Carcass Characteristics of Heat Adapted Cattle as Effected by Growth Rate During the Winter Grazing Phase

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BOTTOM LINE

●Different growth rates of steers achieved by grazing either winter annuals or South Texas native range influenced certain carcass characteristics, but failed to influence the tenderness of the meat at slaughter.

Introduction

The relationship of pre-feedlot gain to carcass quality is elusive to quantify. Many variables (environmental, genetic, mechanical) can effect carcass quality and often one variable can be masked by another one. Most studies have looked at the effects of the slaughtering process and feedlot variables on carcass quality. However, carcass quality may be influenced early in the production cycle. The rate of gain of cattle prior to entering the feedlot may assert a positive or negative effect on carcass quality and tenderness.

This experiment was conducted to ascertain any influence that growth rate during a winter grazing period may have on subsequent carcass characteristics and tenderness.

Experimental Approach

In 1998 and 1999 steer calves (60 and 48 hd) from heat-adapted dams (Tuli X Angus, Senepol X Angus, Brahman X Angus and Angus) were raised on South Texas rangeland until weaning.

In 1998 all the calves were sired by Hereford bulls, castrated in July, and weaned on November 11, 1998. Visual body condition score (BCS, 1 = thin, 9 = fat) and frame score (FS, 1 = short, 7 = tall) were taken at weaning. At weaning calves were placed in the same pen, fed 5 lb/hd/day of a weaning concentrate ration and free choice hay for 16 days. On day 17, they were placed on either native range (NR) or oat pasture (OAT) for a winter grazing period . The steers were weighed and removed from the OAT and NR on February 11 and 12, 1999 and transported to a South Texas feedlot (Liveoak, Batesville, TX) and placed in the same pen.

In 1999, the calves were weighed on May 25, and weaned on October 6. All calves were kept in the same pen and fed 6 lb/hd/day of a weaning concentrate ration and free choice hay. The male calves were castrated 1 week after weaning and weighed every 2 weeks after weaning. On December 10, calves were placed on either NR or ryegrass (RG) pastures. The calves were removed from NR or RG on April 27, 2000 and transported to a South Texas feedlot (Chaparral Feedyard, Uvalde, TX) and placed in the same pen.

In both 1998 and 1999, after 90 days on feed ultra sound images for subcutaneous fat (BFAT) over the 12-13th rib were evaluated and every 30 days after that until they reached 0.4 inches of BFAT, at which time they were slaughtered. All calves were vaccinated for shipping fever complex upon entry to the feedlot. No growth implants were used in the cattle. All the calves were slaughtered at the same facility in Uvalde, Texas. Carcasses were quality graded by splitting the right side between the 12-13 th ribs, 48 hours after slaughter. One rib-eye steak was harvested from each steer for Warner-Bratzler (WB) shear force analysis by the Texas A&M meats laboratory and were vacuum packaged and aged for 14 days before being frozen.

Results and Discussion

For most of the variables measured there was a year by grazing treatment interaction : therefore, the 2 years of data were evaluated independently of each other. In Table 1. we can see the experimental design for each year. In 1998 only FS was different ($p<.05$) at the start of the grazing period, with the NR steers having slightly more frame.

In 1998, weaning data were used as the starting point for the grazing phase of the experiment. In 1999, initial grazing data were taken 64 days after weaning. From Table 1. we can see that we were able to accomplish two different rates of growth. The NR steers in both years had lower ADG, gain and BCS at the

end of the grazing period than did the OAT or RG steers.

In 1998, carcass data from the different growth rates showed that degree of marbling (MARB), quality grade (QG), gain in the feedlot (FLGAIN) and days on feed (DOF) were influenced by pre-feedlot growth rate with the NR steers having higher ($p<.05$) MARB, QG, FLGAIN, and greater DOF. (Table 2.). In contrast carcass data from 1999 showed that pre-feedlot growth rate influenced slaughter weight (SLWT), HCW, REA, KPH and DOF. In this case the RG steers had greater ($p<.05$) SLWT, HCW, REA, KPH and less DOF than the NR steers (Table 2.).

The effect that breed of dam had on carcass characteristics was minimal. In 1998, there were only three dam types represented with the steers from B X A dams having greater ($p<.05$) SLWT, HCW and DOF than the other 2 dam types. In 1999 with the inclusion of A X A dams, there were four dam types represented. In 1999, steers with S X A dams had greater ($p<.05$) SLWT , HCW, KPH and DOF than the other three dam types.

Two different growth rates of steers during the grazing phase were accomplished by using oat and ryegrass pasture to increase growth rate in comparison to the growth rate from steers on native range. These different growth rates influenced carcass characteristics differently in each year. In 1998, growth rate influenced carcass quality (MARB and QG), whereas in 1999 growth rate influenced carcass traits (SLWT, HCW, REA and KPH) but not carcass quality. The different growth rates failed to have any influence on tenderness of the meat (WB shear force).

Table 1. Initial and ending data for the grazing periods [c] .

	1998			1999		
Item	n		S.E.	n		S.E.
	40	20		28	20	
Grazing Treatment	OAT	NR		RG	NR	
Start Grazing Weight	578	594		572	594	
BCS	5.2	5.1		5.0	5.3	
FS	5.0[a]	5.5[b]	.16	5.7	5.6	
End Grazing Weight	742[a]	656[b]	17.6	821[a]	705[b]	11.5
BCS	5.3[a]	4.5[b]	.12	5.8[a]	3.7[b]	.14
FS	4.7	4.8		5.5	5.7	
Grazing Gain	165[a]	65[b]	10.2	249[a]	111[b]	7.1
Grazing ADG, lb/day	1.8[a]	0.7[b]	.11	1.8[a]	0.8[b]	.05
Number of Grazing Days	92	93		135	138	

[a, b] Means within year and row differ at $p<.05$.
[c] Least squared means from the model y = intercept + grazetrt + sire + dam.

Table 2. Carcass data for steers [c].

Item	1998		S.E.	1999		S.E.
Grazing Treatment	OAT	NR		RG	NR	
Slaughter WT	1120	1141		1192[a]	1116[b]	12.1
Hot carcass WT	675	701		742[a]	688[b]	21.5
Fat cover at 12-13 rib, in	.38	.41		.57	.53	
Rib eye area, in^2	12.3	12.7		12.8[a]	11.7[b]	.28
KPH %	1.7	1.6		2.6[a]	2.2[b]	.10
Yeild Grade	3.0	3.2		3.4	3.3	
Marbling Score, 400=Low Choice	331[a]	361[b]	8.5	444	439	
Quality Grade, 10=Low Choice	8.7[a]	9.2[b]	.10	10.2	9.9	
WB shear force, lb/in^2	13.8	14.6		11.6	12.9	
Feedlot Gain	378[a]	486[b]	14.4	372	411	
Feedlot ADG	3.5	3.6		2.9	2.9	
Days on feed	111[a]	139[b]	5.0	126[a]	145[b]	3.5

[a, b] Means within year and row differ at $p<.05$.
[c] Least squared means from model y = intercept + sire + grazetrt + dam.