

Evaluation of Pathogenic and Psychrotrophic Bacteria in Traditionally Processed Pork and Derived Products

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Abstract

Aim: Foodborne pathogens remain a major public health concern, causing millions of illnesses annually, many of which can lead to chronic conditions or even death. The globalization of the food supply chain has significantly increased the risk of foodborne outbreaks, often transcending international borders. Among high-risk food categories, pork and pork-derived products are particularly vulnerable to microbial contamination. This study aimed to assess the hygienic quality and microbiological safety of traditionally processed pork and pork products from Romania.

Materials and Methods: A total of 140 pork samples were collected between 2024 and 2025 from both traditional and industrial processing units, including meat from four carcass regions (chest, flank, cervical area, thigh), while additional samples from three types of refrigerated traditional pork products—homemade sausages, pork ham, and pork fillet—were collected between December 2024 and May 2025 from a local processor in Sălaj County/Romania, with microbiological assessments conducted every 4 days throughout their shelf life. The methods used for isolation and confirmation of bacterial load, were both classical (inoculation on solid media using ISO methods) and molecular (PCR-polymerase chain reaction).

Results and Discussion: Microbiological analysis revealed that 29.16% of pork carcass samples exceeded permissible limits for *Enterobacteriaceae*, indicating hygiene deficiencies during processing. The surface microflora included pathogenic genera such as *Salmonella Typhimurium*, *Campylobacter jejuni/coli* and *Yersinia enterocolitica*. Among meat products analyzed (pork fillet, traditionally processed ham, and homemade sausage), psychrotrophic microbial loads varied widely, with some samples exceeding acceptable levels. Dominant bacterial species included Gram-negative psychrotrophs—particularly *Pseudomonas* spp.—which were prevalent across all three product types. Notably, *Aeromonas* and *Yersinia* species were absent, suggesting low resistance to thermal treatment or salting effects.

Conclusion: Given that *Salmonella enterica* is a leading cause of foodborne illness in the European Union, this study underscores the importance of implementing improved microbiological hazard assessment protocols in traditional meat production systems. The findings highlight the potential consumer health risks associated with inadequate hygiene and the need for stricter safety controls in the processing of pork and pork products.