Effect of Electrostatic Field Induced Device Storage on Freshness and Quality of Tilapia

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ABSTRACT

Live tilapia (Orechromis niloticus) immediately killed were used as raw materials. Two types round fish and crushed meat prepared after three pieces filleting and crushing of the round fish were stored in a 4°C refrigerator equipped with electrostatic field induced device (EFID, E-group) to investigate the changes in freshness and quality. Storage in a common refrigerator controlled at the same temperature was used as the contrast (R-group). The results obtained were as follows: 1. Color of the round fish off rigor gradually changed from grey-black to brown. Ammonia odor developed and the eyes became turbid. Similar deterioration was shown at the 4th and 6th day for R-group and E-group, respectively. 2. pH of the meat decreased, subsequently increased during storage. This phenomenon was concerned in glycolysis. The critical time appeared at the 6th for R-group and 7th day for E-group. 3. Both VBN and K value of the meat increased with increasing storage period. VBN exceeded the hygienic standard at 6th and 10th day for R-group and E-group, respectively, while K value reached 71.6% for R group and 61.7% for E group. EFID showed obvious retardation on freshness decrease. 4. Hunter L was not obviously changed, but Hunter a and b values increased for both of R and E-group during storage. The R group moved fast than E group. 5. On total plate counts, R group reached 3.04 x 106 CFU/g meat at the 6th day, exceeding the sanitary standard. E group still maintained the counts under 106 (2.4 x 105 CFU/g meat) at the 8th day, obviously showed inhibition of microorganisms. 6. Water holding capability of tilapia meat decreased with extending storage time for both R and E groups. E group was slow in decrease. 7. The activity of actomyosin Ca-ATPase decreased during storage. Similar activities were observed for R group at the 6th day (0.401 μmol Pi/min × mg protein) and E group at the 8th days(0.417 μmol Pi/min × mg protein). 8. Solubility of salt-soluble and water-soluble proteins of the fish meat decreased to the minimum values for R group at the 4th day and E group at the 5th day. The extraction rate was reversed during the subsequent storage in connection with denaturation and decomposition of proteins. 9. Gels prepared from the stored meat via processes of salt adding, grinding and heating showed decrease and subsequent increase in gel strength. This probably related to the action of endogenous enzymes. Changes in color for the thermally induced gels were similar to that of crushed meat. 10. EFID was a practicable device for tilapia preservation based on positive evaluation of biochemical indices, microorganism inhibition and muscle properties. The self life was prolonged by 20-30%.

Keywords : electrostatic field induced device ; tilapia ; freshness and quality

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