CAN RESTRICTED GRAIN SUPPLEMENTATION PRACTICE UNDER GRAZING CONDITIONS CHANGE FATTY ACID COMPOSITION IN LAMB MEAT?

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IC+MST 2009 55th International Congress of Meat Science and Technology

Keywords: supplementation, grazing, lamb, carcass and meat quality.

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1 ABSTRACT

75 Corriedale purebred or Merino Dohne crossbred lambs were assigned into 3 treatments (T) with different proportions of pasture (P) (mixture of *Plantago lanceolata cv. Tonic* and *Lotus corniculatus cv. INIA Draco*) and entire sorghum supplementation (C), where: T1, P (4% of live weight, LW); T2, P (2% LW) plus C (0.8% LW); and T3, P (2% LW) plus C (1.6 % LW). The intramuscular fat content (IMF) of the Longisimus dorsi (LD) muscle was not affected by feeding regimes (P>0.05). The IMF meat concentrations of linolenic (18:3 n-3) and EPA (20:5 n-3) were higher for T1 compared with T2 and T3 (P<0.05). The most important fatty acids presented in the IMF were oleic (18:1), palmitic (16:0) and stearic (18:0), which represented between 84.9 and 87.8 % of the total fatty acids evaluated. However, there were not significant differences between treatments (P>0.05) in those fatty acids. There were also no significant differences (P>0.05) in PUFA, MUFA and SFA concentrations between treatments. Similar results were found (P>0.05) for the PUFA/SFA and Ω6:Ω3 ratios, corresponding to 0.22 vs. 0.20 vs. 0.21 and 2.34 vs. 2.53 vs. 2.79 for T1, T2 and T3, respectively.

2 INTRODUCTION

Human nutrition science has demonstrated the importance of food consumption patterns on human health, in particular related to the influence of fat concentration and profile in human diet. Animal feeding has a major importance in changing meat fatty acid composition, influencing human health and consumer perceptions about feeding patterns. In Uruguay, restricted grain supplementation on fattening lambs under grazing conditions is one of the technology options available to increase production. Under restricted pasture conditions, supplementation also improved lamb carcass and meat quality. Studies have shown that the inclusion of certain amounts of concentrates in the diet of grazing lambs on improved pastures, could improve animal performance, carcass and meat quality, sensory attributes, and consumer acceptance without changing the fatty acid composition compared with the grass fed animals.

3 METHODS

• Animals: 75 castrated Corriedale purebred or Merino Dohne crossbred lambs whit. Pasture dominated by a mixture of *Plantago lanceolata cv.* Tonic and *Lotus Corniculatus cv.* INIA Draco and sorghum grain supplementation.

• Treatments: T1) pasture 4% of liveweight (LW), T2) pasture 2% LW plus concentrate 0.8% LW and T3) pasture 2% LW plus concentrate 1.6 % LW.

• Slaughter: Age, 12-13 month

The variables measured were: liveweight gain (LWG), final live weight (FLW), carcass tissue depth at GR point (GR), and hot carcass weight (HCW).

Animals were slaughtered at a commercial slaughterhouse. A portion of LD was vacuum-packaged and frozen for subsequent analysis. Samples were submerged in liquid nitrogen (-196 ºC), pulverized and stored at -20 ºC. Total lipid was determined by chloroform-methanol procedure.

The FAME were analyzed using a Konik HRGC 4000B gas chromatograph, and separated using a 100-m SP 2560 capillary column (0.25 mm i.d. and 0.20 µm film thickness, Supelco, Bellefonte, PA). Nitrogen was the gas carrier at a flow rate of 1 mL/min. Individual fatty acids were identified by comparison of retention times with standards (Sigma, St. Louis, MO; Supelco, Bellefonte, PA; Matreya, Pleasant Gap, PA). Fatty acids are expressed as percentages of the sum of all fatty acids measured.

4 RESULTS

Table 1 – Mean values for carcass traits

	Treatments			
Variable	**T1**	**T2**	**T3**	**P**
LWG (g/d)	163 a	134 b	148 ab	**
FLW (kg)	53.0 a	49.8 b	51.5 ab	*
GR (mm) [1]	9.8	8.7	10.0	ns
HCW (kg)	22.9 a	21.7 a	22.7ab	**

References: ns: not significant (P>0.05), *: P<0.05. a, b: means with different letters among columns are significant different at P<0.05. 1: adjusted by HCW.

Table 2 - Mean values for meat quality parameters

		Treatments			
Variable	**CF**	**T1**	**T1**	**T3**	**P**
IMF (g/100g)		3.8	4.2	4.0	ns
Fatty Acid (g/100gFA)					
C14:0	Ln	1.9 b	2.0 a	1.9 b	*
C14:1	-	0.3	0.3	0.3	ns
C16:0	-	24.3	23.7	24.2	ns
C16:1	1/Ln	1.4	1.5	1.5	ns
C18:0	-	18.1	18.4	19.0	ns
C18:1	Ln	43.3	44.5	43.1	ns
C18:2n6	-	4.4	3.8	4.1	ns
C 20:0	Ln	0.10 b	0.13 a	0.12 ab	*
C18:3n6	1/Ln	0.08	0.08	0.09	ns
C18:3n3	-	1.9 a	1.5 b	1.4 b	**
C20:2n9	-	0.25	0.27	0.29	ns
C20:3n3	Ln	0.15	0.13	0.15	ns
C20:3n6	Ln	0.09	0.08	0.09	ns
C20:4n6	Ln	1.26	1.33	1.51	ns
C20:5n3	-	0.82 a	0.68 b	0.70 b	*
C22:5n3	Ln	0.60	0.55	0.57	ns
C22:6n3	Ln	0.25	0.21	0.22	ns
CLA	Ln	0.73	0.71	0.70	ns
SFA		44.4	44.2	45.3	ns
MUFA		45.0	46.3	44.9	ns
PUFA		9.8	8.7	9.1	ns
PUFA/SFA		0.22	0.20	0.21	ns
Ω6: Ω3		2.34	2.53	2.79	ns

References: ns: not significant (P>0.05), *: P<0.05 and **: P<0.01.
a, b: means with different letters among columns are significant different at P<0.05.

5 CONCLUSIONS

Lowers contents of SFA and higher contents in MUFA are considered beneficial to human health, but in particular more emphasis is now focused on having a greater content of PUFA, especially of the n3 series as well as achieving the recommended Ω6:Ω3 ratio. Under our experimental conditions, the use of restricted amounts of grain supplementation in lambs under grazing conditions did not have major influence in the fatty acid composition of the IMF compared with those of grass fed lambs.

ACKNOWLEDGEMENTS

Authors thank to AECID (Agencia Española de Cooperación Internacional para el Desarrollo) for financial and technical support.