

PHYSICOCHEMICAL PROPERTIES OF CACHENA PÂTÉ AFFECTED BY PARTIAL SUBSTITUTION OF PORK FAT WITH OLIVE AND CANOLA OIL

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I. INTRODUCTION

Cachena is a native bovine breed, with small size and high rusticity. Due to its characteristics, it is a low profitable meat to cattle breeders. It is included as an endangered species in the Official Catalogue of Cattle breed of Spain (RD 2129/2008) with animal census in Galicia of 4,146 (December 31th 2017). Increasing its applications, the breed sustainability could be solved. Pâté is a very popular and cheap cooked meat product manufactured worldwide [1] and forms part of the gastronomic culture in some countries such as Spain, France, Germany and Denmark [2]. It is made with minced liver, animal fat, meat mixed with water and different condiments and additives, which is then applied a heat process. Due to its high content of saturated fatty acids (SFA) and its high caloric content, there are many concerns on the part of consumers [3]. With the aim of improve the quality of the final product, it is necessary to achieve a better reformulation by decreasing the fat content, and/or substituting the animal fat commonly present in the product with another with healthier characteristics [1]. Therefore, the objective of this study was to elaborate pâté by the partial replacement of fat with olive and canola oil and assess how it affected on physicochemical characteristics.

II. MATERIALS AND METHODS

Firstly, cachena liver, cachena lean and pork fat were chopped in large cubes (7 x 7 cm), were vacuum packaged separately and were scalded for 30 min at 80 °C. Ingredients were added and homogenized in a bowl cutter (Sirman, mod C15VV, Marsango, Italy) to the liver and lean in 3 steps according to Dominguez *et al.* [3]. Different amounts of canola (C.O.) and olive oil (O.O.) were added and mixed in the corresponding batch, warm water (65 °C) was added until a homogeneous batter was formed (see Table 1). Finally, the meat batter was manually distributed into metal cans until completely full (100 g) and these were then hermetically closed prior to thermal treatment (80°C during 30 min) in an autoclave (Ster PE 50–100 mini, ILPRA, Barcelona, Spain). The pâté samples were cooled in a blast chiller (-21°C for 30 min) and then were stored in the dark at 4°C for 1 day. The 4 batches mentioned before were manufactured with the same ingredients, formulation, and technology in two different times. Five cans of each batch were taken for the analyses. Physicochemical and colour properties were evaluated following methods described by Dominguez *et al.* [3]. The effect of different fat source on physicochemical properties was examined using a one-way ANOVA, with IBM SPSS Statistics 23 software package.

III. RESULTS AND DISCUSSION

Statistical analysis did not show significant differences ($P>0.05$) on moisture, protein and ash values among batches. All pâtés contained very similar moisture (50.06–56.20 %), protein (14.01–14.58 %) and ash (2.71–2.77 %) levels. These results are in agreement with those found by Dominguez *et al.* [4] who did not find significant differences in moisture, fat or protein among pâté batches. On the other hand, fat content displayed significant differences among groups, presenting the highest fat percentages in samples manufactured with olive oil. This fact could be due to the lower lipid content of pork backfat (around 93%) in comparison with olive oil since pork backfat also contains protein and water [5]. This result is in disagreement with those reported by other authors [4, 6] who did not find significant differences on fat content among formulations.

Table 1. The effect of the partial replacement of pork backfat by olive and canola oil on physicochemical composition and color parameters.

		Control	50% O.O.	50% C.O.	50% O.O. / C.O. (1/1)	SEM	Sig.
Physicochemical composition	Moisture (%)	56.20	50.06	52.18	51.29	1.064	ns
	Protein (%)	14.01	14.19	14.58	14.57	0.096	ns
	Fat (%)	25.07a	29.29b	23.39a	25.80ab	0.736	*
	Ash (%)	2.71	2.74	2.77	2.73	0.014	ns
	TBARS (mg MDA/kg)	0.46b	0.37a	0.74c	0.75c	0.041	***
Color parameters	Luminosity (L*)	60.42b	57.41a	56.07a	56.97a	0.479	**
	Redness (a*)	11.13a	11.99b	12.59c	12.70c	0.161	***
	Yellowness (b*)	17.77a	18.30ab	17.61a	18.53b	0.135	*

SEM, standard error of the mean; Sig, significance; *** ($P<0.001$), ** ($P<0.01$), * ($P<0.05$), n.s. (not significant). ^{a-c} Mean values in the same row (corresponding to the same parameter) not followed by a common letter differ significantly ($P<0.05$).

The lower TBARS values observed in olive oil are caused by antioxidant compounds and high content of monounsaturated fatty acids [5]. On the contrary, the addition of canola oil incremented the lipid oxidation (Table 1). Color parameters were significantly affected by the partial replacement of pork backfat by oils, where the control group presented the highest luminosity values and the lowest redness values. These parameters are intimately related to color properties of raw matter utilized in the formulation, hence, the proportion of the ingredients used could cause to different colors in the finished product [3]. These outcomes are in agreement with data reported by Morales-Irigoyen *et al.* [7] who found significant changes ($P<0.05$) in lightness and redness when fat was substituted by emulsified canola oil.

IV. CONCLUSION

Lipid modification of Cachena pâté by partial substitution of pork backfat with olive and canola oil could be a good strategy to improve this product, nevertheless it is necessary to carry out a more exhaustive study.

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