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The Analysis of Thermal Conductivity in Porcine Meat Due to Electricity by Finite Element Method

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Abstract : This research studied the analysis of the thermal conductivity and heat transfer in porcine meat due to the electric current flowing between the electrode plates in parallel. Hot-boned pork sample was prepared in 2*1*1 cubic centimeter. The finite element method with ANSYS workbench program was applied to simulate this heat transfer problem. In the thermal simulation, the input thermoelectric energy was calculated from measured current that flowing through the pork and the input voltage from the dc voltage source. The comparison of heat transfer in pork according to two voltage sources: DC voltage 30 volts and dc pulsed voltage 60 volts (pulse width 50 milliseconds and 50 % duty cycle) were demonstrated. From the result, it shown that the thermal conductivity trends to be steady at temperature 40□C and 60□C around 1.39 W/m□C and 2.65 W/m□C for dc voltage source 30 volts and dc pulsed voltage 60 volts, respectively. For temperature increased to 50□C at 5 minutes, the appearance color of porcine meat at the exposer point has become to fade. This technique could be used for predicting of thermal conductivity caused by some meat's characteristics.

Keywords : thermal conductivity, porcine meat, electricity, finite element method
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