INTRAMUSCULAR LIPIDS IN GRASS-FED STEERS UNDER DIFFERENT GRAIN SUPPLEMENTATION[1]

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Introduction

Natural grass systems of beef production are common in Argentina. Our grass-fed beef is lean but good quality (García et al. 1994, 1995). Sometimes during fall or winter the grass is not enough and it is necessary to supplement with grain. The grain supplementation can increase the amount of intramuscular lipid (Marmer et al. 1984, Van Koevering et al. 1995) affecting the leanness of our beef. This is a critical point considering that consumers are increasingly aware of diet-health relationships. Many consumers believe that red meat is unhealthful because it has high levels of saturated fatty acids and cholesterol.

Objectives

The present investigation was conducted to determine the effects of finishing systems using grain, grass, or two different grain supplementation strategies on grass-fed steers intramuscular lipids.

Materials and Methods

Angus steers (n=40) with an average initial weight of 150kg were assigned randomly to four experimental treatments (Table 1). T2 and T3 were grass fed supplemented with corn grain at 1 or 1.5% of liveweight. T1 steers were fed "ad libitum" with corn grain and T2 always on grass.

Table 1. Experimental treatments

	Fall-Winter	Spring	Summer
T1 10	Feedlot	Feedlot	Feedlot
T2 10	Corn 1%	Grass	Corn 1.5%
T3 10	Corn 1%	Grass	Grass
T4 10	Grass	Grass	Grass

The animals were slaughtered according to commercial practices at an average liveweight of 380kg. After 24hs chilled samples (a slice of approximately 200 g from the middle of each muscle) of Semitendinosus (ST), Tensor fascia latea (TFL), Longissimus dorsi at 12-13th rib (LD), Psoas major (PM), Semimembranosus (SM), Gluteous (G), Biceps Femoris (BF) were taken. Intramuscular fat content (IMF) was determined in aliquot samples (10g) by hexane extraction of dried samples. Fatty acid composition was determined in TFL, BF and LD muscles according to García et al. (1994, 1995). Multivariate analysis of variance was performed using a least square model. Discriminant factor analysis (DFA) was performed to classify the steers according to the IMF%.

Results and discussion

The IMF % of the studied muscles are shown in Table 2.

Table 2. Intramuscular fat % in the muscles studied

Muscle	T1	T2	T3	T4
BF	4.6±1.63a	2.2±0.56b	2.2±1.14b	2.0±0.53b
TFL	6.2±2.54a	4.0±1.74b	3.0±0.78b	2.7±0.42b
ST	2.8±0.81a	1.8±0.48b	1.3±0.23b	1.6±0.31b
G	3.8±1.57a	2.0±0.53b	1.3±0.20b	1.5±0.33b
SM	3.5±1.15a	2.3±0.61b	1.3±0.20c	1.4±0.51c
LD	4.0±0.97a	2.6±1.73a	1.6±0.66a	2.0±0.51a
PM	4.8±1.72a	3.4±0.53b	3.0±0.58b	3.6±1.0b

a, b, c Values with different letters in the same row are different ($p<0.05$)

IMF% was higher in all T1 muscles ($p<0.05$) respect to T2, T3 and T4. T2 presented higher values than T3 and T4 in all muscles but the differences were only statistically different ($p<0.05$) for SM. In spite of that, DFA shows that using the IMF% was possible to get 90 % of the steers correctly classified (Fig. 1) showing clearly the different effects of the 4 diets on IMF%.

The IMF% were significatively ($p<0.05$) related among muscles (Table 3) indicating a general effect, at least in the studied muscles, of diet on IMF%.

Table 3. Simple correlation coefficients among IMF% in the different muscles

	BF	TFL	ST	G	SM	LD	PM
BF	1						
TFL	0.64	1					
ST	0.62	0.53	1				
G	0.79	0.79	0.60	1			
SM	0.59	0.80	0.59	0.78	1		
LD	0.50	0.59	0.57	0.57	0.69	1	
PM	0.53	0.64	0.51	0.67	0.71	0.45	1

r>0.30 p <0.05; r>0.39 p <0.01

The CV% in the IMF% in all muscles ranged between 31 and 65. The CV% were high in all muscles, indicating that IMF% is a very variable component. The fatty acid composition of IMF for TFL muscle is presented in Fig 2. The differences agree with the literature (Marmer et al. 1984) less 18:0 and more 18:1 in feed-lot beef compared with grass fed beef. The grass-fed beef has more 18:3 and PUFA.

Conclusions

Grass-fed steers can be supplemented with certain levels of grain without altering significantly the amounts of IMF% and the fatty acid composition of steer muscles.

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Fig. 1. Fatty acid composition of TFL muscle

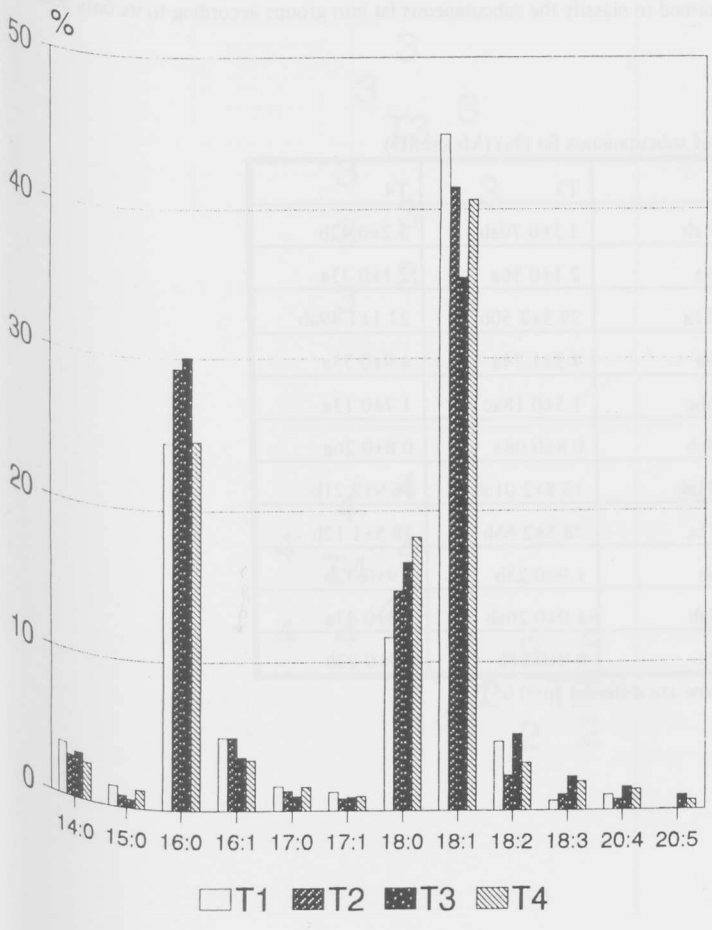

Fig 2. DFA performed to classify in groups according to the IMF% and DM in 7 muscles