

Final Report Review

Project Title: Impact of backgrounding cattle nutrition on feedlot and carcass performance and beef quality and sensory characteristics

Principal Investigator: Dr. Alfredo DiConstanzo

Co-investigators: Dr. Megan Webb Dr. Ryan Cox

Primary institution: University of Minnesota

Award Amount: \$43,530.

Reviewer: Dr. James Russell

Date: October 23, 2019

Project Objectives:

- The determination of interactive effects of energy concentration, energy source and intake management during backgrounding on DM intake, DM conversion to gain, cattle growth and composition, hot carcass weight, carcass characteristics, and beef quality traits of cattle finished on a common diet to a constant fat thickness.

Project Results:

- Feeding a moderate energy (0.58 Mcal NEg/lb.) versus feeding a high energy diet (0.64 Mcal NEg/lb.) during a 48-day backgrounding period did not affect DM intake, daily BW gain, feed conversion, carcass characteristics and shear force and total fat and fatty acid concentrations at the conclusion of the 119-day finishing period.
- While feeding a moderate energy diet reduced feed costs during the 48-day backgrounding period, there was no difference in total feed cost and return to cattle and feed over the total feeding period between cattle fed a moderate energy or a high energy diet during the backgrounding period.
- Restricting feed intake by 19% during a 48-day backgrounding period reduced DM intake, daily BW gain, and feed conversion both during the backgrounding and total feeding periods and hot carcass weight, backfat thickness, marbling, yield grade while increasing the concentrations of omega-6 fatty acids, polyunsaturated unsaturated fatty acids, and linoleic acid in steaks post-harvest.
- Although restricting feed intake during a 48-day backgrounding period reduced feed costs during the backgrounding and total feeding periods, the lower value of carcasses of cattle with restricted feed intake reduced the return to cattle and feed by 69%.

Final Report Summary

Nontechnical Summary:

Title: Impact of backgrounding cattle nutrition on feedlot and carcass performance and beef quality and sensory traits.

Lead Project Director:

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The objectives of this study include the determination of interactive effects of energy concentration, energy source and intake management during backgrounding on DM intake, DM conversion to gain, cattle growth and composition, hot carcass weight, carcass characteristics, and beef quality traits of cattle finished on a common diet to a constant fat thickness. Steers fed either a moderate- or high-energy diet performed similarly during a 49-day backgrounding period. Steers fed at restricted intake gained less and converted feed dry matter to gain less efficiently than those that were fed ad libitum. Effects of this restriction were carried through the finishing period and were reflected over the entire feeding period. Although cattle initially restricted consumed less feed resulting in lower feed costs, the impact of feed restriction on carcass quality and weight resulted in severe carcass value loss. Carcasses of cattle initially restricted were lighter, leaner, with less marbling and with greater propensity to grade at Select or low Choice. This translated into lower economic returns to feed and cattle. These observations demonstrated that a short-term intake restriction, regardless of dietary energy content, led to reductions in carcass quality while limiting carcass weight with only slight improvements in feed cost of gain. Therefore, intake restriction, as imposed in the current study, did not meet the expectations of an optimized backgrounding strategy—greater carcass weight at similar or greater carcass quality. Intake restriction also led to greater concentrations of linoleic acid in steaks. However, this increase in this beneficial fatty acid was not sufficient to supplement more than 1 gram of a total recommended intake of 10 grams daily for humans. Use of ultrasound scanning of ribeye for the purpose of estimating ribeye fat, intramuscular fat or muscling resulted in estimates that were largely insensitive to body composition changes detected by weight and, eventually, by visual appraisal. Because of the apparent lack of detection of obvious compositional effects, application of this technique to predict compositional changes in longitudinal studies is limited.

Impacts

- Feeding a moderate energy (0.58 Mcal NEg/lb.) versus feeding a high energy diet (0.64 Mcal NEg/lb.) during a 48-day backgrounding period did not affect DM intake, daily BW gain, feed conversion, carcass characteristics and shear force and total fat and fatty acid concentrations at the conclusion of the 119-day finishing period.
 - Feeding a moderate energy diet reduced feed costs by 9% during the 48-day backgrounding period, but did not affect total feed costs and return to cattle and feed over the total feeding period from cattle fed or a high energy diet during the backgrounding period.
- Restricting feed intake by 19% during a 48-day backgrounding period reduced DM intake by 9.5%, daily BW gain by 11.4%, and feed conversion by 3.2% over the total feeding period.
 - When harvested at a common date, cattle fed at a 19% feed restriction during backgrounding had reduced hot carcass weight, backfat thickness, marbling, yield grade and increased concentrations of omega-6 fatty acids, polyunsaturated unsaturated fatty acids, and linoleic acid in steaks post-harvest.

- Although restricting feed intake during a 48-day backgrounding period reduced feed costs during the backgrounding (19%) and total feeding (7.8%) periods, the lower value of carcasses of cattle with restricted feed intake reduced the return to cattle and feed by 69%.

Conclusions:

- While feeding cattle on a moderate energy (0.58 Mcal NEg/lb.) resulted in lower feed costs during the backgrounding period than feeding a high energy (0.64 Mcal NEg/lb.) over a 48-day backgrounding period, it did not affect total return to feed and cattle at harvest.
- Restricting feed intake to 81% of ad libitum intake over a 48-day backgrounding period reduced feed costs not only during backgrounding as well as the total feeding period, but also reduced total return to cattle and feed because of reduced carcass value when harvested at the same date as cattle fed at an ad libitum level.
- Therefore, it is most profitable to avoid a backgrounding period by adapting cattle to a high energy diet immediately after adjustment to a feedlot.

Technology transfer

Refereed journal publications:

None reported

Dissertation or theses:

None reported

Reviewed abstracts:

None reported

Extension/Outreach publications:

None reported

Scientific presentations:

None reported

Extension/Outreach presentations:

None reported

Podcasts:

None reported

Other:

None reported

Personnel Support:

Faculty:

None budgeted or reported

Post-doctoral associates:

None budgeted or reported

Technicians:

None budgeted or reported

Farm labor:

None budgeted or reported

Graduate students:

Partial one budgeted

Undergraduate students:

None budgeted or reported

Other:

None budgeted or reported

Leveraged funds:

None reported