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25. STUDY OF THE EFFECTIVENESS OF ACTIVE PACKAGING FOR BEEF STORAGE

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The quality of meat and meat products directly depends on storage conditions, as biochemical and microbiological processes occurring in meat raw materials rapidly deteriorate their organoleptic properties and safety.

One of the modern approaches to extending the shelf life of such products is the use of active packaging systems capable of modifying the gaseous composition of the internal environment, absorbing moisture or oxygen, and thereby slowing down microbial growth [1, 2].

Despite the considerable number of scientific studies aimed at optimizing meat storage conditions, further research is required to explore active packaging with different oxygen absorber capacities for storing beef — one of the most perishable types of meat due to its susceptibility to microbiological spoilage [3, 4].

Aim of the Study. To determine the effect of different packaging types — particularly packaging with oxygen absorbers containing different amounts of the active component (3 g and 6 g), as well as modified atmosphere packaging (MAP) — on the physicochemical and microbiological characteristics of chilled beef during 21 days of storage at +4 °C.

Research Methods. Samples of second-grade beef were packaged in accordance with the requirements of DSTU 6030:2008. Changes in moisture content, pH, water-holding capacity (WHC), and the level of mesophilic aerobic and facultative anaerobic microorganisms (MAFAnM) were analyzed. The control sample was unpackaged beef stored under the same conditions.

Results. The control samples demonstrated the most significant deterioration in quality: moisture loss reached 3.31%, and pH decreased by 0.75 units. The use of active packaging with 6 g oxygen absorbers ensured minimal parameter changes — moisture

loss did not exceed 1.75%, pH remained stable (5.56), and microbial growth was slowed 80-fold compared to the control ($2.50 \pm 0.80 \times 10^6$ CFU/cm³ vs. $2.00 \pm 0.54 \times 10^8$ CFU/cm³).

Conclusion. The application of active packaging — particularly oxygen absorbers with a higher content of active components — significantly extends the shelf life of chilled beef while maintaining its quality and safety. This approach can be recommended for industrial meat packaging technologies, especially within chilled storage and retail distribution systems. Future research should focus on studying the interaction between active packaging components and different types of meat raw materials, as well as optimizing long-term storage conditions.

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