BEEF CATTLE RESEARCH UPDATE

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Effect of Cow Size and Age on Economic Beef Production

Over the last several years, the trend in genetic selection for maximum growth (through the use of growth EPDs) has led to bigger, heavier cows.[1] Both feedlot close-out data (K-State Focus on Feedlots[2]) and USDA livestock slaughter annual summary reports (federally inspected carcass weight data[3]) suggest that the average weight of finished beef steers and heifers has increased approximately 200 to 250 lb since 1990. In 1990, the average finished weight of beef steers and heifers was approximately 1190 and 1050 lb, respectively. Whereas, in 2015, the average finished weight of beef steers and heifers was approximately 1420 and 1275 lb, respectively. Most data suggest that the average the beef cow currently weighs 1350 to 1400 lb.

University of Nebraska researchers evaluated the effect of cow size and age on profitability of beef production systems in the Nebraska Sandhills using four years of cow-calf production systems data from 197 observations per.[4] In the dataset, cows had been assigned to 1 of 5 treatment groups: 1) March calving cows wintered on native range, 2) March calving cows wintered on corn residue, 3) June calving cows wintered on native range, 4) June calving cows wintered on corn residue, and 5) August calving cows wintered on corn residue. Average calving dates and pre-breeding cow body weights (BW) for the three calving seasons were March 24 and 1054 lb, June 15 and 1255 lb, and August 5 and 1290 lb, respectively.[5] Calves born in March were weaned on October 31 while calves born in both June and August were weaned on April 10. All steers born in March were placed in a feedlot for growing and finishing. Heifers born in March were developed into replacement breeding animals for herd maintenance for all systems. Steers and heifers born in June and August were assigned to 1 of 2 post-weaning management system treatments: 1) placement in the feedlot as calves immediately after a 30 day preconditioning period or 2) entrance into the feedlot as yearlings after the summer grazing season.

These data were used to evaluate the following nine possible production management scenarios using historical prices for inputs and production outputs from the research.

1) Raised calves, sold at weaning
2) Raised calves, sold as yearlings
3) Purchased weaned calves, sold as yearlings
4) Purchased weaned calves, sold live slaughter animals
5) Purchased weaned calves, sold grid priced slaughter animals
6) Raised calves, sold live slaughter animals
7) Raised calves, sold grid priced slaughter animals
8) Purchased yearlings, sold live slaughter animals
9) Purchased yearlings, sold grid priced slaughter animals

These researchers reported that cow BW had a positive effect on calf weaning BW, which increased at an increasing rate over the whole range of cow BW. Calf weaning BW increased 0.0000294 lb for every squared lb of cow BW. For example, using this relationship, if cow BW increased from 1000 to 1100 lb, 1100 to 1200 lb, 1200 to 1300 lb and 1300 to 1400 lb, then calf weaning BW would increase 6.2, 6.8, 7.4, and 7.9 lb, respectively. They also reported that cow age increased calf weaning BW up to when the cows average just older than 5 years of age and decreased thereafter. The BW and age of cows in this dataset ranged from 822 to 1594 lb and 3 to 12 years, respectively.

In their economic evaluation, all net returns were represented as dollars per cow exposed to breeding. It was reported that in scenarios where yearling or weaned calves are sold (scenarios 1, 2, and 3), the lightest BW cows provided the greatest contribution to returns. In contrast, in scenarios where raised calves were sold on a live slaughter weight basis or on a grid basis (scenario 6 and 7, respectively), returns were optimized with the heaviest BW cows. In the scenarios where animals were purchased as weaned calves or yearlings and sold on a live slaughter weight basis (scenarios 4 and 8), calves born to heavier dams provided higher returns. In the scenarios where animals are marketed on a grid and purchased either as weaned calves (scenario 5) or yearling animals (scenario 9), the most profitable dam sizes are medium and light BW dams, respectively.

In systems where the lightest cow was favored (scenarios 1, 2, 3, and 9), the difference in contribution to net returns between the lightest cow (822 lb) and the heaviest cow (1594 lb) was $37.55, $32.18, $16.60, and $13.16, respectively, with an average difference per cow of $24.87. In the one system where the medium BW cow was found to maximize contribution to returns (scenario 5), the contribution was $0.80 per cow higher at optimum BW (1259 lb) versus the heaviest cow BW and $1.38 per cow more than the lightest cow BW. In scenarios where the heaviest cows were found to contribute more to returns than the lightest cows (scenarios 4, 6, 7, and 8), the average difference was $57.69 per cow (differed by $122.50, $39.62, $50.98, and $17.64 per cow, respectively for scenarios 4, 6, 7, and 8, for the heaviest versus the lightest cow).

These researchers also reported that dam age contributed to returns differentially depending on the marketing scheme. Younger dams contributed more to profit if cattle were marketed on a on a live slaughter weight basis, whereas grid pricing favored more mature dams. Selling weaned calves favored younger dams, whereas selling yearlings favored calves from older dams.

These data suggest that the most profitable cow size varies with the production and marketing scheme. In general, animals fed to slaughter contribute more positively to profit if they are from heavier cows. But, the lightest cows contribute the most to returns if their offspring are sold as weaned or yearling calves. Since, most cow/calf operators sell calves at weaning, these data suggest that smaller cows are probably more profitable. In summary, one size cow (age or weight) does not fit all production scenarios.

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[1] Johnson, J. J., B. H. Dunn, and J. D. Radakovich. 2010. Understanding Cow Size and Efficiency. In: Proceedings of the Beef Improvement Federation 42nd Annual Research Symposium, Columbia, MO. p. 62-70.

[2] Kanas State University Research and Extension. Focus on Feedlots. http://www.asi.k-state.edu/about/newsletters/focus-on-feedlots.

[3] USDA. Livestock Slaughter Annual Summary. https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1097.

[4] Stockton, M. C., S. Dhoubhadel, and L. A. Stalker. 2016. Cow size and age as economic drivers of beef production systems in the Nebraska Sandhills. Prof. Anim. Sci. 32: 420-429.

[5] Griffin, W. A., L. A. Stalker, D. C. Adams, R. N. Funston, and T. J. Klopfenstein. 2012. Calving date and wintering system effects on cow and calf performance I: A systems approach to beef production in the Nebraska Sandhills. Prof. Anim. Sci. 28: 249-259