




# Effects of electrical field stimulation on the physicochemical and sensory attributes of aged chicken meat

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## Funding information

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## Abstract

Various physical, chemical, and biological practices have been adopted in the meat industry to enhance the tenderness of aged chicken meat. Among these, electrical field stimulation is used as an innovative tool in enhancing meat quality. Purposely, the present study was designed to evaluate the effectiveness of electrical stimulation (ES) on different quality attributes (chemical, physical, & sensory) of laying aged chicken (*Gallus domesticus*) carcasses. To assess the effect of ES on meat quality of aged chicken (1.5 years), a total of 54 birds were slaughtered and their respective carcasses were subjected to electric field strengths (EFSs) of 3.67 and 7.33 V/cm. Physicochemical and sensorial characteristics of the ES-treated groups (3.67 and 7.33 V/cm) and control group (without ES) meat were compared during the storage periods 0, 30, and 60 days. The results revealed that the electrical conductivity and specific energy consumption increased significantly with an increase in the EFS. ES significantly ( $p < .05$ ) decreased peroxide number (by 12.62%), free fatty acids (FFA; by 13.46%), drip loss (by 4.25%), and cooking loss (by 50.85%), and increased pH (by 5.90%). Besides, ES-treated samples showed significant superiorities in terms of sensory characteristics in comparison with control samples. An artificial neural network (ANN) gave a good fitting to predict the development of peroxide value and FFA during storage.

## Practical applications

Electrical stimulation (ES) has been studied as a means to reduce the time required for aging to prevent meat hardness. ES improves the tenderness of meat by reducing

**Abbreviations:** ANN, artificial neural network; B, number of millimeters of KOH smeared with the plank sample; CL, cooking loss (%); DL, drip loss (%); EFS, electric field strengths (V/cm); ES, electrical stimulation; FFA, free fatty acids (%); I, current (A); L, distance between electrodes (m); m, mass of chicken (kg); PV, peroxide value (meq/kg); R.L.S.D, revised least significant difference; S, cross-sectional area (m<sup>2</sup>); SEC, specific energy consumption (kJ/kg); t, operating time (s); U, voltage (V); W, weight of sample (kg); W<sub>1</sub>, sample weight after 48 h (g); W<sub>ac</sub>, weight after cooking (g); W<sub>bc</sub>, weight before cooking (g); W<sub>o</sub>, original sample weight (g);  $\sigma$ , electrical conductivity (S/m);  $\varphi$ , number of milliliters of KOH swabbed with the oil or fat sample.