IPIDS IN LONGISSIMUS MUSCLES FROM GRASS OR GRAIN FED STEERS

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ummary

The effect of grass or grain dietary regimen on Longissimus intramuscular fat and holesterol was examined using two groups of Angus steers slaughtered at similar level of inishing. Carcasses were graded and after a 24 hs chill the Longissimus muscle was emoved for analysis. Total intramuscular fat content, its fatty acid composition and total uscle cholesterol were determined. Grass steers were fatter than grain steers (fat hickness at 12th rib were .92 and .76 cm respectively). Grain fed Longissimus were fatter han that of grass fed (3.9 vs. 2.9%, p<.05) and with more cholesterol (73 vs. 66 mg%, .05). Grass fed Longissimus lipids presented more n-3 fatty acids and a lower relation 6/n-3 (1.6 vs. 2.1, p< 0.05).

ntroduction

The composition of the diet is seen by most medical opinion as one factor increasing he risk of the development of certain diseases via its influence on the level of blood holesterol. The hypercholesterolaemic-atherogenic potential of a food is related to its holesterol and saturated fat content.

Several studies have shown that tissue from forage-fed beef is leaner than tissue from rain-fed beef (Crouse et al., 1984; Brown et al., 1979; Marmer et al., 1984). Studies have een conducted that show that fatty acid composition of bovine fat is influenced by dietary egimen (Rumsey et al., 1972; Marmer et al., 1984).

There are conflicting reports in the literature regarding the effect of lipid omposition modifications of animal diets on the muscle cholesterol content (Bohac & Rhee, 988). The low correlation found between marbling score and cholesterol content suggests hat a large proportion of the cholesterol is present in structural lipids (Rhee et al., 982).

The objectives of the present study were to determine the effects of grass or grain iets on the intramuscular fat and cholesterol contents and in the fatty acid composition f Longissimus muscles from Angus steers.

aterials and Methods

Sixty-four steers Angus, at an average live-weight of 360 kg, were assigned to two ietary treatments (32 steers each). One group was placed on a mixed pasture and the other as fed with sorghum grain and corn silage ad libitum. At similar level of finishing ppraised by experts the steers were slaughtered. The steers were graded in fat degree 1 or (FD1 or FD2) according to Argentine National Meat Board standard regulations. Samples of ongissimus muscle at 10-12th ribs were obtained, the lean tissue was finely chopped and liquot samples were dried and extracted with hexane during 16 h to determine the weight of hemical fat or extracted with the Folch et al.(1957) method for fatty acid analysis. liquot samples from the chloroform extract were saponified and used for total cholesterol etermination with an enzymatic- colorimetric method (Roschlan et al., 1975).

The data were analyzed using the "Lineal General Program (SYSTAT 1987) with ntramuscular fat percentages as principal fixed effect and carcass weight as lineal ovariate, and cholesterol mg% as principal fixed effect and intramuscular fat percentage as ineal covariate.

esults and Discussion

Some carcass traits are summarized in Table 1. The grass-fed steers were fatter

(p <.05) than the grain fed ones according to the subcutaneous fat thickness and percentage of steers classified as FD2.

The percentages of intramuscular fat were higher in the grain-fed LD than in the grass fed (p<0.05) (Table 2). This results were similar to the findings of Marmer et al.(and Crouse et al.(1984) and shows the dietary effects on the intramuscular fat deposit The intramuscular fat % were lower than the values for LD.

The cholesterol content in the grass-fed LD muscles were lower than in the grain LD muscle (p< 0.05) (Table 2). Rhee et al.(1982) found no significant differences cholesterol content in raw steaks with different amounts of marbling except that steaks " Practically devoided " marbling contained significantly less cholesterol than did ste with any other marbling scores. Tu et al.(1967) indicated that the total cholesterol cont of muscle increases very little as the percent lipid value arose. The cholesterol conten muscle is lower than in intermuscular or subcutaneous fats (Rhee et al., 1982) then t cholesterol intake from beef may be reduced by trimming off the separable fat.

The fatty acid composition from total LD lipids in grass and grain-fed steers presented in Fig. 1. Significant differences were detected only for 15:0, 17:1, 18:3 20:3. Marmer et al.(1984) and Larick & Turner (1989) found similar results. Rumsey et al.(1972) show that cattle fed forage diets have more saturated fatty acid in their fat t cattle fed a concentrate diet. In our case, 14:0 and 16:0 decrease but 18:0 increases grass fed compared to grain fed. It can be seen that a small but significant differenc n-3 fatty acids between grass and grain fed steers was detected. In grass fed steers diet contain high amounts of linolenic acid (n-3). Though most linolenic acid is partly completely hydrogenated a small amount escapes hydrogenation and is absorbed and conver to n-3 PUFA. In contrast, in grain fed steers the seed's lipids contain mainly linoleic (n-6) and there is a very low intake of n-3 PUFA. In Fig. 2 are presented the to saturated, monounsaturated and PUFA fatty acids and the n-6/n-3 relation in grain and g

Table 1. Some characteristics of the steers.

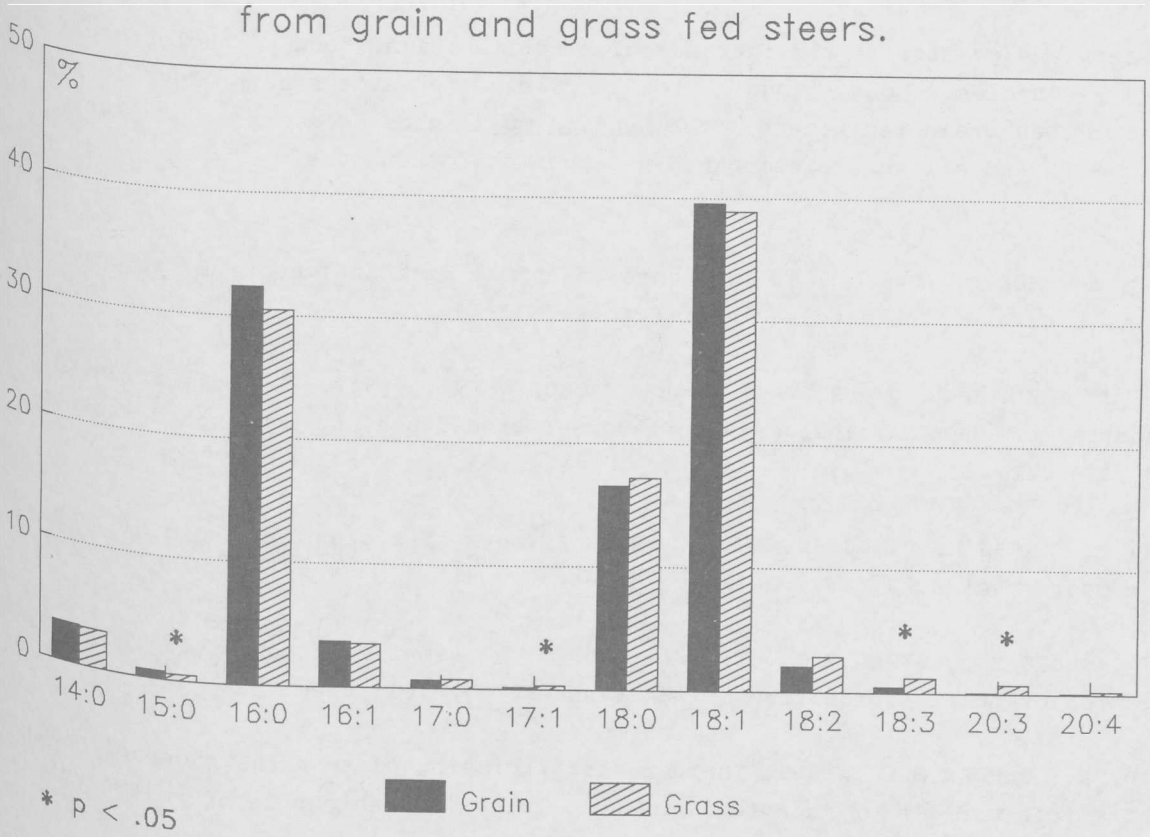
	Grain	Grass
n	32	32
Live weight, kg		
Initial	360	360
Final	436	465
Gain, g/day	.65	.59
Fat thickness		
12th rib, cm	.76	.92
Fat degree 1, (%)	31	22
Fat degree 2, (%)	69	78

Table 2. Total intramuscular fat and cholesterol in LD muscle. Mean and SD.

	Grain	Grass
IMF %	3.9+- 1.1	2.9+-0.9*
Cholesterol mg%	72.2+-13.7	66.6+-8.8*

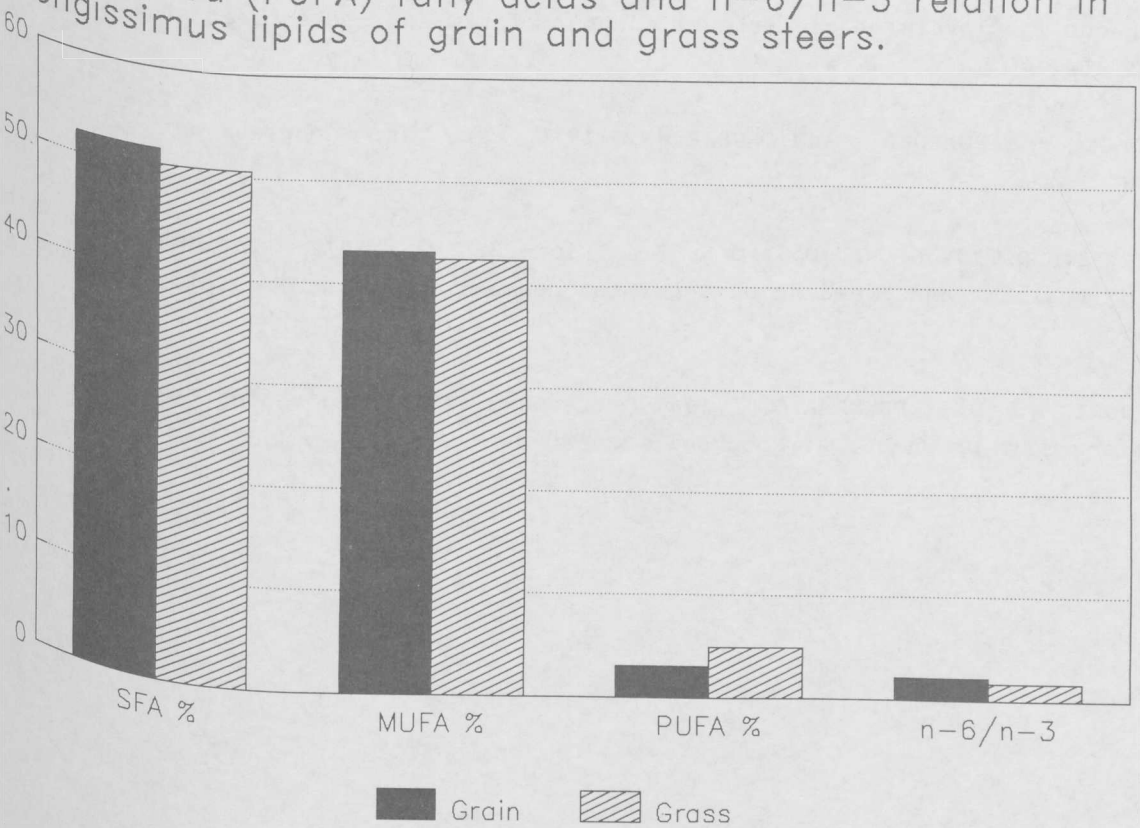
* p < .05

Fig.1. Fatty acid composition of LONGISSIMUS lipids from grain and grass fed steers.



* p < .05

Fig. 2. Saturated (SFA%), monounsaturated (MUFA%), unsaturated (PUFA) fatty acids and n−6/n−3 relation in longissimus lipids of grain and grass steers.



steer Longissimus lipids.

Conclusions

Dietary energy affects the intramuscular fat (marbling) and cholesterol of Longissimus muscles. Longissimus for grass fed steers have less intramuscular cholesterol than grain fed steers. The Longissimus lipids from grass fed steers have high levels of PUFA and a lower relation n-6/n-3 than the grain ones.

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