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Physicochemical characterization of Majorcan Black Pig lard

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Abstract. The *Ensaimada de Mallorca* is a typical sweet from the Island, made of flour and animal fat, and it is covered by a Protected Geographical Indication. Its name derives from *saïm*, which means pork lard in Catalan, and until the first half of the twentieth century it came exclusively from Majorcan Black Pigs. Currently, the Majorcan Black Pig lard is not used any more in the elaboration of *Ensaimada*. In the present study the physicochemical properties and thermal behaviour of fat from Majorcan Black Pigs were determined. The effect of the different origins of fat tissue from the pig carcass (flare fat *vs* intermuscular fat) on the elaboration process and quality of *Ensaimada* was assessed, using a reference scale set up by the Regulatory council of the *Ensaimada de Mallorca*. The results obtained showed that the physicochemical characteristics and behaviour of fat from Majorcan Black Pig were dependent on the type of fat tissue used in its preparation. The Majorcan Black Pig lard showed a monounsaturated fatty acid composition of 45.6% ± 2.6 in flare fat, and 50.9% ± 3.8 in intermuscular fat, due mainly to high oleic acid content. The type of fat that showed more similar characteristics and behaviours to those defined as the standard was the flare fat.

Key words. Majorcan black pig – *Ensaimada*.

Caractérisation physico-chimique du saindoux de porc noir de Majorque

Résumé. *L'*Ensaimada de Mallorca *est un gâteau typique de l'île à base de farine et de saindoux, qui est couvert par une Indication Géographique Protégée. Son nom dérive du mot saïm, ce qui en majorquin signifie saindoux. À Majorque le saindoux, jusqu'à la première moitié du XX^{e} siècle, provient exclusivement du Porc Noir de Majorque. Actuellement, le saindoux du Porc Noir de Majorque n'est pas utilisé dans la préparation de l'Ensaimada de Mallorca. On a étudié les propriétés physico-chimiques du saindoux de porc noir de Majorque et son comportement lorsqu'il est soumis à des procédés thermiques. Nous avons évalué l'effet de la source de matières grasses utilisées (lard du bassin rénal* vs *lard sous-cutané) dans la préparation et la qualité de l'Ensaimada, en utilisant le format standard établi par le Conseil de régulation de l'Ensaimada de Mallorca. Les résultats ont montré que les caractéristiques physico-chimiques et le comportement du saindoux de porc noir de Majorque dépendent du type de graisse utilisée dans sa préparation. Le saindoux de porc noir de Majorque a présenté une composition en acides gras mono-insaturés de 45,6% ± 2,6, dans le cas de la graisse du bassin rénal, et de 50,9% ± 3,8, dans le cas de la graisse intermusculaire, principalement en raison de la teneur élevée en acide oléique. En général, le type de gras qui montrait des caractéristiques et un comportement les plus semblables à ce qui est établi par la norme, était celui élaboré avec du lard pelvien rénal.*

Mots-clés. *Porc noir de Majorque – Saindoux* – Ensaimada.

I – Introduction

The *Ensaimada de Mallorca* is a typical sweet from the Island of Majorca, made of flour and animal fat, and it is covered by a Protected Geographical Indication. Its name derives from *saïm*, which means pork lard in Catalan, and until the first half of the twentieth century it came exclusively from Majorcan Black Pigs (MBP). Currently, the MBP lard is not used any more in the elaboration of *Ensaimada*. MBP produce high amounts of subcutaneous fat, and most of it is used to produce *Sobrassada*, the main meat product from these animals, the remaining subcutaneous and flare fat has a low market value due to scarce demand for it, thus it is of

great interest to enhance the use of subcutaneous fat from MBP to elaborate *Ensaimada*. The first step is to get information regarding the suitability of fat from MBP to elaborate *Ensaimada* determining its physicochemical properties.

The main objective of the present study was to determine the physicochemical properties and thermal behaviour of Majorcan Black Pigs subcutaneous fat to assess its suitability to be used in the elaboration of *Ensaimada de Mallorca*.

II – Materials and methods

Different fat deposits from MBP which could be potentially used to elaborate Ensaimada were sampled at the slaughter plant, including flare fat and intermuscular fat. The quality parameters were studied following the methodologies described below.

Acidity was calculated over the percentage of oleic acid respect to fatty acid profile. Peroxides index express the active oxygen milliequivalents per kg of fat, and it is measured by the potassium iodide oxidation levels. Solid curve was determined by differences in the density when increasing the temperature. The fatty acid profile was determined by gas chromatography and the proportion of each fatty acid group is expressed in percentage. Texture was determined using a TPA analysis using a RA XT 2i Texturometer in fresh samples and the measure was repeated after melting and solidifying each fat sample. Colour was determined by a colorimeter Minolta using the illuminant D65 in fresh fat and melted-solidified samples.

All the measurements were also determined in a reference sample given by the Regulatory Council of *Ensaimada de Mallorca* to compare with the characteristics of flare fat and intermuscular fat from Majorcan Black Pigs.

III – Results

The results obtained showed that the physicochemical characteristics and behaviour of fat from Majorcan Black Pig were dependent on the type of fat tissue used in its preparation (Table 1). The Majorcan Black Pig lard showed a monounsaturated fatty acid composition of 45.6% ± 2.6 in flare fat, and 50.9% ± 3.8 in intermuscular fat, due mainly to high oleic acid content.

IV – Conclusions

The characterisation of the main physicochemical properties and thermal behaviour of the two types of fat showed that flare fat showed more similar traits and behaviour to those presented by the fat sample considered as the reference. It implies that fat from adult Majorcan Black Pigs could be used to elaborate *Ensaimada* maintaining similar properties. Improving the added value of this type of fat would improve economic sustainability of MBP production chain The next step would be to introduce a proportion of intermuscular fat when elaborating *Ensaimada*, to the point of not affecting the technological and sensory traits of the final product achieving the objective of taking as much profit of the fat as raw material.

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Table 1.- Physicochemical properties and thermal behaviour of flare fat and intermuscular fat from Majorcan Black Pigs and a reference sample from the Regulatory Council of Ensaimada de Mallorca

	Flare fat		Intermuscular fat		Reference	
	Mean	**S.E.**	**Mean**	**S.E.**	**Mean**	**S.E.**
Acidity (% AC OLEIC)	0.42	0.017	0.28	0.021	0.48	0.036
Peroxides	0.59	0.02	0.54	0.035	0.31	0.02
Solid curve (%solids)						
10ºC	48	1.053	36.35	1.586	46.46	2.374
20ºC	32.48	0.989	22.52	1.252	35.24	3.463
30ºC	11.57	0.146	3.5	0.093	15.26	0.704
40ºC	2.64	0.012	0.5	0.031	3.74	0.279
Fatty acids (%)						
SFA	44.03	0.842	39.12	1.533	45.5	2.811
MUFA	45.59	2.593	50.92	3.818	37.9	5.114
PUFA	6.87	0.142	5.95	0.195	13.34	0.409
Texture						
Texture fresh (g)	94.72	0.79	44.31	0.62	83.89	1.995
Texture melted (g)	134.69	0.405	89.8	1.855	127.69	2.168
Color Minolta						
L	87.89	0.017	86.84	0.021	86.59	0.15
a	-1.41	0.011	-2.16	0.029	-1.19	0.031
b	9.28	0.018	8.82	0.03	11.73	0.046
Color Minolta after melting						
L	87.42	0.01	86.64	0.012	84.58	0.087
a	-1.86	0.009	-2.87	0.035	-1.87	0.035
b	7.84	0.009	7.72	0.025	11.9	0.05