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CHEMICAL CHARACTERISTICS OF "ALHEIRA" - A TRADITIONAL PORTUGUESE SAUSAGE  
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SUMMARY: The chemical composition of a traditional smoked sausage, was studied on one hundred samples randomly drawn from five city markets which represent the producer region and the main consumer centres.

The means of the data were as follows: moisture -  $51.30 \pm 3.61$ ; protein -  $8.13 \pm 1.05$ ; fat -  $20.92 \pm 3.04$ ; <sup>(even in process)</sup>nitrogen free extract (NFE) -  $17.51 \pm 1.06$ ; ash -  $2.11 \pm 0.09$ ; NaCl -  $1.73 \pm 0.17$  and  $4.77 \pm 0.27$  for pH. Except for salt (NaCl), significant differences ( $P < 0.05$ ) were observed among batches. This study has shown the heterogeneity of this sausage and the need to improve the quality of the raw material and of the technological process for making homogeneous products.

INTRODUCTION: Portugal has a large variety of traditional sausage products. Among the various kinds of smoked sausage, "alheira" is one whose origin both in time and place we know. It appears that this sausage-making process started in the XVIth century introduced by the Hebraic community who had taken refuge in the mountains in the north of Portugal and is the result of religious prejudice. They had to show that they were now Christians by eating pork, so they had the ingenious idea of creating a sausage which had no pork in its composition, although it looked as if it did. Beef, chicken, turkey or game were allowed. They also added bread, olive-oil, garlic, parsley and paprika. The stuffing was filled into cattle gut, and subjected to the drying effect of smoke for a few days above a kitchen fire.

As time elapsed, pork fat and meat were introduced and nowadays the composition of this sausage differs according to the producers. They may use more chicken or pork or include all the other meats including game (rabbit or partridge). The other components have always been present but the olive-oil has been substituted totally or partially by melted pork fat.

This sausage is highly appreciated by consumers, it is a cheap product for a winter meal and in the last few years has spread to the main consumer centres.

The objective of this work was to study the chemical composition of "alheira" sampled in the market-places of five cities, representing the producing region and the consumer centres, in order to discover if it was a homogeneous product.

The studied variables were moisture, protein, fat, nitrogen free extract (NFE), ash, salt content (NaCl) and pH.

MATERIAL AND METHODS: The technological process of "alheira" consists in boiling all the meat in water with salt, garlic and parsley. Then some of the water is poured over previously cut bread slices to make a consistent paste. Finally bonless meat, in rather small pieces, paprika, melted fat and more garlic and parsley are added. The stuffing is

filled into a thin cattle gut, and subjected to the drying effect of smoke for two or three days in a traditional smokery.

The study was based on one hundred samples, randomly drawn from five city markets; batches 1 and 3 represent the main consumer centres and batches 2, 4 and 5 the producing regions.

The moisture, fat, protein, ash and salt content (NaCl) were determined according to the A.O.A.C. procedures (1975). Nitrogen free extract was calculated by difference. The pH was measured with an Orion pH meter, model 601A. The analysis of variance was made according to Stell and Torrie (1982).

RESULTS AND DISCUSSION: The table 1 shows the laboratory results of chemical composition of "alheira".

Table 1 - The approximate composition of the "Alheira"\*

Batches	Moisture %	Protein %	Fat %	NFE %	Ash %	NaCl %	pH
1	52.56	7.17	19.89	18.38	1.97	1.64	4.35
2	52.55	7.00	19.34	18.90	2.19	1.96	5.03
3	45.45	8.09	27.41	16.95	2.13	1.62	4.95
4	50.82	9.23	20.96	16.78	2.18	1.86	4.85
5	55.10	9.14	17.01	16.53	2.10	1.59	4.66
$\bar{X}$	51.30	8.13	20.92	17.51	2.11	1.73	4.77
SD	3.61	1.05	3.04	1.06	0.09	0.17	0.27
SIGNIF.	P<0.05	P<0.05	P<0.05	P<0.05	P<0.05	NS	P<0.05

\* Each value is the mean of twenty samples  
NFE - nitrogen free extract

The mean values founded for moisture ( $51.30 \pm 3.61$ ); protein ( $8.13 \pm 1.05$ ); fat ( $20.92 \pm 3.04$ ); nitrogen free extract ( $17.51 \pm 1.06$ ) and ash ( $2.11 \pm 0.09$ ) accorded with the values found by Gonçalves Ferreira and Graça (1961) in "alheira".

The protein content could be improved without a large increase in the price (Martins, 1984, Barreto 1985).

The pH value ( $4.77 \pm 0.27$ ) was low compared with most traditional Portuguese sausage and this is explained by the inclusion of bread in the paste. The value of this parameter ( $pH \leq 5.0$ ) allows us to include those which are stabilized and do not require refrigeration according to the E.E.C. decision 77/79 (Cantoni *et al.*, 1977; Leon Crespo *et al.*, 1984).

Except for salt (NaCl) significant differences ( $P < 0.05$ ) were observed among batches. The variability of the samples can be explained by heterogeneity in raw material and the technological process by the different processors.

Although different tastes could be observed the organoleptic characteristics of the studied sausage were considered normal for this kind of sausages.



CONCLUSIONS: Considering that the chemical composition is an indicator of the quality of sausage, this study showed the need to improve the quality of raw material and the technological process for making homogeneous and stabilized products, with organoleptic characteristics similar to those of the traditional type.

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