FATTY ACID PROFILE OF MEAT OF FRIESIAN CALVES CROSSED WITH RUBIA GALLEGA AND LIMOUSINE

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Abstract – Nineteen animals of two groups (Rubia Gallega crossed with Friesian [RG×F] and Limousine crossed with Friesian [LI×F]) were used in this study in order to evaluate the effect of crossbreeding on the fatty acid profile resulting calves. Male calves were reared in an intensive system and were fed with feed and straw, and slaughtered at the age of 10 months. The results showed that LI versus RG crossbreeding did not have significant effect on nutritional quality of the intramuscular fat (IMF). In general, the crosses LI×F showed the higher fatty acid contents. The most abundant fatty acids were SFA, with values that ranged between 46.32% and 47.77%, followed in importance by MUFA and PUFA.

Key Words – intramuscular fat, nutritional quality, crossbreed

I. INTRODUCTION

Nowadays, consumers demand healthy and high quality food products, linked to raising and natural food, obtained with native breeds and traditional agricultural practices, related to environment, ecological and welfare aspects, because they associate meat from these animals with high quality products [1]. The use of local breeds is a good alternative to beef production system, being possible consider crossbreeding programs with imported beef breeds in order to improve the lipid of meats offering consistently high meat quality and hence the consumer acceptability [2, 3]. The most common programs use Friesian (F), Limousine (LI) and Rubia Gallega (RG) [1]. Breed is one of the production factors that have a great influence on intramuscular fat content and its lipid profile [4]. These parameters are consider important quality indicators and have a great influence on consumer acceptability [5]. Thus, the aim of this research is to describe the effect of the breed used for crossbreeding (RG or LI with Friesian), on fatty acid profile of resulting calves.

II. MATERIALS AND METHODS

The study was carried out with 19 calves that were divided into two groups: 9 from crossbreed Rubia Gallega x Friesian (RG×F) and 10 from crossbreed Limousine x Friesian (LI×F). Male calves were reared in an intensive system and were fed with feed and straw, and slaughtered at the age of 10 months. The day before slaughter, the cattle were weighed and transported to the abattoir, trying to minimize animal stress. Animals were stunned with a captive bolt, and slaughtered and dressed according to current EU regulations [6]. The muscle *longissimus dorsi* (LD) was extracted from the left half of each carcass. The extraction of fat for the determination of fatty acid composition was performance following the method proposed by Bligh and Dyer [7]. The transesterification, identification and quantification of fatty acid methyl esters took place using gas chromatography techniques according to the chromatographic conditions described by Domínguez *et al.* [8]. Results were expressed as percentage of total fatty acids (FAMES). ANOVA of one way using SPSS package (SPSS 19.0, USA) was performed.

III. RESULTS AND DISCUSSION

The fatty acid profile of the intramuscular fat (IMF) of Friesian crosses RG×F and LI×F that presented more than 1% of total FAMEs are shown in Table 1. A total of 18 FAMEs were detected and quantified. The FAMES which represented less than 1% will also take into account in the saturated fatty acids (SFA), monounsaturated (MUFA) and polyunsaturated fatty acids (PUFA). The most abundant fatty acids were SFA, with values that ranged between 46.32% and 47.77%. Followed in importance by MUFA and PUFA. This behavior is in agreement with the results found in other crosses [1, 9]. Palmitic and stearic acids were the most abundant SFA, with mean percentages of 24.87% and 18.67%, respectively, with higher contents in the crossbreed LI×F. Regarding MUFA, oleic acid was the most abundant (approximately 80% of total MUFA). Furthermore, it was also the most abundant on fatty acid profile, which represented around 28% of the total FAMES. Similar values were obtained in other crosses and Spanish beef cattle breeds [1, 9, 10]. Finally, linoleic acid had the highest contents of PUFA, with mean values of 10.48%, following by arachidonic acid that showed values higher than 1.5%. These percentages were higher than those found by the aforementioned authors [1, 9].

To assess the nutritional properties of IMF, the ratio between PUFA and SFA (P/S) were determined (Table 1). The mean values obtained were lower than the FAO recommendations for human diet (0.85) [11]. These values were higher

than those found in other crosses with Holstein-Friesian [1, 9]. With regard the ratio n6/n3, the values obtained were higher than the recommendations of FAO that should not exceed 4.0 [11].

Table 1. Main fatty acid profile (more than 1% of FAME) of *longissimus dorsi* (LD) muscle from Friesian crosses

	RG×F	LI×F	SEM	SIG
C14:0	2.26	2.31	0.13	n.s.
C16:0	24.51	25.22	0.65	n.s.
C16:1n-7	2.49	2.55	0.12	n.s.
C18:0	18.42	18.89	0.65	n.s.
C18:1n-11t	3.21	4.61	0.39	n.s.
C18:1n-9	29.94	26.16	1.66	n.s.
C18:2n-6	10.31	10.65	0.81	n.s.
C20:4n-6	1.81	1.93	0.14	n.s.
SFA	46.32	47.77	1.24	n.s.
MUFA	36.26	34.04	1.39	n.s.
PUFA	13.76	14.23	1.14	n.s.
n6	12.63	13.14	0.97	n.s.
n3	1.13	1.09	0.22	n.s.
n6/n3	13.37	15.57	0.93	n.s.
P/S	0.30	0.31	0.03	n.s.

SEM: Standard error of the mean; SIG: n.s. (not significant).

IV. CONCLUSION

The content and composition of fatty acids in meats are important factors in assessing their nutritional quality. Rubia Gallega and Limousine are considered high quality breeds. This study allowed to obtain more accurate results about the nutritional quality of the cross-bred calves. As a general conclusion, the breed used for crossbreeding with Friesian did not have significant effect on the fatty acid profile and the nutritional properties of IMF.

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