

Impacts of beef finishing systems and genetics on performance, meat quality and sensory attributes

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Introduction

This project investigates the Michigan local beef value chain and how finishing systems impact beef quality and healthfulness. It will address the challenges related to beef quality and product consistency, annual supply and the high cost of beef production. Two different genetics of cattle were evaluated, Red Angus (RA, moderate fat) and Akaushi x RA (AK, high fat) compared within natural, grass- and grain-fed production systems. Investigation of these two systems and breed combinations allow for broader comparative research, including indicators of healthfulness in grass and grain-fed beef.

Materials and methods

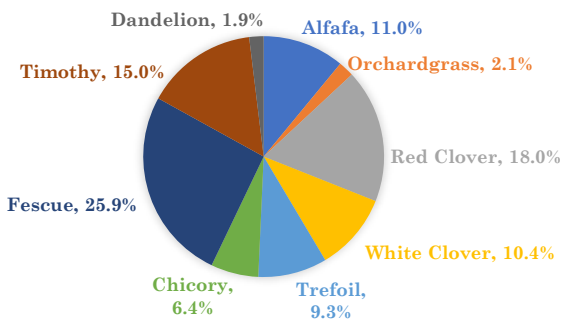
- First year of a 3-year study (2019- 2022) has been completed.
- Local: Upper Peninsula Research and Extension Center (UPREC), Chatham, MI.
- Sixty animals of two genetic groups (RA or AK cross) were divided in two finishing system (grass- or grain-fed).
- The animals were slaughtered at same time (October 1st) at a commercial slaughter plant according to standard operating procedures.
- Hot carcass weight, numerical yield grade and quality grade were recorded.
- A portion of rib steaks were collected from one rib from each carcass for nutrient and sensory analysis.

Objectives

1. Determine impact of Akaushi genetics on grass- and natural grain-fed beef performance, quality, consistency (compared to Red Angus sired);
2. Assess genetics and finishing strategy impact on beef healthfulness and sensory attributes;
3. Generate enterprise budgets and producer decision tools;
4. Determine participant attitudes, beliefs, behaviors, and willingness to purchase grass or natural grain-fed beef.



GRAZING DIET - PREVALENT PLANT SPECIES



FEEDLOT DIET

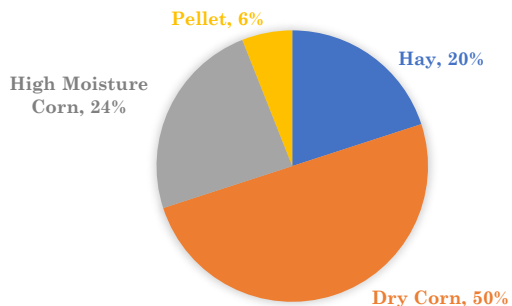


Table 1. Diet characteristics from feedlot and grazing finishing strategies.

Characteristic	Feedlot	Grazing
Days in the finishing phase	107	80
Group estimated dry matter disappearance(kg/d)	11.0	NE
Productivity (DM mass, kg/ha)	-	4298.4
<i>Diet composition (%)</i>		
Dry matter	75.8	20.5
Ash	4.4	7.1
Crude protein	9.7	11.5
NDF	21.2	52.2
ADF	10.0	35.0
NE: not evaluated		



- There were no significant interactions between breed and system for data. Thus, the main effects of breed and system are reported independently.
- Initial, final and total gain were significantly higher in grain compared grass, although no significant difference was detected for average daily gain between the finishing systems.
- Total gain for grain was higher because the animals remained longer in feedlot than in grazing (107 vs. 80 days).
- No significant differences were observed in performance among the breeds ($P > 0.05$).



Results

Table 2. Performance and carcass data and consumer panelists' scores for beef palatability attributes

Item	Breed		System		P value		
	RA	AK	GRASS	GRAIN	Breed	System	B*S
<i>Performance</i>							
Initial weight (kg)	453.58	455.29	439.12	469.74	0.823	0.016	0.530
Final weight (kg)	580.67	579.16	548.77	611.06	0.876	0.003	0.791
Total gain (kg)	116.44	114.96	90.06	141.32	0.715	0.005	0.327
ADG ¹ (kg/d)	1.228	1.218	1.125	1.320	0.812	0.112	0.323
<i>Carcass</i>							
Weight at slaughter (kg)	558.98	560.49	533.65	585.81	0.868	0.004	0.881
HCW ² (kg)	328.64	337.81	308.02	358.43	0.104	0.0008	0.401
Carcass Yield ³ (%)	58.74	60.17	57.72	61.19	<0.0001	0.0005	0.085
Backfat (mm)	10.33	10.39	7.17	13.55	0.935	0.001	0.061
Ribeye (cm ²)	70.21	74.36	68.92	75.65	0.020	0.017	0.595
Internal fat (%)	1.43	1.63	0.55	2.52	0.0007	<0.0001	0.004
Marbling score ⁴	Choice-	Choice0	Choice-	Choice+	0.003	0.002	0.958
<i>Sensory attributes</i>							
Flavor	6.41	6.31	6.09	6.64	0.577	0.001	0.147
Juiciness	5.94	6.16	5.76	6.34	0.248	0.002	0.269
Texture	6.44	6.33	6.00	6.78	0.543	<0.0001	0.447
Overall acceptability	6.40	6.25	5.95	6.71	0.411	<0.0001	0.584

- System affected all carcass characteristics.
- Steers fed grain diet had greater carcass weight, HCW, carcass yield, backfat, ribeye area, internal fat and marbling score compared with cattle fed grass diet.
- Ribeye area was significantly more extensive in grain compared grass.
- As expected, AK had higher internal fat and marbling score compared to RA. Also, AK had higher ribeye area and carcass yield.
- The results of the sensory attributes showed that steaks from grain-fed animals had a high acceptance in terms of flavor, juiciness, texture and overall acceptability compared grass-fed animals.
- No significant differences were observed in sensory attributes among breeds.

¹ADG = Average daily gain, ²HCW = Hot carcass weight, ³Ratio of HCW to body weight at slaughter, ⁴Choice- = 400–499, Choice0 = 500–599, Choice+ = 600–699, ⁵Panelists assigned steak attributes using 9-point scales (1 = dislike extremely; 9 = like extremely) for flavor, juiciness, texture/firmness, and overall acceptability.