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Research Article

Advancement Techniques and Procedures in Meat Preservation: A Comprehensive Review

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Abstract: The process of evolution and development of meat preservation methods with regard to efficiency in prolonging shelf life, preserving quality, and ensuring safety is considered in this review. The traditional methods like drying, salting, and smoking are related in view of their historical importance and current relevance. Modern developments, including refrigeration, vacuum packaging, and modified atmosphere packaging, are discussed in relation to enhanced efficiency and practice in the meat industry. The review also covers the role of biopreservation, which makes use of natural antimicrobial agents to enhance the safety of meat products. Further, the review includes new and emerging technologies that include high-pressure processing, irradiation, and nanotechnology applications for their potential to change the face of preservation of meat. These novel methods may offer exciting opportunities to deal with modern food safety and quality issues. As such, this review provides an overview of the preservation techniques while attempting to trace current practices and existing challenges, with a view to suggesting future directions for research and development in meat preservation for food technology advancement and public health.

Keywords: Meat preservation, biopreservation, high-pressure processing, irradiation, and nanotechnology

INTRODUCTION

Meat preservation has always been of real importance to food science and technology, one that is entrenched in the need to extend the shelf life of meat products while ensuring their nutritional quality and safety. Demand for preserved meat dates way back into ancient civilizations where techniques such as drying, salting, and smoking were developed to prevent spoilage and protect against pathogenic contamination. Although such methods were quite effective, technological advances have significantly changed these traditional methods of preservation to modern techniques that are equally effective, if not more so, and safe. The history of preservation is expansive and diverse, with techniques based on resources and climatic conditions. One of the oldest methods of preservation was drying, which depends on the principle of moisture removal to prevent the action of microbes. This technique in arid regions was pivotal, as the sun and wind were used for the drying of meat into such products as jerky and biltong [1]. Salting and curing, employing salt and, more recently, nitrates/nitrates, became common because of the effectiveness at drawing out moisture and creating an environment hostile to bacteria. Whereas smoking had been a combination of drying and the actual antimicrobial effect of smoke compounds, adding flavor and extending the shelf life of meat made it a staple preservation method in many cultures [2]. With the advent of industrialization, and the initiation of refrigeration technology in the 19th century, new approaches to preserving meat were created. Refrigeration and freezing are the most common practices within the meat industry due to the effect of such low temperatures in reducing microbial growth and consequently inhibiting enzymatic activities responsible for spoilage. Refrigeration keeps the meat from 0°C to 4°C, increasing the shelf life by some few days, while