THE EFFECT OF ANIMAL AGE AT SLAUGHTER ON FATTY ACID AND CHOLESTEROL CONTENT OF BEEF RIBEYE STEAKS

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Story in Brief

Differences in fatty acid and cholesterol content were assessed as a function of animal age at slaughter. Ribeye steaks (n=50) were obtained from steers that originated from two ranches in Oklahoma and were assigned the following treatments: early weaned (EW; weaned at 3.5 mo and placed directly in feedlot), normal weaned (NW; weaned at 7.9 mo and placed directly in feedlot), wheat pasture (WP; weaned at 7.9 mo, grazed wheat pasture for 112 d, and then placed in feedlot at 11.6 mo), short grazed (SG; weaned at 7.9 mo, wintered on dry native range, grazed on early intensive managed native range for 68 d and then placed in feedlot at 15.4 mo) and long grazed (LG; weaned at 7.9 mo, wintered on dry native range, grazed on native range for 122 d and then placed in the feedlot at 17.4 mo). Crude fat content of the ribeye was not different due to treatment. The treatments that grazed native range, SG and LG, resulted in lower crude protein contents than the other treatments probably due to the low crude protein content of that forage. Moisture content was highest in EW and lowest in LG. Steaks from the LG treatment had the lowest and highest concentrations of saturated fatty acids (SFA) and unsaturated fatty acids (UNSFA), respectively. The ratio of hypercholesterolemic to hypocholesterolemic fatty acids decreased as animal age at slaughter increased. Cholesterol content was lowest for WP but was also different depending on origin. These results indicate that animal age at slaughter can alter the composition of fat and amount of cholesterol deposited in tissues.

(Key Words: Beef, Fatty acid, Cholesterol.)

Introduction

Many Oklahoma beef producers utilize available wheat pasture and native range to background cattle prior to feedlot entry. Previous research (Duckett et al., 1993) indicates that differences exist in fat composition of forage-fed versus grain-fed beef. Also, that the monounsaturated fat content increases as time on feed increases. Thus, backgrounding systems that utilize forage, shorten length of grain feeding and increase age at slaughter have the potential to change fat

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composition. For these reasons, the fatty acid and cholesterol content was quantified in steaks from steers of various ages at slaughter due to the backgrounding system used prior to feedlot entry.

Materials and Methods

Ribeye steaks (n=50) were obtained from steers that came from two Oklahoma ranches and were assigned the following treatments: early weaned (EW; weaned at 3.5 mo and placed directly in feedlot), normal weaned (NW; weaned at 7.9 mo and placed directly in feedlot), wheat pasture (WP; weaned at 7.9 mo, grazed wheat pasture for 112 d, and then placed in feedlot at 11.6 mo), short grazed (SG; weaned at 7.9 mo, wintered on dry native range, grazed on early intensive managed native range for 68 d and then placed in feedlot at 15.4 mo) and long grazed (LG; weaned at 7.9 mo, wintered on dry native range, grazed on native range for 122 d and then placed in the feedlot at 17.4 mo). Steers were slaughtered at a similar fat thickness endpoint (.5in) which required 287, 198, 134, 123 and 101 d in the feedlot for EW, NW, WP, SG and LG, respectively. Ribeye steaks were removed from each carcass and the longissimus muscle used for lipid extraction (Burton et al., 1985). Fatty acid and cholesterol content were quantified using gas chromatography. Data were analyzed using the GLM procedure of SAS with a model that included the effects of ranch, treatment and the two-way interaction. Least squares means are reported.

Results and Discussion

The effect of animal age at slaughter on performance (Gill et al., 1993b), economics and carcass characteristics (Gill et al., 1993a), tenderness (Burton et al., 1994), and cutability (Deering et al., 1993) has been previously reported. The proximate composition of the completely trimmed ribeye steaks is presented in Table 1. Crude fat content did not differ (P>.30) between treatments. However, crude protein content was lower (P<.01) in the SG and LG treatments compared to EW, NW and WP. The tissue levels are probably a

Table 1. Proximate composition of beef ribeye steaks.

	Crude fat, %	Crude protein, %	Moisture, %
EW	5.38	21.97[a]	72.36[b]
NW	4.70	22.42[a]	72.61[ab]
WP	4.62	22.37[a]	72.51[ab]
SG	5.54	21.33[b]	72.88[ab]
LG	4.73	21.38[b]	73.77[a]
SEM	.38	.17	.38

[abc] Means with uncommon superscripts in the same column differ (P<.05).

reflection of low crude protein content of native range. Moisture content was highest (P<.02) for the LG and lowest (P<.05) for EW with the rest of the treatments intermediate.

The SFA and UNSFA concentrations are shown across treatments in Figure 1. The LG treatment had the highest (P<.01) and lowest (P<.04) percent of UNSFA and SFA, respectively. These differences in fatty acid composition translated into a hypercholesterolemic (plasma cholesterol elevating fatty acids; SFA-C18:0) to hypocholesterolemic (plasma cholesterol lowering; UNSFA) ratio that decreased (P<.01) as age at slaughter increased (Figure 2).

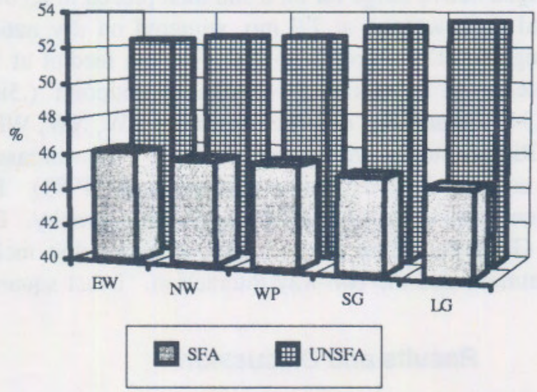

Figure 1. Percentage of saturated and unsaturated fat in beef ribeye steaks.

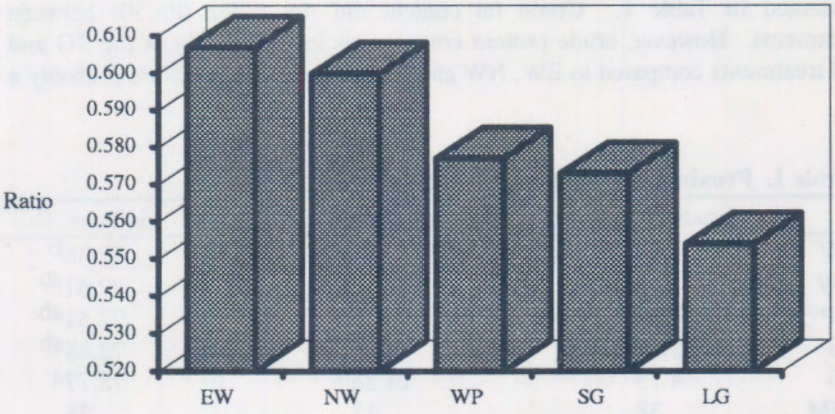

Figure 2. Ratio of hypercholesterolemic to hypocholesterolemic fatty acids.

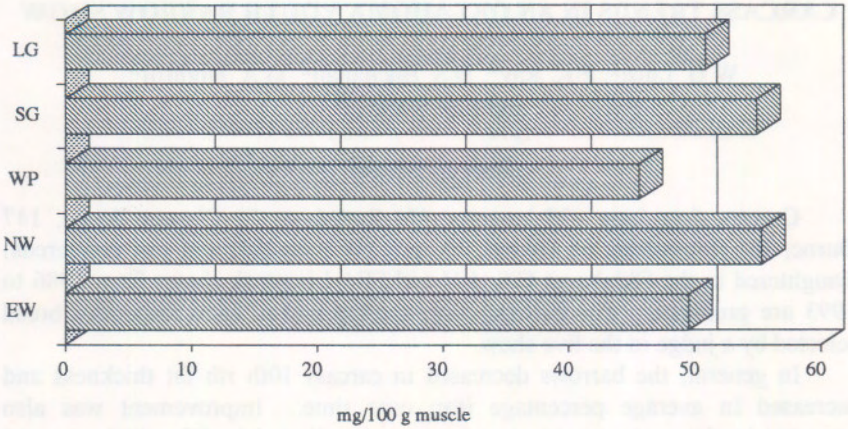

Figure 3. Cholesterol content of beef ribeye steaks.

Figure 3 shows the differences in tissue cholesterol content across treatments. Steaks from the WP treatment had the lowest (P<.01) cholesterol content. Cholesterol content was also lower (P<.10) in LG and EW compared to NW and SG. However, there were also differences in cholesterol content due to ranch origin (48.04 vs. 51.82; P<.03). Additional research is needed to ascertain an explanation for these differences in cholesterol content.

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