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QUALITY OF BEEF FROM PASTURE FINISHED CATTLE

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Abstract

One hundred sixteen Hereford x Gelbvieh x Angus steers were finished on four pasture and a feedlot treatment. Pastures were supplemented with a grain concentrate mixture to supply 0, 25, 50, and 75% of the ration nutrients. The feedlot treatment was a conventional feedlot with self-feeders and a ration of 90% grain concentrate plus 10% ground hay. Carcasses from the steers were hung in a conventional slaughter plant cooler for 72 hr, graded, and strip loins were removed from one side of six randomly selected carcasses from each replicated pasture for a total of sixty loins. Loins were cut into steaks and submitted to a sensory laboratory for descriptive analysis (aroma, flavor, texture, and shear force) and acceptability analysis (consumer acceptability). Off-colored, yellow fat was not observed in this study. Two dark cutting carcasses were harvested which is below the national average incidence of dark cutting. Results indicate that the pasture finished beef tended to lack tenderness and juiciness. The higher percentage grain supplemented treatment (75%) tended to be more similar to the feedlot treatment than the non-supplemented treatment. In the consumer acceptance study, differences were found but all steaks were rated at or above "neither like nor dislike" on the 9-point hedonic scale, thus on average, none of the steaks were disliked. When considering the results from both descriptive and acceptance studies, the results lead to the conclusion that some pasture feeding of beef may be possible without detrimentally affecting steak quality. Since several of the significant descriptive analysis attributes were textural (tenderness and juiciness), it is important to consider other factors contributing to steak texture for pasture finished beef, such as pre and post slaughter conditions.

Introduction: In comparison to feedlot finishing of cattle, pasture finishing would lower the cost of production, eliminate the concentration of waste (manure) and be perceived by the public as environmentally friendly. Pasture finished beef (PFB) is not well received in the packing and meat trade, and every attempt is made to discount the value of PFB carcasses. There are four major criticisms leveled against PFB - lacking in tenderness, yellow fat, dark cutting, and off flavors (Seideman et al., 1985; Griebenow et al., 1997). The objective of our studies have been to determine if some level of grain supplementation on pasture will overcome these shortcomings and allow PFB to compete in the marketplace without discounts.

Materials and Methods: Methods of pasture management, cattle management, and results of animal performance were presented previously (Martz et al., 1996; Gerrish et al., 1996). The feedlot replicated pens of cattle finished first, and were killed September 29, 1995; and PFB cattle were killed November 7, 1995. The PFB cattle were killed at a lighter weight because the supply of pasture was exhausted and we wanted to slaughter the steers directly from pasture without any alterations of ration. All cattle were killed in a small packing plant in southwestern Missouri, hung for three days then graded by a certified USDA grader. Immediately after grading, a short loin was removed from randomly selected carcasses on each treatment and transported to the meats laboratory on the Columbia Campus, University of Missouri where the loins were cut into strip loin steaks for evaluation and analysis. Six steers were randomly selected for sampling prior to slaughter. Steaks were submitted to the Sensory Laboratory for Descriptive Sensory Analysis and for Acceptance Testing (consumer evaluation).

Descriptive Analysis. A 10-member panel participated in score sheet development and training sessions for the beef steaks. The score sheet consisted of 16.4 unit unstructured line scales (0=not, 16.4=very for 25 attributes). Each panelist received two pieces of steak from all 61 steaks. One piece of steak was used when evaluating the aroma and flavor attributes, and the other piece was used when evaluating all other attributes. Steaks were evaluated monadically in individual sensory booths under red lights. To complete the descriptive analysis study, a total of 10 sessions were conduced on separate days. Steaks from each steer were randomly assigned to the 10 sessions.

Acceptance Testing. Eighty-eight panelists participated in the consumer evaluation. Five sessions were conducted with 15 to 20 panelists participating per session. The consumer panelists evaluated the steaks in conditions similar to the Descriptive panelists, with the exception of evaluating the samples under white light instead of red lights. Each panelist indicated their degree of liking, using the 9-point hedonic scale (with categories from 9=like extremely to 1=dislike extremely) for 6 samples of steak. Results from the Descriptive Analysis indicated those attributes which were significant, and based on this information, 6 steak codes were selected for the consumer evaluation as follows: Two steak codes from each treatment (0, 75, and feedlot), with one of each of these from feeding replication 1 and the other one from feeding replication 2; where the data of these were near the appropriate treatment average for most of the significant attributes.

Cookery and Serving. Frozen beef steaks were defrosted in a refrigerator at 41F for 24 hours prior to each test session. Steaks were cooked and sampled under controlled conditions in the Sensory Laboratory kitchen. Steaks were broiled to 93F then turned and broiled to a final temperature of 154F. Edges of each beef steak were removed and the remaining portion was cut into 1/2" cubes using an electric knife and a plexiglass template. Tooth picks were inserted into the steak cubes and two adjacent pieces were placed into each three-digit randomly coded and heated 1.08 oz beaker. The beakers had been preheated in sandbaths to 170F to aid in maintaining the sample temperature. Samples were then served to the panelists. The whole serving procedure took less than 5 minutes.

Results and Discussion: The average Hedonic ratings for acceptability (consumer evaluation) of cooked beef from pasture and feedlot finished steers was 5.75, 6.12, and 6.66 (LSD = 0.47) for treatments 0, 75% and Feedlot, respectively. The acceptance evaluation results were as expected based on the results of the descriptive sensory analysis which indicated that as the percentage of grain supplement fed was increased, the steaks were liked more. However, there was some overlapping of acceptance among treatments.

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Five consumer acceptance sessions were held and analysis of the data (not shown in this report) indicated that the steaks were rated consistently across the 5 consumer evaluation sessions. Although there were significant differences among the treatments in the consumer acceptance study, all of the steaks were rated at or above "neither like nor dislike" on the 9-point hedonic scale; thus on average, none of the steaks were disliked. These findings are in agreement with Reagan et al. (1995) who reported that US customers who ate beef found little difference in eating quality, among cuts of beef from the range of quality grades from high choice to low select.

Steers finished in the feedlot and with the 50 and 75 % grain supplement levels were fatter than the 0 and 25% grain supplement levels as indicated by their higher backfat values and higher marbling scores (Table 1). Average daily gain for the final 78 days on feed and average quality score for feedlot and 75% groups was higher compared to the 0, 25, and 50% treatment groups (Martz, 1996 and Table 1). Average yield grade was less than 3.0 for all groups in this study which indicates that none of the steers were overly finished. Yellow colored or off-color tallow was not observed in these carcasses. Two steers were evaluated as dark cutting which is less than the national average.

Cooked beef was evaluated for 1) aroma: beefy/meaty, blood/raw meat, beef fat, char-grill/smokey, vegetative, earthy, nutty, or off-aroma; 2) flavor: beefy/meaty, blood/raw meat, beef fat, char-grill/smokey, vegetative, earthy, nutty, or off-flavor; 3) texture: tender (initial bite), juicy (initial bite), tender (average), juicy (average), stringy, mealy, gristle, aftertaste, and 4) Warner-Bratzler shear force. Only the comparisons among treatment means (grain levels) which were statistically significant ($P < .05$), are reported in Table 2. Of the significant attributes listed in Table 2, some, beefy/meaty aroma, beef fat aroma, char-grill/smokey aroma, blood/raw meat flavor, and char-grill/smokey flavor, were less directional; while others, tender (initial bite), juicy (initial bite), tender (average), juicy (average), and mealy texture were more directional. Attributes which were more directional were more clearly separated for the feedlot treatment from the other treatments than were the less directional attributes (Table 2). For tender (initial bite), juicy (initial bite), tender (average), juicy (average), and mealy texture, the feedlot treatment had significantly larger intensities than the other treatments which were not significantly different from each other. The feedlot treatment had significantly smaller intensities than the other treatments for stringy and gristle, with the 0% grain treatment having the highest intensities. The feedlot treatment had the smallest intensity for aftertaste which was significantly different from the other treatments. Warner-Bratzler shear force measurements agreed in ranking of the treatments with the descriptive tenderness evaluations.

These results indicate that the PFB tended to lack tenderness and juiciness. No off-flavors were observed. The higher percentage grain supplemented treatment (75%) tended to be more similar to the feedlot treatment than the non-supplemented treatment.

Conclusions: Differences were found among the treatments in both the descriptive analysis and the acceptance evaluation studies. When considering the results from both studies, the information leads to the conclusion that some grass feeding of beef may be possible without detrimentally affecting steak quality. Since several of the significant descriptive analysis attributes were textural (tenderness and juiciness), it is important to consider other factors contributing to steak texture, such as pre and post slaughter conditions. An example of preslaughter treatment would be a short intense feeding of grain supplement to enhance the level of finish of the PFB. Examples of postslaughter treatments would be aging of the beef and/or electrical stimulation of the beef.

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Table 1. Quality grade, backfat thickness, marbling score, and yield grade of steer carcasses finished on pasture and in feedlot.

	Dietary nutrients supplied from grain supplement, %				
Category	0	25	50	75	Feedlot
Number Steers	14	20	22	24	28
Quality Grade[1]	0,4,10	0,10,10	0,15,7	1,22,1	17,11,0
Quality Score, avg.	1.29[a]	1.60[a]	1.86[ab]	2.49[b]	4.76[c]
Backfat, in.	.07[a]	.11[ab]	.12[ab]	.19[b]	.32[c]
Marbling Score, avg.	3.7[a]	3.8[a]	4.1[a]	4.2[a]	5.2[b]
Yield Grade, avg.	1.86[a]	1.94[a]	1.95[a]	2.24[ab]	2.54[b]

[1]Values in row within column are number of carcasses which graded choice, select, or standard, respectively.

[abc]Values in the same row which have different superscripts are significantly different ($P < .05$).

Table 2. Aroma, flavor, texture, aftertaste and Warner-Bratzler shear force values for cooked beef harvested from pasture and feedlot finished steers.

	Dietary nutrients supplied from grain supplement, %				
Attribute	0	25	50	75	Feedlot
Aroma:					
Beefy/meaty	8.41^{ab}	8.24^{a}	8.24^{a}	9.05^{b}	7.66^{a}
Beef fat	5.12^{ab}	5.07^{ab}	5.40^{bc}	5.83^{c}	4.50^{a}
Char-grill/smokey	3.93^{ab}	3.66^{ab}	4.18^{b}	5.99^{c}	3.24^{a}
Flavor:					
Blood/raw meat	5.52^{a}	6.35^{b}	6.48^{b}	6.24^{ab}	6.81^{b}
Char-grill/smokey	2.81^{a}	2.87^{a}	3.72^{b}	4.91^{c}	2.29^{a}
Vegetative	4.95^{c}	3.65^{ab}	4.40^{bc}	3.75^{ab}	3.53^{a}
Texture:					
Tender (int. bite)	8.27^{a}	8.51^{a}	8.83^{a}	8.61^{a}	12.33^{b}
Juicy (int. bite)	6.77^{a}	6.95^{a}	7.71^{a}	7.34^{a}	9.97^{b}
Tender (avg.)	8.15^{a}	8.82^{a}	8.64^{a}	9.08^{a}	12.83^{b}
Juicy (avg.)	7.63^{a}	7.80^{a}	8.29^{a}	8.29^{a}	10.37^{b}
Stringy	5.20^{c}	4.66^{bc}	5.09^{bc}	4.26^{b}	2.49^{a}
Mealy	5.75^{a}	5.79^{a}	5.45^{a}	6.34^{a}	7.46^{a}
Gristle	2.76^{c}	2.18^{bc}	1.93^{b}	2.13^{bc}	.84^{a}
Aftertaste	5.19^{b}	4.83^{b}	5.05^{b}	4.77^{b}	3.74^{a}
W-B Shear Force, lb	7.5^{a}	7.1^{a}	7.1^{a}	6.3^{b}	5.7^{c}

^{abc}Values in the same row with different superscripts are significantly different ($P<.05$).

ECONOMIC SURVEY OF MANAGEMENT INTENSIVE GRAZING DAIRIES IN NORTHEAST OHIO

T. E. Noyes, M. L. Bennett and D. J. Breech[1]

Abstract

Dairy producers have adopted management intensive grazing (MIG) as a way to reduce costs of producing milk, thereby increasing farm profitability. However, little actual farm economic data has been collected to determine if there is an advantage to using MIG for dairying. This study was conducted to collect economic data from dairy farms using MIG and was part of an overall dairy farm business summary for the production years 1994 and 1995 using the FINPACK program FINAN for year end analysis. Net return per cow for the MIG farms in 1994 and 1995 was $447 and $468 respectively whereas the average for all the farms in the summary (includes M1G farms) showed $400 and $429 net returns. The farms using MIG in 1994 generated gross farm incomes of $2313.77 per cow compared to gross incomes of $2632.75 per cow for all the farms in the summary. However, the total costs per cow was $1865.63 for the MIG farms compared to $2231.76 for all farms. For 1995 the MIG farms grossed $2131.48 per cow compared to $2528.34 for all farms with total production costs of $1663.70 per cow and $2098.37 per cow, respectively. Although the dairy farms utilizing MIG have lower gross incomes the savings in total operating costs are making these farms more profitable then the average of all the farms in the summary.

Introduction: Some dairy producers from around the United States are switching to management intensive grazing (MIG) for the economic advantage it has over the more traditional dairy practice of total herd confinement and utilizing all mechanically harvested, stored feeds. The New York Dairy Farm Business Summary (Smith et al., 1996) showed farms utilizing MIG in 1994 and 1995 had higher net farm incomes when compared to nonrotational grazing farms. Similar results have been reported in studies from other states such as Wisconsin, Vermont, and Michigan.

The objective of this study was to determine if there is an economic advantage to Ohio dairy farms utilizing MIG. Studies from the other states suggest that even though dairy farms utilizing MIG usually have a lower gross income, they also have a higher net income due to the savings in costs of production. If this is true for Ohio dairies, then other Ohio dairies could benefit from implementing MIG on their farm.

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