

Final Report Review

Project Title: Effects of dietary energy level and type of anabolic implant on animal performance and carcass traits of finishing steers

Principal Investigator: Dr. Zachary Smith

Primary Institution: South Dakota State University

Award Amount: \$76,400

Reviewer: Dr. James Russell

Date: August 17, 2020

Project Objective:

- To determine the influence of dietary energy level (i.e., roughage inclusion level) and terminal implant type on beef cattle performance, carcass traits, and beef production per acre of cropland in finishing steers harvested at a common fatness endpoint.

Project Results:

- Neither corn silage inclusion levels of 15 or 30% nor implant type (non-coated or coated) influenced average daily gains, feed intake, or feed efficiency on a live animal basis.
 - But feeding the low corn silage inclusion level improved average daily gain and feed efficiency by 5.9 and 7.1% when adjusted for hot carcass weight.
- Feeding corn silage at the 15% inclusion rate increased dressing percentage and hot carcass weight by 1.7 and 2.2%, respectively.
- Feeding corn silage at the 30% inclusion rate tended to increase beef production by 41 pound per acre (2.2%) over the 15% corn silage inclusion level.
- Coated steroid implants increased USDA Marbling Scores by 7.8%, but did not influence cattle growth performance or other carcass traits.

Final Report Summary

Nontechnical Summary:

Title: Effects of dietary energy level and type of anabolic implant on animal performance and carcass traits of finishing steers

Project Director: Zachary Smith, Ph.D., an Assistant Professor in the Department of Animal Science at South Dakota State University (Email: Zachary.Smith@sdsstate.edu; Office #: 605-688-5165).

Project initiated: September 1, 2019

Project completed: June 12, 2020 (live animal); August 5, 2019 (final report submission)

Total funds budgeted: \$76,400.00

Total funds spent: \$75,420.41

Nontechnical summary:

The purpose of this experiment was to determine the impact of corn silage inclusion level and growth promoting implant type in finishing steers on growth performance, carcass traits, and beef production per acre of cropland. This experiment used one-hundred and fifty-six steers housed in twenty pens (5 pens/treatment) with 7 to 8 steers per pen. Steers were fed (dry matter basis) 15% or 30% corn silage and administered a coated or non-coated implant on day 1 of the study. The resulting treatment combinations were: 1) 15% corn silage/non-coated implant, 2) 15% corn silage/coated implant, 3) 30% corn silage/non-coated implant, and 4) 30% corn silage/coated implant. There was no interaction between corn silage inclusion level and steroidal implant type for any variables measured in this experiment. Neither corn silage inclusion level nor implant type had any influence on cumulative live growth performance responses, but feeding a lesser inclusion level of corn silage resulted in improved carcass-adjusted basis growth performance. Feeding greater levels of corn silage numerically increased beef production per acre of cropland by nearly 41 pounds of beef per acre. Feeding less corn silage resulted greater dressing percentage and hot carcass weight. Coated steroidal implants increased USDA Marbling scores and had no influence on any other carcass traits. 3 This study demonstrated that feeding greater levels of corn silage in the finishing diet does not influence live basis growth performance, but decreases carcass - adjusted basis growth performance. These differing responses should be exploited depending upon how a producer's cattle are marketed. If cattle are sold on a carcass weight basis, a lower level of corn silage can result in greater HCW when cattle are harvested at an equal days on feed. Level of silage in the finishing diet did not influence agronomic returns per acre of cropland suggesting that depending upon environmental condition and workload demands at harvest time, integrated crop-livestock systems can feed greater levels of corn silage without detriment to returns to a fixed land base. Terminal implant type did not influence growth performance or carcass weight, but did influence USDA Marbling scores. Use of these differing technologies in practice should be determined upon the method in which the beef cattle are marketed, cost of the implant, and the improvements in revenue for cattle that are rewarded a premium for greater quality grades.

Impacts

- Feeding diets containing up to 30% corn silage to finishing beef cattle has no deleterious impacts on live-basis finishing phase growth performance or carcass quality attributes.
 - Feeding greater levels of corn silage reduces reliance on off-farm feedstuffs
 - Feeding corn silage compared to other roughage sources allows for all roughage to be obtained in a short time frame.
 - Feeding greater levels of corn silage in replacement of corn grain does not reduce income generated from a fixed land base
 - Feeding greater levels of corn silage may reduce incidence and severity of liver abscesses.
- Feeding diets containing 15% corn silage results in greater hot carcass weights and dressing percentages than feeding 30% corn silage diets in the same number of days.
 - If feeding lower levels of corn silage, finished cattle should be marketed on a carcass weight basis.
- Within a 132-day finishing period, a coated steroidal implant did not affect cattle growth performance compared to a non-coated implant, but did improve carcass quality grade.
 - As coated implants are twice as expensive as non-coated implants, their cost difference must be considered relative to any improvements in carcass value.

Conclusions

- Neither corn silage inclusion levels of 15 or 30% nor implant type (non-coated or coated) influence average daily gains, feed intake, or feed efficiency on a live animal basis.
 - But feeding the low corn silage inclusion level improves average daily gain and feed efficiency when adjusted for hot carcass weight.
- Feeding corn silage at the 15% inclusion rate increases dressing percentage and hot carcass weight in comparison to feeding a 30% corn silage diet.
- Feeding corn silage at the 30% inclusion rate slightly increases beef production per acre compared to a 15% corn silage inclusion level.
 - This result implies that feeding corn silage up to 30% of the diet in replacement of corn grain does not reduce income generated from a fixed land base.
- Coated steroid implants increase USDA Marbling Scores, but did not influence cattle growth performance or other carcass traits compared to non-coated steroid implants
 - This improvement in carcass value must be considered relative to differences in implant costs.

Technology transfer

Refereed journal publications:

Buckhaus, E.M. and Z.K. Smith. 2021. Effects of corn silage inclusion level and type of anabolic implant on animal growth performance, apparent total tract digestibility, beef production per hectare, and carcass characteristics of finishing steers. *Animals* 11:579 (<https://doi.org/10.3390/ani11020579>).

Reviewed abstracts:

Abstract for the 2020 National ASAS Virtual meeting, July 2020 (Presented; Obtain reference in January 2021)

Abstract for the 2021 meeting of Midwestern Section of the ASAS, March 2021 (Planned; Obtain reference March 2021)

Extension/Outreach publications:

Paper planned to presentation at the South Dakota State University Beef Day 2021, January 2021. (Planned; Obtain reference in January 2021).

Scientific presentations:

Presentation for the 2020 National ASAS Virtual meeting, July 2020

Presentation for the 2021 Meeting of the Midwestern Section of the ASAS, March 2021 (Planned)

Extension/Outreach presentations:

None reported

Podcasts:

None reported

Other:

None reported

Personnel support:

Faculty:

None

Post-doctoral associates:

None

Farm labor:

None

Graduate students:

1 Graduate student (1 year) \$15,110.68 for salaries and benefits

Undergraduate students:

None

Other:

None