SERUM CHOLESTEROL AS A PREDICTOR OF INTRAMUSCULAR OR SUBCUTANEOUS LIPIDS IN STEERS**

Garcia, P.T.*, Pensel, N. A., Morales, D., Margaria, C. A., Rosso, O.(1)
Instituto Tecnologia de Alimentos. CICV. INTA
CC 77 (1708) Moron, Buenos Aires, Argentina.
(1) Dto Produccion Animal. EEA, INTA, Balcarce.
* FICA, UNLZ, Bs. As., Argentina
**INTA-AACREA Project

Keywords: intramuscular lipids, cholesterol, steers, serum

INTRODUCTION

Meats are considered for many people a source of dietary saturated fat and cholesterol. The concern about the dietary cholesterol and i effect in cardiovascular diseases has increases the needs to have indicators for meat cholesterol in the living animal. Serum cholesterol i related to lipid intakes and could be an indicator of intramuscular fat deposition.

The aim of this study was to determine the relationships between cholesterol serum levels determined monthly in 40 Angus grassing stee under 4 different diets (T1 grain supplemented, T2 grain supplementation in fall and summer, T3 grain supplementation only in fall and T4 no supplementation) and intramuscular lipids in seven selected muscles, subcutaneous fat fatty acid composition and also the mm of subcutaneous fat thickness.

MATERIALS AND METHODS

Forty Angus steers under 4 different diets (T1 grain supplemented, T2 grain supplementation in fall and summer, T3 grain supplementatio only in fall and T4 no supplementation at all) were used as experimental animals. Information about the experimental essay and intramuscula lipids were already published (García et al. 1996). Cholesterol serum levels were determined monthly, after 12 hrs without grai supplementation but on pasture when the steers were under supplementation at the sampling moment, with the method of (Roschlan et a 1975). At slaughter weight (380 kg) intramuscular lipid content (IMF) were determined by boiling hexane extraction of dry aliquot samples o Biceps femoris (BF), Tensor fascia latea (TFL), Semitendinosus (ST), Gluteous (G), Semimembranosus (SM), Longissimus dorsi at 12-13t rib (LD) and Psoas major (PM) muscles. Subcutaneous fat fatty acid composition at 10-12th ribs was determined using GLC (García et a 1996). The thickness of subcutaneous fat at this point was also recorded and subcutaneous fatty acid composition was determined using GLC The data were analyzed using a General Lineal Procedure (SAS Institute, 1987).

RESULTS AND DISCUSSION

The average serum cholesterol values from the 8 sampling were significantly ($p<0.05$) lower in T1 (3.8 mmol/l) and T2 (4.4 mmol/ compared to T3 (4.7mml/l) and T4 (4.9 mmol/l) (Table 1). This trend was consistently in all the 8 sampling and shows the diet effect i serum cholesterol. The CV% for serum cholesterol in the different sampling moments are presented in Table 2. In the same Table are given th mean cholesterol values and same statistical differences. The CV% for intramuscular fat are shown in Table 3. The values for CV% ar generally higher for IMF% than for serum cholesterol. In Table 4 the simple correlation coefficients between intramuscular fat % in the seve muscles and serum cholesterol are shown. Serum cholesterol was related significantly with intramuscular fat % (Table 4) but in different way according to the diet. In T1 negatively, with the high values in SM ($r=-0.80$ $p<0.01$) and PM (PM) ($r=-0.76$ $p<0.01$). In T2 no relationship were found, in T3 ($r=0.74$ $p<0.01$ in G and $r=0.65$ $p<0.05$ in PM) and in T4 in ST ($r=0.81$ $p<0.01$, $r=0.67$ $p<0.05$ in G and $r=0.72$ $p<0.01$ i Longissimus. No significant relation among cholesterol serum levels and subcutaneous fatty acid composition or subcutaneous fat mm wer detected (Table 5).

CONCLUSIONS

Steer serum cholesterol was related with intramuscular fat percentages in different ways according to diet and muscle. No relation amon cholesterol serum levels and subcutaneous fatty acid composition or subcutaneous fat mm were detected.

REFERENCES

GARCIA, P.T., PENSEL, N.A., MARGARIA, C.A., ROSSO, O. AND GOMEZ, P. 1996. Intramuscular lipids in grass-fed steers unde different grain supplementation. 1996. Procc. 42nd International Congress of Meat science and Technology. F-2 206-207

ROSCHLAN, P., BERNARD, E. and GRUBER, W. 1975. Int. Congress on Clin. Chem. Toronto. Abstr. No 1.

Table 1. Average steer serum cholesterol in the 4 treatment. Mean±SD and CV%.

Treatment	n	Mean ± SD	CV%
T1	80	3.8±0.4a	11
T2	80	4.4±0.5b	11
T3	80	4.7±0.7c	16
T4	80	4.8±0.6c	13

a,b, c. Means with different letters are significantly different $p<0.05$

Table 2. Variation Coefficients (CV%) for serum cholesterol in the 8 sampling moments in the 4 treatment. Means±SD and CV% in each sampling moment.

Sampling	T1 n=10	T2 n=10	T3 n=10	T4 n=10	All means±SD n=40	CV% n=40
S1	17	30	31	12	4.3±1.08c	25
S2	18	15	20	18	4.4±1.06c	24
S3	16	27	26	22	4.1±1.04ac	23
S4	14	13	18	21	3.6±0.80a	22
S5	19	16	32	15	4.7±1.22c	25
S6	11	11	11	14	4.6±0.65c	14
S7	16	8	12	12	4.7±0.64c	13
S8	15	9	9	13	5.3±0.79b	14

a,b, c. Means with different letters are significantly different $p<0.05$

Table 3. CV% for intramuscular fat in the different muscles for the four treatments.

	MUSCLE						
	BF	TLF	ST	G	SM	LD	PM
T1 n= 10	35	40	28	41	32	24	35
T2 n=10	25	43	26	26	26	66	15
T3 n=10	52	26	17	16	15	41	19
T4 n=10	26	15	19	22	36	25	27

Table 4. Simple correlation coefficients between plasma cholesterol mmol/l and intramuscular fat % in the seven muscles.

	MUSCLE						
	BF	TLF	ST	G	SM	LD	PM
T1 n= 10	-0.11	-0.31	0.09	-0.16	-0.79**	-0.01	-0.75**
T2 n=10	0.18	-0.07	-0.15	-0.10	-0.33	-0.51	-0.46
T3 n=10	0.20	0.19	0.06	0.74**	0.42	0.15	0.65*
T4 n=10	0.36	0.38	0.80**	0.66	0.53	0.72**	0.24

* $p<0.05$ ** $p<0.01$

Table 5. Simple correlation coefficients among plasma cholesterol and mm of sub fat and its fatty acid composition in mainly grain (T1+T2) or grass (T3+T4) regimen.

		Fatty Acid									
	mm Sub. Fat	14:0	15:0	16:0	16 :1	17 :0	17 :1	18 :0	18 :1	18 :2	18 :3
T1+T2	0.13	-0.38	-0.48	0.14	-0.08	-0.38	0.10	-0.04	0.11	0.06	0.25
T3+T4	0.28	-0.39	-0.40	-0.46	0.25	0.55	0.02	0.07	0.31	0.06	0.07