

EFFECT OF FEEDING LINSEED ON LIPOGENIC ENZYME GENE EXPRESSION OF RASA NAVARRA LAMB SUBCUTANEOUS AND INTRAMUSCULAR ADIPOSE TISSUES



M. Corazzin², O. Urrutia¹, J.A Mendizábal¹, K. Insausti¹, B. Soret¹, A. Arana¹ *.
¹Departamento de Producción Agraria. Universidad Pública de Navarra. SPAIN.
²Università degli Studi di Udine. ITALY.

INTRODUCTION

- Long chain n-3 polyunsaturated fatty acids (PUFA) and Conjugated Linoleic Acid (CLA) have potential health benefits, then it would be of interest to increase its content in the subcutaneous (SC) and intramuscular (IM) adipose tissues (ATs) in lamb.
- It was shown that supplementation of ruminant diets with n-3 PUFA resulted in an accumulation of these fatty acids and in an increase in vaccenic acid (VA) in AT, which can be catalyzed to 9c11t-CLA by the Steatoyl-CoA desaturase (SCoAD) enzyme in the AT.
- However, in cattle it was observed that despite an increase in VA concentration in muscle, 9c11t-CLA did not increase, likely due to down-regulation of the SCoAD gene attributed to PUFA.

OBJETIVES

- The main objective of this study was to examine the effects of n-3 PUFA diet supplementation (linseed enriched diets) on the gene expression of three main lipogenic enzymes, in lamb: SCoAD, Acetil-CoA Carboxylase (ACC), involved in fatty acid (FA) *the novo* synthesis and Lipoprotein Lipase (LPL) which is responsible for plasma FAs uptake.
- A previous experiment showed that the inclusion of linseed enriched diets resulted in an increase in n-3 PUFA, VA and alpha linolenic acid (ALA) (IM: P<0.001, SC: P<0.01) and that 9c11t-CLA did not change, in both depots. Then, to studying the gene expression of the afore mentioned enzymes could help to clarify the mechanisms involved in these results.

RESULTS

- SCoAD gene expression decreased in both depots (P<0.001) when linseed was included (10%).
- The inclusion of linseed (10% in SC and 5% in IM depot) caused an ACC gene expression decrease in both depots (P<0.001).
- LPL gene expression increased in SC depot (P<0.01) and decreased in IM depot (P<0.05) when diets were enriched with linseed.

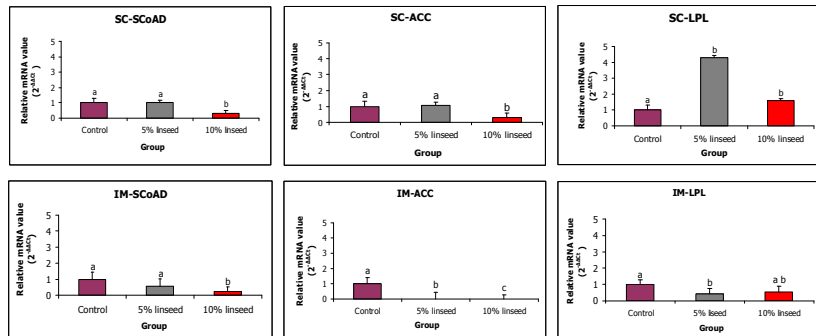


Figure 1. Relative gene expression of ACC, LPL and SCoAD on subcutaneous (SC) and intramuscular (IM) adipose depots. Expression was normalized against β -actin and Control group was considered as calibrator. Data are expressed as means + SEM.

CONCLUSIONS

- The decrease of SCoAD desaturase gene expression in SC and IM adipose tissues of lambs fed on linseed could be related to the non variation of CLA content although there was an increase of VA, in both depots. This result agrees with the inhibitory effect of n-3 PUFA previously observed in cattle and is important when implementing animal diets aiming to increase the PUFA content in meat.
- The decrease in the *de novo* synthesis regulation enzyme (ACC) in both depots likely due to the higher content of n-3 PUFA in the fat from linseed caused.
- The differences between depots in the expression of LPL may suggest depot different patterns during fattening.

MATERIAL AND METHOD

- Animals: 36 male Navarra Breed lambs



Weight	Group	Diet	ME (Mcal/kg)	CP (% FM)
Weaning 15 kg	C (n=12)	Barley and soya	2.7	14.56
	L-5 (n=12)	Barley and soya + linseed 5%	2.75	14.35
Slaughter 26 kg	L-10 (n=12)	Barley and soya + linseed 10%	2.82	14.48

- Growth, carcass and fatness parameters

Table 1. Live Weigh (LW), Average Daily Gain (ADG), Cold Carcass Weight (CCW), Back Fat Thickness (BFT), % of Intramuscular Fat (%IMF) and diameter of intramuscular (\emptyset IM) and subcutaneous (\emptyset SC) adipocytes.

Group	LW (Kg)	ADG (g/d)	CCW (Kg)	BFT (mm)	IMF (%)	\emptyset SC (μ m)	\emptyset IM (μ m)
C	26.6	317.0	11.4	3.0	2.34	80.1	33.5
L-5	26.3	315.0	11.6	3.0	2.17	85.7	35.7
L-10	26.5	319.0	11.5	3.2	2.25	79.3	35.8

- Gene expression

- Genes: SCoAD, ACC & LPL
- qPCR ($\Delta\Delta$ Ct Method)
- Anova (SPSS 18)

