PROTEOLYSIS ON "PAINHO DE PORTALEGRE" DRIED FERMENTED SAUSAGE ACCORDING TO THE PRODUCTION SYSTEM

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Background

Distinct cultural and social backgrounds of the populations and the environmental/climatic conditions inherent to the Portuguese geographical regions greatly determined the physical and sensorial characteristics of the country style dry-fermented meat products. Recently, a great effort has been done to foment and promote specific processed meat products (protected geographical indication - PGI and protected designation of origin - PDO) among the traditional production. These products are presently processed in small/micro plants under hygienic and environmental conditions that diverge from the former home made production for self consumption in some important issues, e.g. % salt addition, raw material mincing size, environmental temperature/relative humidity variation profile.

Objective

The aim of the present work was to investigate the influence of the two production systems on the proteolysis process of the dry fermented sausage named Painho de Portalegre.

Material and Methods

"Painho de Portalegre" dry fermented sausages with 8 and 30 days of ageing, processed according to the PGI and the traditional style standards, were obtained from 2 regional producers. Proteolysis rate was appreciated throughout the protein electrophoretic profile (SDS-PAGE), Total Volatile Basic Nitrogen (TVBN) (NP-1848, 1982), Non Protein Nitrogen (NPN) (Kjeldahl/NP 3442, 1990), Free Amino Acids Nitrogen (FAAN) (NP 3443, 1990), Ammonia (NP 3444, 1990)) and free amino acids profile (EU Directive nº98/64/CE 3 of September 1998).

Results and Discussion

The results concerning nitrogen fractions of "Painho de Portalegre" evaluated at 2 critical phases of both processing systems, are depicted on Table 1. *aW* evolution clearly indicates a faster drying process on traditional production. Despite the similarity of the air temperature profile, the 20% lower environmental relative humidity (RH) when compared with that measured during the PGI processing system (Figure 1) explains the divergence on that parameter for equivalent drying/ripening periods of time. The different design of the smoking/drying room, generating distinct air flow around the place and products, as well as the smaller production volume for the traditional system are the main factors influencing the results. This important aspect could differently determine the development of proteolysis. In fact, after 1 month of ripening, the values of different nitrogen fractions on "Painho de Portalegre PGI" almost doubled those of the traditional product, probably related with longer enzyme activity in former, due to a slower increase of the NaCl concentration. The almost identical ammonia mean values on both products after 30 days of ageing has not been confirmed for longer periods (results not published). Nevertheless they confirm the trend obtained for the other analysed parameters.

Free amino acids detected after 30 days of ripening (Table 2) showed similar profiles for both types of production. However, the concentration of compounds related with sweet (alanine, glicine, treonine, serine, proline) and bitter (leucine, valine, isoleucine, metionine, fenilalanine) tastes (Verplaetse, 1994) is generally higher in PGI (445 and 447 mg/100g) than in the traditional product (198 and 164 mg/100g). In relation to those associated to the acid taste (glutamic and aspartic acids and histidine) the trend was the contrary (19 mg/100g vs 109 mg/100g). Microrganisms may also play a more important role in PGI processing technology since native strains are referred to possess peptidasic and aminopeptidasic activities (Hughes *et al.*, 2002). The higher degree of proteolysis pointed out for the PGI product based on the indicators referred above is fully confirmed by SDS Polyacrylamide gel electroforesis of myofibrillar proteins solubilized from myofibrils (Figure 2). After 8 days of drying/ripening, the traditional product showed myosin and actin bands with slightly less intensity and, on the contrary, an increase band % for those representing the smaller molecules (30, 31 and 27 kDa). The speed up of proteolysis during the early stages of traditional processing could be due to the higher temperatures observed for the carcass and raw material storage before the casings stuffing (held out of refrigeration for about three days). Three weeks later (A1 and B1) and possibly due to the *aW* evolution referred elsewhere, the picture changed completely with the PGI product presenting much less intensity on myosin (4.26 vs 17.98) and actin (14.18 vs 27.98) bands and significantly more lower molecular weight compounds. According to Toldrá *et al.*, (1993), the activity of catepsins B, D, H and L is strongly inhibited by increasing in salt concentration and decreasing in *aW*.

Acknowledgements

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References

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Table 1 – Variation on physical-chemical characteristics along de ripening phase of "Painho de Portalegre" dry fermented sausage from different production systems.

	8 days ripening		30 days ripening	
	PGI type	**Traditional type**	**PGI type**	**Traditional type**
pH	5.20	5.32	5.46	5.42
aW	0.96	0.92	0.93	0.85
TVBN (%)	0.014	0.025	0.072	0.039
NPN (%)	2.88	2.4	6.88	2.56
FAAN (%)	0.072	0.108	0.243	0.124
Ammonia (mg/100g)	-	-	0.10	0.07

Table 2 – Influence of production system on the free amino acids profile of 30 days ripened "Painho de Portalegre" dry fermented sausage.

Amino acids (mg/100g)	**PGI**	**Traditional**	**Amino acids (mg/100g)**	**PGI**	**Traditional**
Aspartic acid	3.0	13.0	Isoleucine	74.5	28.5
Glutamic acid	15.5	93.0	Leucine	145.0	55.0
Alanine	211.0	85.5	Lysine	140.0	66.5
Cysteíne	0.0	2.5	Methionine	48.5	11.0
Phenylalanine	69.0	25.5	Proline	34.0	20.5
γ–aminobutiric acid	155.5	1.0	Serine	58.0	28.0
Glicine	74.0	32.0	Threonine	67.0	30.5
Histidine	0.0	2.5	Valine	108.5	42.5

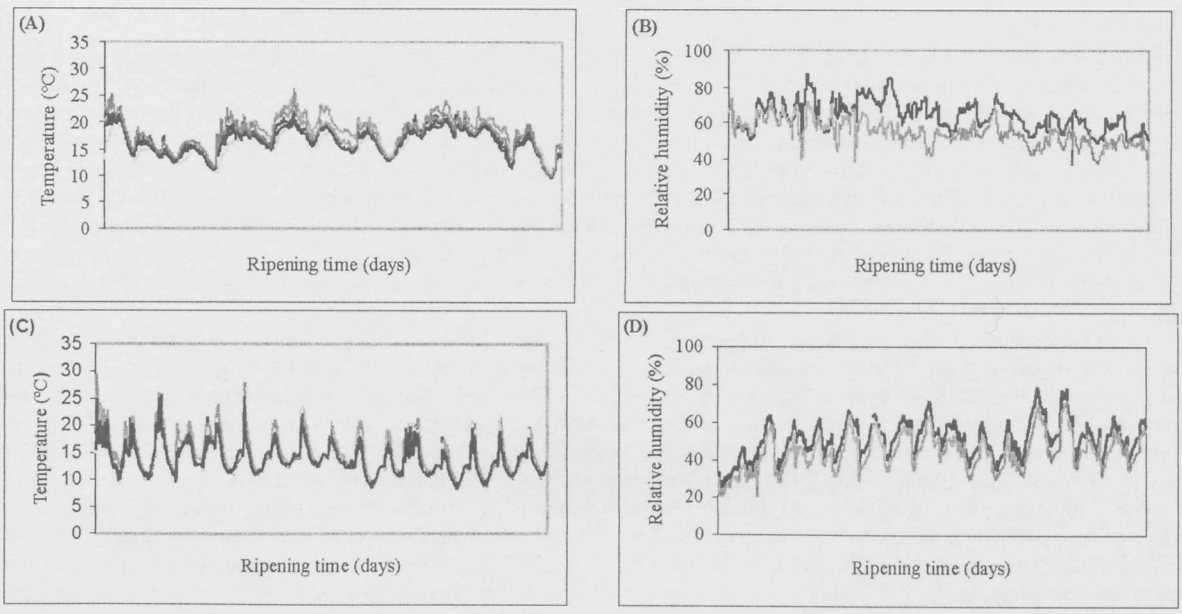

Figure 1 - Temperature and relative humidity environmental conditions during the drying/ripening phase of PGI (A and B) and Traditional (C and D) Painho de Portalegre dry fermented sausages.

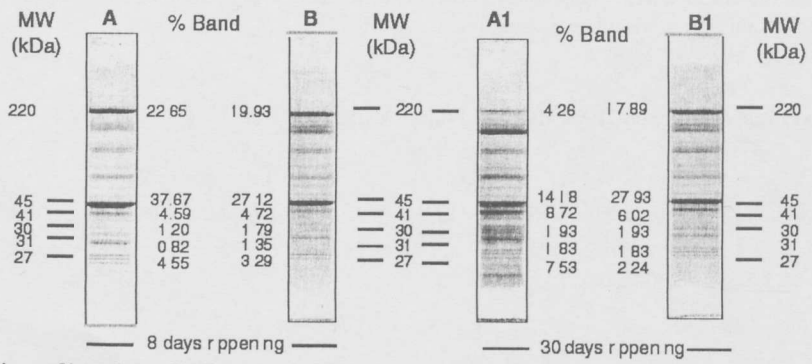

Figure 2– Electroforetic profiles of myofibrillar proteins of PGI (A and A1) and Traditional (B and B1) "Painho de Portalegre".