Animal Industry Report

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Grass-Finishing High Value Beef: A Pilot Project in Northern United States

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Grass-Finishing High Value Beef: A Pilot Project in Northern United States

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Summary and Implications

This project examined the feasibility of producing USDA Choice beef—without grain-based finishing—through genetic selection and pasture management. Purebred Angus heifers with high-marbling potential and small/medium frame size were born spring 2011. Heifers were allotted to either pasture (grass-finishing) or feedlot (grain-fed) treatments based on liveweight and intramuscular fat content. When reaching market weight (±1,000 lb) heifers were harvested and carcass data was collected. Feedlot cattle were marketed on August 27, 2012. The grass-finished cattle were marketed on November 1, 2012. Starting and end weights were similar for both treatments but feedlot cattle reached market weight 50% faster (3.9 vs 2.1 lb/day). The average intramuscular fat percent was not different at the start of the trial but there was a trend of grain-fed cattle to have greater intramuscular fat. Rib eye area, yield grade, and number grading Choice were numerically higher for feedlot cattle. This project demonstrated that it is feasible to combine high marbling genetics with pasture management to produce Choice beef in Iowa. Grass-finished cattle were able to achieve 2.1 pounds of gain per day and 60% of the grass-finished cattle ultimately graded Choice. Selection of small-framed, high-marbling potential beef cattle is essential because of the relatively low-energy density of the grass-based diet and the limited grazing season. Efforts to improve pasture quality and extend the grazing season would be beneficial to meet this goal.

Introduction

Consumer interest in grass-finished beef is high but adoption by farmers in the northern U.S. including Iowa has been limited. Consistently producing a high-value carcass from forage-fed cattle is challenging. Intramuscular fat or marbling is a major factor in quality grading of beef. Marbling is heavily influenced by cattle genetics and energy concentration of the diet. Finishing cattle on grain is a proven approach to consistently produce high-value beef carcasses with desirable quality grades. Grain feeding beef cattle may not be an option due to niche market constraints or consumer preferences. Therefore, high-marbling genetics and intense pasture management would be critical for successful grass-fed programs. It is hypothesized that grass-finished cattle will consistently produce high-value carcasses if excellent pasture management is combined with high-marbling genetics.

Materials and Methods

Twenty-two purebred Angus heifers identified as high-marbling potential and small/medium frame size were born spring 2011 (March 21–May 18, 2011) at the ISU McNay Research Farm, Chariton, Iowa. After weaning, the cattle were fed a forage-based backgrounding ration through the winter. Cattle were moved to the ISU Armstrong Research Farm, Lewis, Iowa for this trial on May 1, 2012. Heifers were allotted to either pasture (grass-finishing) or feedlot (grain-fed) treatments based on liveweight and intramuscular fat content measured using digital ultrasound.

Feedlot cattle were housed in a bedded hoop barn and fed a complete mixed ration of 16% ground hay, 36% corn, 2% supplement, and 46% modified distiller's grains on an as-fed basis. The grazing cattle were finished on a 26-acre grass-legume (Smooth brome grass and alfalfa) pasture. The pasture was subdivided into paddocks and cattle were moved to a fresh paddock every 3-4 days until dry conditions prevailed mid-July after which heifers were allowed to graze the entire pasture. Bloat blocks were offered free choice to the grazing cattle. Surplus forage (42 tons) was harvested on May 29 and July 2 to maintain high-quality forage on pasture. A 10 × 30 ft portable steel shade (10 ft high) was provided to the pasture cattle near the water source.

Cattle were weighed at 28-day intervals. When reaching market weight (±1,000 lb) heifers were harvested at the Tyson plant, Denison Iowa and carcass data was collected. Prior to marketing, cattle were scanned to determine rib eye area, fat cover, and intramuscular fat. Three times throughout the summer, cattle activity was monitored using accelerometers. These devices are about the size of a deck of cards and record the number of steps taken as well as time spent lying down and standing by animals. The devices were attached to the hind leg of each heifer for 7 days during May, June, and July.

Results and Discussion

Table one summarizes performance of feedlot and grass-finished Angus heifers. Feedlot cattle were marketed on August 27, 2012. Sixty-six days later (November 1, 2012) the grass-finished cattle were marketed. Grazing was

no longer feasible after November 1 due to freezing temperatures interrupting water supply. Starting and end weights were similar for both treatments but feedlot cattle reached market weight 50% faster. The average intramuscular fat percent was not different for the two treatments at the start of the trial but there was a trend of grain-fed cattle to have greater intramuscular fat.

Table two presents carcass characteristics as measured at the packing plant. Feedlot cattle produced 7% heavier carcasses. Rib eye area, yield grade, number grading Choice was numerically higher for feedlot cattle, but the number of experimental units was too few to ascertain if this difference was significant.

Table three summarizes the daily number of steps taken by cattle on the two treatments for a one-week period in May, June, and July. Cattle on pasture took more steps, most likely as they moved from grazing areas to the source of water in the pasture. Activity may have been reduced if water was provided in every paddock. This increased level of activity may also have contributed to the increased time to market observed in the grass-fed cattle. Grazing cattle were most active around 9:00 pm while feedlot cattle were most active around 3:00 pm. Both groups were fairly inactive from midnight to 3:00 am.

Based on prior work at Iowa State University, cattle that have ≥ 5% intramuscular fat as measured by digital ultrasound usually grade Choice. In this study, 10 feedlot cattle had ≥ 5% IMF and 11 head ultimately graded Choice. On pasture, 7 of 10 animals had ≥ 5% IMF, but only 6 animals ultimately graded Choice. This may have in part been due to the appearance of the grass-finished carcasses. As expected, after almost 6 months of green forage as the only feed the fat cover of the grass-finished heifers was yellow. Yellow fat coloration can contribute to lower quality grades in a system designed around grain-fed (white fat) cattle.

Key Lessons

This project demonstrated that it is feasible to combine high marbling genetics with pasture management to produce high-value beef in Iowa. Grass-finished cattle were able to achieve 2.1 pounds of gain per day and 60% of the grass-finished cattle ultimately graded Choice. Selection of small-framed, high marbling potential beef cattle is essential because of the relatively low-energy density of the grass-based diet and the limited grazing season. Efforts to improve pasture quality and extend the grazing season should be encouraged.

Acknowledgements

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http://www.leopold.iastate.edu/

Table 1. Performance of grain-fed and grass-finished Angus heifers.

	Grain-fed	Grass-fed	*P-value*
Start weight, lb	641± 21	636 ± 22	0.86
End weight, lb	999 ± 24	989 ± 26	0.77
% IMF[a], start	4.09 ± 0.27	4.36 ± 0.29	0.49
% IMF[a], end	6.18 ± 0.29	5.40 ± 0.31	0.08
ADG[b], lb/d	3.9 ± 1.1	2.1 ± 1.3	<0.001

[a]IMF = intramuscular fat determined by ultrasound
[b]ADG = average daily gain

Table 2. Carcass characteristics of grain-fed and grass-finished Angus heifers.

	Grain-fed	Grass-fed	*P-value*
Rib eye area, in^2	11.4 ± 0.2	10.8 ± 0.3	0.08
Backfat, in	0.5 ± 0.1	0.4 ± 0.1	0.14
Hot carcass weight, lb	619 ± 14	576 ± 16	0.05
Yield grade, average	2.99 ± 0.16	2.57 ± 0.17	0.09
Number grading Choice, hd	11	6	0.08

Table 3. Daily number of steps per head taken by Angus heifers on pasture and feedlot.

	Feedlot	Pasture
May	105[a]	198[c]
June	115[a]	233[d]
July	56[b]	158[e]

[abcde] Values without the same letter are different.

Figure 1. Daily pattern of activity for cattle on feedlot and pasture.