

MECHANICAL PROPERTIES AND SENSORIAL EVALUATION FROM "CHOURIÇO GROSSO"-A REGIONAL PORTUGUESE SAUSAGE

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Background

The free product circulation among the countries of the European Union improves the interest of the high quality traditional products from each country. This fact contributes to the maintenance of the gastronomic culture from each region allowing simultaneously the development of regional industry.

In Portugal the cured meat products from Alentejano pig exhibit an exquisite quality and reach high level of prices.

Barreto *et al.* (1998) refers to the Alentejano breed as a portuguese race, that origin products with very interesting nutritive characteristics and very appreciated sensorial properties (Martin-Pena *et al.*, 1992; Mata *et al.*, 1992; Dimitriadis *et al.*, 1995) that justify the increase demand on portuguese market.

Is urgent to study these products in order to maintain the usual characteristics of quality in spite of increasing of production, from the traditional factories and from new ones.

Objectives

To study two different kinds of storage, vacuum-package and one modified atmosphere, during 6 months using products obtained from two different methods, smoked-cured and unsmoked-cured applying mechanical methods and sensorial evaluation.

Methods

"Chouriço grosso" is a regional and traditional portuguese sausage made from meat and fat obtained from Alentejano pig.

In this work we have studied products obtained from two factories. One of them uses smoke from holm-oak wood during the curing time (referred as factory A) and the other one uses an unsmoking process (referred as factory B). The process conditions at A factory are: Ripening (2 days; temperature: 3-5°C; relative humidity: 90-95%); Curing (8 days; temperature: 30-35°C and smoking; 21 days; temperature: 17-18°C). At the B factory the process conditions are: Ripening (2 days; temperature: 3-5°C; relative humidity: 90-95%); Curing (30 days; temperature: 10-12°C; relative humidity: 78-80%).

The final product was stored in vacuum package and in modified atmosphere (20% CO₂; 80% N). Samples were picked up just when the process was completed (0 month) and at 3 and 6 months of storage at room temperature.

The mechanical evaluation was obtained using a texture analyser Stable Microsystem Mod. TA-HDi and its software. The tests performed were a Texture Profile Analysis (TPA) with a compress platen and a cutting test with a blade knife. The samples for the first test were cylindrical with 3,5 cm of diameter and 3,5 of height and were compressed twice to 10% of the initial height. For the cutting test the samples were slices with 4 mm of height and the cut was total and the maximum force was measured.

A trained panel composed by 12 persons performed sensorial evaluation. A descriptive quantitative method using a scale from 0 to 100 points was used.

For the mechanical tests 10 samples and for sensorial evaluation 4 samples of each modality at each time were tested.

The results were analysed through an ANOVA-MANOVA considering 3 factors (Storage Time, Factory Process, Kind of Storage) and their interactions, using the STATISTICA software.

Results and Discussion

The analyse of the results (Tables 1 and 2) allow us to say that the factors Storage Time and Factory Process were the most important, showing almost always significative differences.

For the factor Kind of Storage just the Aroma Intensity parameter was significative ($p < 0,05$) with higher values for the samples vacuum packaged.

Some of the interactions between the factors Storage Time and Factory Process were significative. This fact is due to negative and faster evolution of the product from Factory B, when compared with the product from Factory A. The worst behaviour of the product from Factory B was caused by not enough biochemical stability generating undesirable reactions, that reflects on mechanical and sensorial parameters analysed. This opinion is also supported by other results obtained from microbiological, chemical and physical analysis, not published yet.

Conclusions

To storage this kind of product for a period of 6 month is possible if the product is well cured, using vacuum package or the modified atmosphere studied.

The process used in Factory A, smoked product, exhibit better characteristics for maintain quality during storage.

References

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Table 1 – Means and Standard deviation of Mechanical Properties and Sensorial Evaluation from a portuguese regional sausage obtained from 2 factories (A and B) and stored during 6 months in vacuum package (V) and modified atmosphere (MA)

Factory Process	A (smoked product)						B (unsmoked product)					
	0		3		6		0		3		6	
	V	MA	V	MA	V	MA	V	MA	V	MA	V	MA
Mechanical Properties												
Hardness (N)	2536 ±1001	2536 ±1001	1269 ±396	1162 ±203	1369 ±666	1860 ±371	1413 ±947	1413 ±947	1398 ±804	907 ±279	1218 ±446	841 ±192
Fracturability	16,7 ±3,8	16,7 ±3,8	16,2 ±3,0	16,0 ±2,1	9,5 ±1,4	13,0 ±4,2	15,2 ±4,3	15,2 ±4,3	16,6 ±3,0	16,9 ±3,8	10,6 ±3,0	13,1 ±3,9
Adhesiveness (N)	-26,6 ±26,2	-26,6 ±26,2	-86,4 ±64,7	-40,2 ±15,9	-10,1 ±4,0	-12,7 ±5,8	-10,4 ±13,1	-10,4 ±13,1	-67,6 ±63,5	-68,7 ±69,4	-57,5 ±31,4	-19,5 ±3,9
Springiness	0,753 ±0,064	0,753 ±0,064	0,803 ±0,084	0,796 ±0,030	0,711 ±0,143	0,761 ±0,052	0,751 ±0,037	0,751 ±0,037	0,768 ±0,081	0,825 ±0,077	0,803 ±0,121	0,698 ±0,060
Cohesiveness	1866 ±781	1866 ±781	918 ±285	870 ±163	1036 ±684	1394 ±318	979 ±702	979 ±702	958 ±553	634 ±223	796 ±276	560 ±125
Gumminess (N)	0,732 ±0,066	0,732 ±0,066	0,723 ±0,018	0,747 ±0,042	0,687 ±0,141	0,747 ±0,023	0,700 ±0,062	0,700 ±0,062	0,689 ±0,063	0,692 ±0,040	0,659 ±0,039	0,667 ±0,019
Chewinness (N)	1420 ±642	1420 ±642	735 ±224	693 ±138	821 ±705	1121 ±270	732 ±512	732 ±512	749 ±482	527 ±206	584 ±143	387 ±74
Cutting Test (N)	10796 ±3317	10796 ±3317	5740 ±2125	7527 ±2331	6745 ±2576	7983 ±2985	7465 ±1119	7465 ±1119	4784 ±1074	3656 ±1819	2977 ±1412	3785 ±1498
Sensorial Evaluation												
Colour Intensity	70 ±14	70 ±14	67 ±12	67 ±12	65 ±14	66 ±13	67 ±14	67 ±14	61 ±16	53 ±14	58 ±15	54 ±12
Aroma Intensity	70 ±13	70 ±13	71 ±11	63 ±15	67 ±14	64 ±14	67 ±16	67 ±16	64 ±15	58 ±12	67 ±12	66 ±12
Tenderness	67 ±18	67 ±18	65 ±17	67 ±14	63 ±17	61 ±16	60 ±19	60 ±19	53 ±21	43 ±20	42 ±26	39 ±28
Flavour Intensity	70 ±15	70 ±15	72 ±13	71 ±12	70 ±10	68 ±12	71 ±14	71 ±14	69 ±14	65 ±16	68 ±19	65 ±18
General Appreciation	66 ±15	66 ±15	60 ±18	63 ±16	64 ±14	59 ±16	66 ±13	66 ±13	51 ±19	46 ±20	37 ±20	36 ±21

Table 2 – F values and p-level of Mechanical Properties and Sensorial Evaluation from a portuguese regional sausage obtained from 2 factories and stored during 6 months in vacuum package and modified atmosphere

	F values p-level						
	Storage Time (1)	Factory Process (2)	Kind of Storage (3)	Interactions			
				1x2	1x3	2x3	1x2x3
Mechanical Properties							
Hardness (N)	11,18 0,00005	16,03 0,0001	0,30 0,59	4,59 0,01	0,62 0,54	2,00 0,16	0,65 0,52
Fracturability	18,00 0,000000	0,01 0,92	2,00 0,16	0,91 0,41	1,75 0,18	0,01 0,92	0,11 0,89
Adhesiveness (N)	12,46 0,00002	0,35 0,56	2,28 0,13	1,80 0,17	0,62 0,54	0,02 0,90	2,14 0,12
Springiness	4,63 0,01	0,44 0,51	0,63 0,43	0,22 0,80	0,20 0,82	0,85 0,36	3,84 0,03
Cohesiveness	1,14 0,33	17,97 0,00006	1,55 0,22	0,17 0,85	0,538 0,59	0,933 0,34	0,312 0,73
Gumminess (N)	10,03 0,0001	19,92 0,00002	0,13 0,72	4,46 0,01	0,47 0,63	1,63 0,21	0,51 0,60
Chewinness (N)	7,14 0,001	19,38 0,00003	0,08 0,78	4,05 0,02	0,36 0,70	1,43 0,24	0,53 0,59
Cutting Test (N)	33,59 0,000000	63,61 0,000000	1,23 0,27	1,41 0,25	0,55 0,58	1,88 0,17	1,31 0,27
Sensorial Evaluation							
Colour Intensity	16,17 0,000000	35,13 0,000000	1,90 0,17	3,31 0,04	0,78 0,46	2,46 0,12	0,82 0,44
Aroma Intensity	5,41 0,004	4,18 0,04	4,74 0,03	2,08 0,13	2,35 0,10	0,27 0,61	0,08 0,98
Tenderness	15,54 0,000000	70,02 0,000000	1,63 0,20	6,37 0,002	0,57 0,57	1,39 0,24	1,06 0,35
Flavour Intensity	1,69 0,19	2,80 0,09	1,35 0,25	1,56 0,21	0,39 0,68	0,56 0,46	0,18 0,83
General Appreciation	45,14 0,000000	66,41 0,000000	0,46 0,50	21,32 0,000000	0,20 0,82	0,09 0,77	1,12 0,33