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Introduction

Context :

The nutritional quality of food is a topic of increasing concern to consumers and producers. The relationship between dietary fat, cholesterol and the prevalence of coronary heart disease (CHD) has focused attention on meat products containing animal fats specially saturated fatty acids (SAFA) and cholesterol which are among the main dietary contributors to CHD. Therefore, the nutritional guidelines recommend to decrease the dietary intake of SAFA in favour of monounsaturated (MUFA) and polyunsaturated (PUFA) fatty acids to optimize the balance between SAFA/MUFA/PUFA, with a ratio $\omega 6/\omega 3$ of 5.

Aim :

The aim of this study is to develop and formulate a nutritionally optimized dry sausage: namely, to replace the native animal fat by vegetable oils (VO) rich in $\omega 6$ and $\omega 3$ according to the nutritional recommendations. The selected VO (rapeseed and palm oils) have been formulated and texturized to meet the requirements defined by VALANSOT, the industrial partner of this study.



Material & Methods

MATERIAL

- The fatty acid composition and the Solid Fat Content of different vegetable oils were determined to characterise their functional and nutritional properties.
- The selection of the alternative vegetable oil is most important as it greatly influences the process and the properties of the final products.
- The undisclosed process of the dry sausage making has been optimised by VALANSOT.

Methods

Solid Fat Content (%) :

The SFC of the liquid/solid fraction blends were measured by a Bruker pulsed nuclear magnetic resonance (p-NMR) spectrometer, equipped with a Minispec PC/20 data analyser.

Gas Chromatography (GC) :

The fatty acid compositions were obtained according to standard NF EN ISO 5508.

Ageing test :

An ageing test was conducted to determine the oxidative stability of the dry sausage. The samples were cut and stored at room temperature and daylight, in plastic boxes. Peroxide value was regularly measured.

Sensorial assessment :

The "vegetable dry sausage" has been tasted and compared to the traditional product by a consumer panel.

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Laboratory accreditation according to NF EN ISO/CEI 17 025
 Ongoing audit by BVQI for ISO 9001:2000 quality certification
 Initial audit : June 2006.



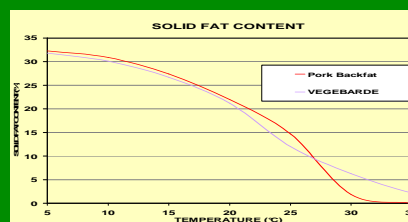
Results

Total replacement of the the pork backfat by vegetable oils (deposed name: VEGEBARDE®) with properties similar to the original product (texture, visual aspect, juiciness, flavour intensity and tenderness).

Chemical composition :

VEGEBARDE® is a mixture of rapeseed and palm oils: palm mainly composed of SAFA and MUFA balanced with rapeseed rich in C18:2 $\omega 6$ and α -C18:3 $\omega 3$. Their respective proportion has been adjusted according to their FA composition and after an adapted process of crystallization. The blend has been industrially evaluated and approved with an undisclosed sausage making process.

Solid Fat Content (%) :



VEGEBARDE® and the pork backfat show rather close changes in solid fat contents with temperature.

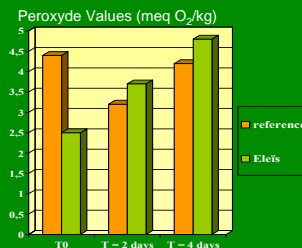
Chemical composition of ELEİS dry sausage (formulated with VEGEBARDE®) :

	Dry sausage (per 100 g)	
Carbohydrates	5,7 g of wich 3,6 g of sugar	
Proteins	24,9 g	
Lipids	19,6 g of wich	SAFA : 41,5%
		MUFA : 46,0%
		PUFA : 12,4%
		of wich, omega 6 : 10,6%
		omega 3 : 1,8%
Dietary fibres	2,1 g	
Sodium	1,78 g	
Energy values	1210 KJ (290 cal)	

- The ELEİS lipid fraction still contains SAFAs, but the triglyceridic structure of VEGEBARDE® makes the difference in terms of nutritional interest (reduced bioavailability).
- 100g of Eleis dry-sausage cover 20% of the recommended nutritional daily intake (2 g) in omega 3.
- Eleis $\omega 6/\omega 3$ ratio (5,9) comes close to the recommendation (5).

Ageing Test :

The peroxide value evolution observed over a 4 days period does not show any critical increase, compared to the pork-fat dry sausage.



Some controls, made after 60 days of storage at 18°C, show no difference with samples at initial time (T0) and the reference product.

Sensory panel :

A panel of tasters has assessed Eleis in comparison with a reference "pork backfat product", according to the following descriptors: texture, visual aspect, juiciness, flavour intensity and tenderness. No significant difference has been pointed out.

Conclusion

Thanks to an appropriate selection of alternative vegetable fats, a process optimisation and laboratory control of product physical properties, VALANSOT succeeded in producing 100 kg of Eleis using VEGEBARDE®. A patent registration is in process by VALANSOT. A press release is available. The ELEİS dry sausage will be presented at the SIAL, Paris, 22-26 October 2006.