INCLUSION OF MILK WHEY ON THE FINISHNG DIET OF PIGS: EFFECT ON FATTY ACID PROFILE

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Abstract – The influence of finishing diet on fatty acid profile of pig meat was studied. The results suggested that the inclusion of milk whey in the pig diet have slightly effect on fatty acids. The differences found were less than 1% in MUFA and PUFA, while SFA did not show differences. As a general conclusion, the partial substitution of feed by whey provides us with an alternative for the reduction of production costs without affecting largely the fatty acids.

Key Words – Nutritional value, reduce production costs, dairy by-products

I. INTRODUCTION

Meat and meat products are basic components of diets in developed countries. It is well known that nutritive values of pork depends on the fat content and fatty acids composition, and both factors have strongly influence in human health [1]. Recently, a number of epidemiological studies have associated meat consumption with the development of two of the major chronic diseases in the Western world; cardiovascular disease and colon cancer [2]. On the other hand, it is well known that diet have a great influence on the fatty acid composition of animal tissues [3]. Some fatty acids respond faster to dietary change than others. The use of by-products (as milk whey) in the feeding of pigs would reduce production costs and bring a product with healthier fat. Therefore, the aim of this research was the study the inclusion of milk whey in the finishing diet of pigs on the fatty acid composition of intramuscular fat.

II. MATERIALS AND METHODS

II.1 Animal management and sample collection

For this study, thirty pigs reared in an intensive system were used. All animals were feed with compound feed, however, 3 months prior to slaughter, 15 animals were also feed with a milk whey. The animals were slaughtered by electrical stunning and exsanguination. After the refrigeration period (24 h at 4 °C), samples from loin (*Longissimus dorsi* muscle) from each carcass were obtained. All samples were minced and frozen at -20ºC until their analysis.

II.2 Fatty acid profile

Total fat was extracted from 10 g of ground meat sample according to Bligh and Dyer method [4]. Total fatty acids were quantified according to Domínguez *et al.* [5] procedure. Fifty milligrams of fat were used to determine the fatty acid profile. Separation and quantification of the FAMEs was carried out using a gas chromatograph following the chromatographic conditions described by Domínguez *et al.* [5]. Results were expressed as % of total fatty acids.

II.3 Statistical analysis

The effect of finishing diet on fatty acids profile was examined using a one-way ANOVA. All analyses were conducted using the IBM SPSS Statistics 19.0 program software package.

III. RESULTS AND DISCUSSION

The fatty acids that presented more than 1% of total FAMEs of pig meat are shown in Table 1. Besides we did not show all FAMEs in Table 1, a total of 22 FAMEs were detected and quantified. The FAMES which represented less than 1% will also be discussed below and taken into account when making the SFA, MUFA and PUFA sum. The content and composition of specific fatty acids in meats are important factors in assessing its nutritional quality. Nine out of twenty-two fatty acids were influenced by the finishing diet. In this study, meat from animals feeding with both diets showed the prevalence of MUFA (51%) followed by SFA (39%) and PUFA (8-9%) (data not shown). The fatty acids profile were similar to those reported by other authors in pigs [6-9], who described MUFA as majority fatty acids, followed by SFA and PUFA. In the studies of De Jesus et al. [6,7] and Domínguez et al. [9], the SFA content was between 35 and 39%, MUFA between 50 and 57% and PUFA between 8 and 10%. However, Domínguez and Lorenzo [8] described higher values of SFA in Carballiña and Barcina lines of Celta pigs (42-43%). On the other hand, finishing diet did not affect the amounts of SFA in meat. Within SFA, only C17:0 (0.24 *vs.* 0.19% for control and whey diets, respectively; $P<0.001$) and C20:0 (0.16 *vs.* 0.17%, for control and whey diets, respectively; $P<0.05$) showed significant differences.

In contrast, the MUFA content showed significant differences between diets; since animals feed with control diet presented the highest values (51.64 vs. 51.01%; $P<0.05$). These differences were due to the highest values of C17:1n-7, 11t-C18:1, C18:1n-9 and C20:1n-9. The most notable differences were observed in C18:1n-9, where control samples presented the highest values.

Table 1 Main fatty acids (more than 1% of total FAMEs) of pigs feed with control and milk whey diet

	Batch			
	Control	***Milk Whey***	***SEM***	**Significance**
C14:0	1.41	1.44	0.024	ns
C16:0	25.14	25.32	0.158	ns
C16:1n-7	3.20	3.31	0.081	ns
C18:0	12.13	11.98	0.182	ns
C18:1n-9	43.11	42.51	0.238	**
C18:1n-7	3.95	3.94	0.055	ns
C18:2n-6	6.58	7.23	0.215	**
C20:4n-6	1.13	1.11	0.057	ns

Significant level: ** P<0.01, ns= not significant

As occurs in MUFA, PUFA content also were influenced by finishing diet. In this case, control samples presented lower values of PUFA (8.87 *vs*. 9.50%) than animals feed with whey. The total *n*-3 PUFA did not show significant differences between diets (0.58% in both cases), while total *n*-6 PUFA of samples from animals feed with whey were higher ($P<0.05$) than samples from control (8.20 *vs*. 8.85%, for control and whey samples, respectively).

IV. CONCLUSION

Despite the differences commented in result and discussion, the changes in fatty acids profile were very low. This may be related to the fact that the amount of milk whey was very low, or that the finishing diet period was not large enough to observe greater differences. With the results in mind, the partial substitution of feed by whey provides us with an alternative for the reduction of production costs without affecting to a great extent the fatty acids profile.

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