia use genomic testing on their commercial herds.

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