NUTRITIONAL ADVANTAGES OF DRY FERMENTED SAUSAGES ELABORATED WITH VEGETABLE OILS

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BACKGROUND

Meat industry is trying to develop new products or to modify traditional ones in order to increase nutritional advantages without decreasing their typical characteristics (flavour, odour, taste..). Chorizo the Pamplona is a traditional Spanish dry fermented sausage with a great acceptance by consumers but its fat content can imply an inconvenience for certain sectors of population. Fat contributes to the flavour, texture, mouth feel, juiciness and overall sensation of lubricity of these products, not being easy its reduction. Several attempts have been done to reduce the pork backfat content. Among others, vegetable oils have been employed as partial substitutes (Marquez et al., 1989; Park et al., 1990; Riendau, 1990; Bloukas & Paneras, 1993; Bloukas et al., 1997a; Paneras & Bloukas, 1994; Park et al., 1989; Pappa et al., 2000; Bloukas et al.,1997b; Muguerza et al., 2002). In a previous work, Muguerza et al. (2001) elaborated Chorizo de Pamplona with different percentages of pre-emulsified olive oil. It was concluded that up to 25% of pork backfat could be replaced with pre-emulsified olive oil in the production of this kind of fermented sausages. Higher replacing levels resulted in considerable dripping of fat during ripening.

OBJECTIVE

The aim of this work was to evaluate the nutritional advantages of technologically viable dry fermented sausages elaborated with pre-emulsified vegetable oils. Furthermore, a comparison of the nutritional advantages between olive or soy oil in the elaboration of these products was studied.

METHODS

Sausage formulation and processing

Two experiments were carried out, in both of them two batches of Chorizo de Pamplona were elaborated (control and modified product) following traditional technology (Muguerza et al., 2001). Control products were produced using 75% of pork meat and 25% of pork backfat. Modified products were elaborated using a pre-emulsified olive oil or a pre-emulsified soy oil, respectively, substituting 25% of the pork backfat.

Chemical analysis

The method of Folch et al. (1957) was used for the extraction of lipids. Fatty acid composition was determined by gas chromatography. Boron trifluoride/methanol was used for the preparation of fatty acid methyl esters (AOAC, 1990). Fatty acids were determined according to Muguerza et al. (2001).

Data analysis

Values of fatty acid profile and cholesterol were the mean of four determinations per batch. Student t test was used to determine significant differences ($p<0.05$) between the two types of sausages in each experiment.

RESULTS AND DISCUSSION

Myristic and stearic acids show similar amounts in pork backfat, olive oil and soy oil, however, in soy oil products myristic acid showed a small decrease with regard to control, but without relevance in relation to the total saturated fraction due to its small content. In relation to palmitic acid, although it is present in lower content in vegetable oils than in pork backfat, no significant decrease was found in this acid in olive oil products. The decrease of palmitic acid showed in soy oil sausages was responsible for the lowest amount of total saturated fatty acid (SFA) in this type of products.

Oleic acid increased significantly ($p>0.001$) when olive oil was added (38.89 to 47.70 g/100 g of fat), whereas a significant decrease ($p<0.05$) in this acid was observed in soy oil products (35.36 to 28.26 g/100 g of fat). A small decrease was observed in palmitoleic acid being significant in the two experiments ($p< 0.05$; $p< 0.01$, respectively). The sum of monounsaturated fatty acid (MUFA) was higher than control in olive oil sausages but lower than control in soy oil products, as a result of the oleic acid modification. As it was expected, linoleic and linolenic acids, did not show significant differences between control and olive oil products, however, linolenic acid increased from 10.53 to 14.69 g/100 g of fat increasing the sum of polyunsaturated fatty acid (PUFA). In soy oil products these acids increased significantly from 11.50 to 15.37 and from 0.86 to 1.28 g/ 100 g of fat, respectively ($p<0.001$; $p<0.01$) due to their high abundance in soy oil.

Although the total SFA, MUFA and PUFA of dry fermented sausages did not show great modifications, ratios MUFA+PUFA/SFA-stearic and PUFA/SFA-stearic increased in a significant way in both experiments being the last ratio almost double in soy oil products. The use of olive and soy oils leaded to a reduction in cholesterol content of 12.92% and 5.65%, respectively.

CONCLUSIONS

- Ratios MUFA+PUFA/SFA-stearic and PUFA/SFA-stearic increased with both type of oils.
- Olive oil sausages showed the highest reduction in the cholesterol content.

PERTINENT LITERATURE

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Fig 1. Profile of the most representative fatty acids (g/100g fat)

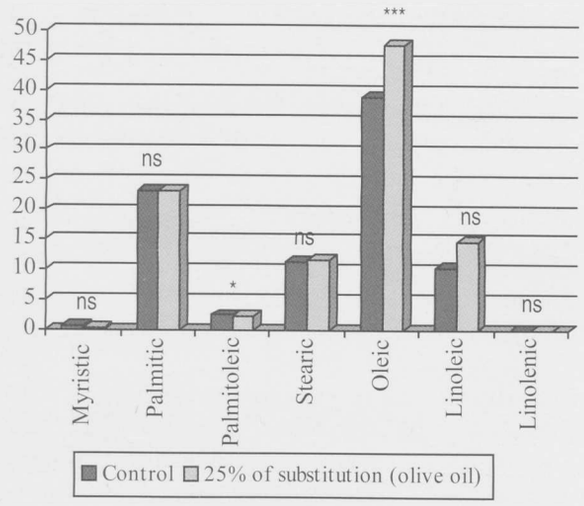
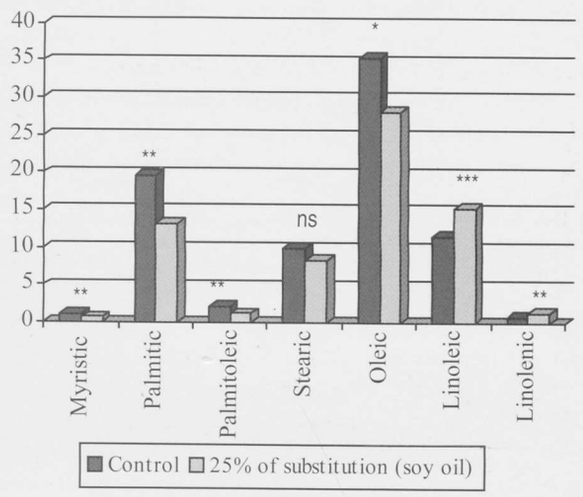


Fig 2. Profile of the most representative fatty acids (g/100g fat)



Level of significance: ns, not significant; *, p <0.05; **, p <0.01; ***, p <0.001.

Table 1. Parameters related to fatty acid profiles and cholesterol.

	Olive oil		Soy oil	
	Control	25%	Control	25%
Σ SFA-stearic (g/100 g product)	8.53	7.92	7.21	4.89
Σ MUFA (g/100 g product)	14.07	16.26	12.82	9.75
Σ PUFA (g/100 g product)	3.68	4.87	4.26	5.55
MUFA+PUFA/SFA-stearic	2.08	2.67	2.31	3.13
PUFA/SFA-stearic	0.43	0.61	0.58	1.13
Cholesterol (mg/g product)	94.24	82.06 (**)	92.96	87.71 (n.s.)

SFA, saturated fatty acid; MUFA, monounsaturated fatty acid; PUFA, polyunsaturated fatty acid; ns, not significant; **, p <0.01.