MICROBIOLOGICAL PROFILE AND HAZARDS OF TRADITIONAL SAUSAGE FROM TRÁS-OS-MONTES

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Introduction

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Northern Portugal is known for its wide variety of highly appreciated traditional meat products, and the Trás-os-Montes region is particularly rich in its diversity and specificity. These products were traditionally made with characteristics of aw and/or pH that ensured its stability without refrigeration. However, changes in manufacturing scale, associated to the high variety of raw materials, other than pork meat and fat, used in the preparation of some of them (viscera, blood, bones, bread, pumpkin, flour, chicken), might lead to products changes, and eventually, to hazards for the consumer. Amongst microbiological hazards usually associated to this kind of products, Staphylococcus aureus, Salmonella and Listeria monocytogenes are notorious. Different types of fermented sausages have been implicated in staphylococcal poisoning outbreaks (Lücke, 1985). This organism, which is salt and nitrite tolerant, is also able to grow under a wide range of environmental conditions. Given the proper conditions, therefore, its growth occurs with enterotoxin production (Gonzáles - Fandos et al., 1999). In 1998, data presented at the World Congress of Foodborne Diseases, refet bod Salmonella spp. as the main responsible for the outbreaks registered in Europe. In recent years, meat products have attracted conse increased attention as an important source of foodborne listeriosis. hand elimi

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Objectives

The main goal of this work was the evaluation of some aspects of the microbiological profile of traditional Trás-os Montes sausages, particularly those concerning hygienic quality and safety for the consumer, as a preliminary approach to the problem of microbiological hazards in this type of products. Ed. A

Methods

161 samples of 9 different types of sausage products were analysed (10 Moura de Calda Quente; 10 Chouriço Doce; 11 Bocha; 10 Chouriço de Abóbora; 10 Chouriço Azedo; 10 Botelo; 32 Alheira; 38 Linguiça and 30 Salpicão). These products should be studied in two separated groups: those that must be heat processed before consumption, and dry meat products, such as Linguiça and Salpicão, that can be eaten without any domestic treatment. It was performed total count of mesophilic microorganisms and search for coliform bacteria, Escherichia coli, S. aureus, according to Portuguese standard methods. Salmonella spp, Listeria spp, L. monocytogenes and Staphylococcus enterotoxin were detected using an Enzyme Linked Fluorescent Assay in an automatic system (miniVIDAS-Biomerrieux 99088), using the test sets and the preparation of the samples recommended by the manufacturer. The pH was measured directly on the paste with a crison pH meter model microph 2002. The aw was determined in a Rotronic Higroskop DT at 25°C.

Results and discussion

All samples presented a high counting of mesophilic microrganisms, near 8 log c.f.u. /g. In traditional sausage products from Trás-os-Montes, no starter microrganisms are used, nor fermentable sources are added to the dough, except for some products in which bread, blood, sugar or honey are obligatory ingredients. In some earlier studies concerning traditional sausage products from Trás-os-Montes, it was observed high levels of lactic acid bacteria, and a less counting of micrococcus and staphylococcus, as well as relatively low pH values. The values of these parameters are close to those found in products previously inoculated, and could explain the results we found in mesophilic microflora counting in some of these products.

Table 1 shows the contamination levels of the samples, considering coliform bacteria, E. coli and microorganisms responsible for foodborne diseases. Figure 1 shows the average values found for aw and pH, for each kind of analysed product.

29% of the analysed samples showed coliform contents, indicating a deficient hygienic quality (Coliform present in 0,001g), presenting 23% evidence of a faecal contamination (E. coli in 0,01g of analysed product).

Considering the integral results of the analysed products, it doesn't seem to exist a constant relationship between the hygienic quality of the products and the presence (or absence) of the searched pathogenic microorganisms, except for the presence of Salmonella. In fact, 86% of the products contaminated by Salmonella showed a microbiological profile indicating a deficient hygienic quality and evidence of a faecal contamination (Coliform present in 0,001g and E. coli in 0,01g).

No connection was found between the presence of L. monocytogenes or S. aureus and the hygienic quality of the products. Now, one of the main food contamination sources by S aureus is man, and the presence of this microorganism is usually connected to deficient handling (Eley, 1996), and not to a deficient hygienic quality. The origin of meat products contamination by Listeria is sometimes difficult to identify, due to its ubiquitarian character. The contamination with this microorganism is associated to water, handlers, several raw materials (particularly meat) and other ingredients. Once inside the industry, Listeria multiplies throughout the facilities surfaces, equipments and tools, making it possible to contaminate products at different production stages (Moreno & Garcia, 1993).

Amongst microorganisms that can cause foodborne diseases, S. aureus stood out for its frequent occurrence, beeing present in 1g in 40% of the analysed products. 126 of the samples monitorised on the search for S. aureus, were also subject to search for stafilococcic toxin. Results show, as expected, that the presence of the microorganism alone doesn't necessarily imply the existence of an effective risk to the consumer's health. Despite 42% of these samples showed S. aureus, only 5% showed positive on the search for stafilococcic toxin. Such results can be due to the fact that aw in these products is low enough to inhibit the production of stafilococcic enterotoxin. (Bergdoll, 1989). The opposite was also observed, i.e., the absence of S. aureus doesn't necessarily imply there is no danger for the consumers health. 5 positive samples at the search for stafilococcic toxin were free of S. aureus. These samples of dry products (ready to eat), have a smoking/drying stage during the processing that might contribute to inactivate the microorganism, without the inactivation of its toxin.

The potential hazard represented by the presence of stafilococcic toxin, ready to eat products are apparently the most hazardous; 82% ⁽⁹ in 11) of the samples with detectable toxin are from this group. 13% of the ready to eat products presented *Listeria*, 5% of them were L. monocytogenes. Salmonella was only present in 3% of the ready to eat products. According to criteria defined by Leistner and Rodel (1976), in these products the aw alone is low enough (aw ≤ 0.91) (Fig. 1), to ensure its stability. In the products that need ²⁰⁰king before consumption, Listeria was found in 10%, L. monocytogenes in only 3%, and Salmonella in 6%. The hazard that these roducts might represent is conditioned by thermal processing that occurs during the domestic preparation.

Conclusions hat

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Considering the integral results of the analysed products, it doesn't seem to exist a constant relation between the products hygienic Mality and the presence - or absence - of the searched pathogenic microorganisms. Apparently, ready to eat products deserve special attention concerning the danger of causing foodborne diseases. Between the 11 samples positive at the stafilococcic toxin, 9 belonged ^b ready to eat products. From the 5 samples presenting *Listeria monocytogenes*, 3 belonged to this group of products. This shows the mportance of eliminating and/or reducing the level of these pathogenic agents in food products, specially in ready to eat products. The increase of foodborne diseases recently verified results namely from the lack of hygio-sanitary conditions at the places where bod products are prepared, and from the deficient formation of the handling personnel. Foodborne diseases have serious ^{consequences}, both in public health and in general economy. So, control rules should be applied. Proper education of food industry andlers, adequate production techniques, and the implementation of HACCP systems, are examples of measures that might liminate and/or reduce to an acceptable level the occurrence of these pathogenic agents in sausage products.

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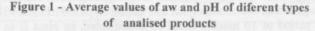
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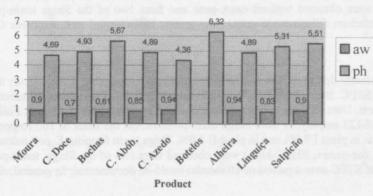
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Table 1 - Results of the search for microorganisms related to hygienic quality and responsible for foodborne diseases (number and % of samples where the microorganism was found, maxim dilution or dilution interval in which it was found).

	N° of analised samples	Present in 25g	Absent in 1g	Present 1-0,1g	Present 0.01g	Present ≥0.001 g
Coliforms	161		31 (19%)	57 (35%)	26 (16%)	47 (29%)
E. coli	161		90 (56%)	34 (21%)	15 (9%)	22 (14%)
S. aureus	160		96 (60%)	25 (16%)	39 (24%)	
Salmonella	147	7 (5%)				
Listeria spp.	147	17 (12%)				
monocytogenes	147	5 (3%)				





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