

Final Report Review

Project Title: Feeding high quality beef

Principal Investigator: Erika Lundy

Co-Investigators: Dr. Dan Loy, Patrick Wall

Primary Institution: Iowa State University

Award Amount: \$21,477

Reviewer: Dr. James Russell

Date: October 5, 2019

Project Objectives:

- Determine growth and carcass performance of steers of known genetic potential for high marbling when fed differing nutritional and implant programs.
- Evaluate rate of internal fat deposition using ultrasound based on feeding and implant strategies.

Project Results:

- Backgrounding cattle on a lower energy (0.57 Mcal NEg/lb.; 30% roughage) diet for 70 days reduced feed efficiency compared to feeding cattle a high energy (0.63 Mcal NEg/lb.; 12% roughage) diet over the feeding period.
- While feeding a lower energy diet during backgrounding hindered intramuscular fat during the backgrounding phase, marbling scores at harvest did not differ between steers that were backgrounded or fed a high energy diet over the feeding period.
- While steers implanted with a long-acting implant deposited intramuscular fat throughout the feeding period, steers implanted with a series of implant deposited no additional intramuscular fat after the third implant was administered.
- Feeding steers produced from a herd of Angus cattle selected for high quality beef for 20 years and verified with expected progeny differences (EPDs), GeneMax™ Focus scores, and percent intramuscular fat via carcass ultrasound resulted in 100% of the carcasses grading Choice or higher with 65% of the carcasses grading Prime regardless of feeding or implant strategy.
- Correlations between ultrasound and actual ribeye area, marbling score, and backfat were 0.70, 0.67, and 0.78, which were well above the level of acceptability for these traits.

Final Report Summary

Nontechnical Summary:

Project Title: Feeding High Quality Beef

Principal Investigator:

Erika Lundy 154 Public Sq, Suite C Greenfield, IA 50849 ellundy@iastate.edu 641-743-8412

Co-investigators:

Dr. Dan Loy 313 Kildee Hall Ames, IA 50011 dloy@iastate.edu 515-294-3795

Patrick Wall 210 N. Iowa Str Knoxville, IA 50138 patwall@iastate.edu 641-842-2014

Project timeline: December 18, 2018 – June 26, 2019 (live animal portion)

An Iowa State University study was conducted to evaluate the effects of nutritional management and implant strategies on steers that have been selected for superior marbling. The ISU Angus herd located at the McNay Memorial Research and Demonstration Farm is backed with genomic data and has undergone intense selection for high marbling capabilities over 20 years, presenting researchers with a unique opportunity to investigate improving production efficiency of high-quality beef that Iowa is well known for. The objective of this study was to determine growth and carcass performance of steers with known genetic potential for high marbling when fed differing nutritional strategies and administering different implant programs. Steers were assigned to treatments based on a 2 X 2 factorial design including two diet types and two implant strategies. Dietary treatments include a finishing diet or a backgrounding diet fed for 70 days prior to a transition to the same finishing diet. Implant treatments included with a single, long duration implant (Synovex One Feedlot) or a multiple, regular duration implant strategy (Synovex S, Synovex Choice, Synovex Choice) designed to deliver equal amounts of trenbolone acetate (TBA) throughout study duration. Steers that were backgrounded were less efficient but had similar final marbling compared to steers started on the finishing diet, suggesting that a more aggressive feeding program may lower production costs. The use of carcass ultrasound allowed for tracking intramuscular fat deposition throughout the study. The lower, energy diet fed during background phase appeared to hinder intramuscular fat but ending marbling scores were not different based on diets. However, after the third implant was administered in series treatment, no additional intramuscular fat was deposited whereas steers implanted with the single, long-acting implant continued to deposit more intramuscular fat. Additional research is needed to determine the impact that implant and nutritional programs have on growth and carcass parameters of steers with superior marbling capabilities. Overall, steers on this study graded 100% Choice and higher, with 65% of carcasses grading Prime. These results indicate great potential exists for using implants and higher energy diets to increase efficiency without compromising carcass quality.

Impacts

- Feeding a finishing diet (0.63 Mcal NEg/lb.; 12% roughage) for the entire feeding period improved feed conversion and lowered feed cost by 7.6% compared to feeding a backgrounding diet (0.57 Mcal NEg/lb.; 30% roughage) for 70 days prior to being fed the finishing diet.
 - While feeding a lower energy diet during backgrounding for 70 days hindered intramuscular fat during the backgrounding phase, marbling scores did not differ between steers with high marbling potential that were backgrounded or fed a high energy diet over the feeding period.
- While steers implanted with a long-acting implant deposited intramuscular fat throughout the feeding period, steers implanted with a series of implant deposited no additional intramuscular fat after the third implant was administered.
- Feeding steers produced from a herd of Angus cattle selected for high quality beef for 20 years and verified with expected progeny differences (EPDs), GeneMax™ Focus scores, and percent intramuscular fat via carcass ultrasound resulted in 100% of the carcasses grading Choice or higher with 65% of the carcasses grading Prime regardless of feeding or implant strategy.
 - The proportion of steers grading Prime was considerably greater than the 8 to 14% of Iowa cattle and 4% of U.S. cattle estimated to grade Prime.

- Correlations between ultrasound and actual ribeye area, marbling score, and backfat thickness were 0.70, 0.67, and 0.78 demonstrating the suitability of ultrasound data for genetic evaluation of beef quality.

Conclusions

- Feeding a finishing diet for the entire feeding period improves feed conversion and lowers feed cost by 7.6% compared to feeding a backgrounding diet for 70 days prior to being fed the finishing diet, but doesn't affect marbling score of cattle with a high potential for marbling.
- While steers implanted with a long-acting implant deposit intramuscular fat throughout the feeding period, steers implanted with a series of implant deposit no additional intramuscular fat after the third implant was administered.
- Feeding steers with a high genetic potential for marbling will result in a much higher percentage of cattle grading choice or better compared to Iowa or U.S. averages.
- Correlations between ultrasound and actual ribeye area, marbling score, and backfat thickness demonstrate the suitability of ultrasound data for genetic evaluation of beef quality.

Technology transfer:

Refereed journal publications:

1 planned for Journal of Applied Animal Science

Dissertation/Thesis:

None

Reviewed abstracts:

Beenken, A et al. 2020. Planned for abstracts for the Midwest Section of the American Society of Animal Science

Extension/Outreach publications:

1 Planned for 2020 ISU Animal Industry Report

Scientific presentations:

Beenken, A et al. 2020. Planned for Midwest Section of the American Society of Animal Science, Omaha, NE

Extension/Outreach presentations:

Dan Loy and Erika Lundy. Feeding Quality Beef. Eastern Iowa Feedlot Conference. Welton, Iowa. August 9, 2019. 45 attendees.

Erika Lundy and Dan Loy. Feeding Quality Beef. Southwest Iowa Cattle Feeder's Day. Lewis, Iowa. June 13, 2019. 33 attendees.

Erika Lundy. Managing for carcass quality. Feedlot Short Course. Ames, Iowa. August 8, 2019. 40 attendees.

Podcasts:

None

Other:

None

Personnel Support:

Faculty:

None

Post-doctoral associates:

None

Extension specialists:

Erika Lundy, 5% of salary

Patrick Wall, 3% of salary

Technicians:

None

Farm labor:

None

Graduate students:

None

Undergraduate students:

None

Other:

None