

EVALUATION OF HISTOLOGICAL CHANGES IN OZONATED RED AND WHITE MEAT

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Abstract

Ozone treatment is one of the technological methods used in preserving meat because it is a strong and highly effective antimicrobial agent that helps eliminate a wide range of microorganisms, including viruses, bacteria, and fungi. Hence, the importance of research lies in prolonging the duration of meat preservation. Therefore, this study aimed to discover the effect of ozone on muscle meat tissue and to identify histological changes in the muscles of beef, sheep, goats, chicken, and fresh fish treated with ozone from the cohesion of muscle tissue (muscle fibers), and other histological changes in muscle fibers and between muscle fibers.

This study was conducted in veterinary laboratories - at Tikrit University to determine ozone's effect on the histological properties of fresh red and white meat. Ozone was produced according to the manufacturer's instructions (A2Z/ Aqua-6 specification), after which the ozone concentration produced from water (ppm) was measured using the K-7404 chemical device Kimet Kimites[®]. The experiment was divided into five groups according to each type of meat: cattle, sheep, goats, chickens (broilers), and fish (*Cyprinus carpio*). Fresh meat was purchased from the local markets of Tikrit in Salah al-Din province. They were cut into medium-sized pieces with a knife. Then ozone was treated at a concentration of (0.5 ppm) according to each group, where each group was divided into 3 treatments: the first group included (A) a control sample without treatment; the second treatment, (B) ozone treatment for 20 minutes; and the third treatment (C) is ozone treatment for 30 minutes with a constant concentration of 0.5 ppm. The study samples were taken 50 g of meat cut into small squares. These tissues were washed with a physiological solution (natural saline) to remove the blood and then transferred to the stabilization stage.

The tissue sections were prepared by taking meat pieces and treating them with formalin at a concentration of 10% (90 mL of water + 10 mL of 40% formaldehyde) for 24 hours. The samples were washed with running water to remove formalin residue for half an hour, and then the water was removed from the treatment route with different concentrations of ethyl alcohol (30, 50, 70, 80, 95, and 100%) for the purpose of gradually withdrawing water from them. The duration of each pass was 30 minutes, and the absolute alcohol step (100%) was repeated twice to complete the final removal of water. Then the samples were placed in xylene for 30 min. in two stages to make the tissue more transparent, after that the samples were placed in a mixture of xylene and molten paraffin wax at 58 °C, in a ratio of 1 : 1, for 60 minutes, after which they passed through the molten wax for half an hour with three passes in order to ensure penetration. After that the wax and the samples were buried with polished wax inside the iron mold in the shape of the letter L. The samples were split with a sharp blade, and then the mold was placed on a stand mounted on the microtome tissue sections. They were transferred to a water bath at a temperature of 40 °C in order to spread the tissue and prevent the accumulation of cells on top of each other. After that, the sections were loaded on glass slides holding the diamond pen. At the end, the histological sections were colored, and the prepared sections were examined using a light microscope.

In general, the results showed that the use of ozone in meat has improved the properties of meat by relaxing and hypertrophy of muscle fibers with the expansion of muscle fibers and the distance between muscle fibers due to water preservation by muscle fibers and preventing: shrinkage, water loss, and water loss, unlike control sample in the normal state, where the muscle fibers lose water as a result of animal slaughter and reduce pH, which is an important quality trait for the consumer.

We can conclude that the use of ozone in the treatment of animal meat's skeletal muscles improves organoleptic properties and maintains muscle strength by preventing muscle fibers from contracting due to hypertrophic muscle fibers. Ozone in meat keeps muscle tissue from water contraction and loss.

Key words: *Ozone, O₃, Red and white meat, Histological tissue, Muscle.*