ENVIRONMENTAL AND NUTRITIONAL EFFECTS ON BEEF PALATABILITY AND CARCASS COMPOSITION

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Abstract

Half-bred Bos indicus-influenced steers (n=92), raised at the Agricultural Research Center, Texas A&M University, were used to evaluate the impact of environment (south, east and central Texas) and nutrition (low versus high) immediately post-weaning (treatments = 6) on growth, composition and eating characteristics of beef after feedlot feeding. After treatments, steers were fed a high concentrate diet at the ARC to a visually assessed fat constant endpoint of 1.0 cm of external fat over the 12th rib within a pen. Steers were harvested and electrically stimulated at a commercial packing plant. Twenty-five g sample was removed 24-h postmortem from the longissimus muscle for the Warner-Bratzler shear test. Sensory evaluations were conducted for myofibrillar tenderness, juiciness, overall tenderness, overall flavor, and overall acceptability. Warner-Bratzler shear force values were not affected by treatment (P>0.05). However, after characteristics and muscle to bone ratio feeding half-blood steers to a constant fat endpoint, carcass sensory and fat composition was not affected by treatment (P>0.05). Data indicated environment and nutrition during the stocker phase impacted many of the important compositional and palatability components of beef production in Texas. Feedlot feeding of high concentrate diets removes much of the variation in beef yield and palatability induced by environment and nutrition during the stocker phase. Steers that are subjected either to hotter climates or lower plane of nutrition tended to grow slower during the stocker phase and gain more rapidly during the feedlot phase to compensate for losses in the stocker phase. Management systems in Texas impact the variability of composition and palatability of Texas beef.

KEYWORDS: Beef, Nutrition, Palatability, Environment

Introduction

Numerous studies have been done on the effect of pre-slaughter nutrition on growth, production efficiency, carcass characteristics, and meat quality. It has been hypothesized that differences in nutrition and environment in the stocker phase induces differences in these differences are reduced or eliminated during the feedlot phase of production. Many of these studies have compared the effects of forage-based and grain-based feeding. Source of dietary energy, such as lower-energy forage diets as compared to higher-energy grain diets, has an effect on the quality of the meat. Comparing the effects of forage-based and grain-based feeding. Source of dietary energy, such as lower-energy forage diets as compared to higher-energy grain diets, has an effect on the quality of the meat.

Objective

The objective of this project was to examine the effect of three different environments and their native or rye pastures on feedlot carcasses on carcass characteristics, carcass composition, and meat palatability.

Materials and Methods

Stear Select - Ninety-two F2 Angus x Brahman steers were selected and randomly assigned to one of eight environment/nutritional treatments to evaluate carcass and tenderness:
- Overton-Low, Rotational (n=9)
- Overton-High, Rotational (n=10)
- McGregor-Low (n=18)
- McGregor-Calf (n=18)
- Overton-Low, Continuous (n=8)
- Overton-High, Continuous (n=9)
- Uvalde-Low (n=10)
- Uvalde-High (n=10)

Fabrication - Steaks from both sides were fabricated into 6 sections, 8 cm thick. Sections were randomly assigned to aging periods (1, 7, 14, 21, 28, and 35 d). Treatment 9-10th rib section was used for determination of carcass separable and non-separable connective tissue amount (8=none, 1=abundant), overall tenderness (8=extremely tender, 1=extremely tough), and overall flavor intensity (8=extremely intense, 1=not intense). Sensory evaluations were conducted for myofibrillar tenderness, juiciness, overall tenderness, overall flavor, and overall acceptability.

Sensory Evaluation - After each aging period, steaks were cooked to a constant endpoint of 1.7 °C, average internal temperature of 80.2 °C, and 35 min. Warner-Bratzler shear force values were not affected by treatment (P>0.05). However, after characteristics and muscle to bone ratio feeding half-blood steers to a constant fat endpoint, carcass sensory and fat composition was not affected by treatment (P>0.05). Data indicated environment and nutrition during the stocker phase impacted many of the important compositional and palatability components of beef production in Texas. Feedlot feeding of high concentrate diets removes much of the variation in beef yield and palatability induced by environment and nutrition during the stocker phase. Steers that are subjected either to hotter climates or lower plane of nutrition tended to grow slower during the stocker phase and gain more rapidly during the feedlot phase to compensate for losses in the stocker phase. Management systems in Texas impact the variability of composition and palatability of Texas beef.

Results

Treatments affected rates of gains during the stocker phase (Figure 1).
- Rotating pastures during the stocker phase obviously affected live animal growth for the Overton-Low steers by the end of the feedlot phase, steers differed in live weight due to treatment (Figure 1).
- Stocker treatments affected carcass yield grade characteristics, but had minimal effects on carcass quality grade characteristics. While yield grade differed across treatments, quality grade did not differ (Figure 2).
- Differences in Warner-Bratzler shear force values at 1 d of aging were negated after 14 d of aging.
- Meal palatability was impacted by environment and nutrition treatments (Table 1).
- Treatment and length of aging, affected Warner-Bratzler shearing force.
- Differences in Warner-Bratzler shear force values at 1 d of aging were negated after 14 d of aging.

As expected differences in tenderness and quality grade were found.
- Chemical moisture and lipid percentages did not differ across treatments.

Conclusions

Data indicated environment and nutrition during the stocker phase impacted many of the important compositional and palatability components of beef production in Texas. Feedlot feeding of high concentrate diets removes much of the variation in beef yield and palatability induced by environment and nutrition during the stocker phase. Steers that are subjected either to hotter climates or lower plane of nutrition tended to grow slower during the stocker phase and gain more rapidly during the feedlot phase to compensate for losses in the stocker phase. Management systems in Texas impact the variability of composition and palatability of Texas beef.

It is clear that if the beef industry is going to continue to produce beef with acceptable carcass characteristics and palatability in Texas.

Figure 1: Treatment effects on Weight at the end of stocker and feedlot phases.

Figure 2: Treatment effects on yield and quality grades.

Table 1. Least squares means for sensory attributes of longissimus tenderness, juiciness, connective tissue, overall tenderness, overall flavor, and overall acceptability

Table 2. Least squares means for Warner-Bratzler shear force values at 1 d of aging.

Figure 3: Least squares means for storage day by treatment interaction of Warner-Bratzler shear force (P<0.05).

References


Figure 4: Graphical representation of Warner-Bratzler shear force values at 1 d of aging.