Tropentag, September 9-11, 2020, virtual conference



"Food and nutrition security and its resilience to global crises"

## Design and Fabrication of A Three Phase Poultry Bird defeathering Machine

Ademola Adenigba<sup>1</sup>, Adedotun Adedeji<sup>2</sup>, Adewumi Oladigbolu<sup>3</sup>

<sup>1</sup>The Federal Polytechnic Ilaro, Ogun State Nigeria, Agricultural and Bio-environmental Engineering, Nigeria

<sup>2</sup>Federal University of Technology Akure, Agricultural Engineering Department,

<sup>3</sup> The Federal Polytechnic Ilaro, Agricultural and Bio-Environmental Engineering Department, Nigeria

## Abstract

A poultry bird defeathering machine was designed and fabricated in the department of Agricultural and Bio-Environmental Engineering, Federal Polytechnic Ilaro. The machine consist of a feather plate on which rubber pluckers were arranged, a defeathering chamber on which rubber pluckers were set in an array and was powered with a 1.5kW electric motor. A single phase (defeathering chamber) of the machine was tested at three operating speeds of 200, 280 and 360 rpm, which were obtained by using belt, pulley and a variable resistor system. In order to evaluate the effect of rotor speed and scalding temperature on feather retention, plucking efficiency, and the defeathering time of each bird, Isa brown chickens which were old layers (spent hens) were tested in the machine at five scalding temperatures (room temperature, 30, 50, 70 and 100°C). Data obtained were recorded and presented in tables and graphs. Results showed that feather retention rate and defeathering time decreased with increased operating speed, while plucking efficiency increased with speed.

However, an ANOVA test on the collated data resulted in 0.72, 0.72 and 0.32 for feather retention, plucking efficiency and defeathering time respectively. This result indicated that the effect of defeathering speeds were insignificant. Nonetheless, the scalding temperature had significant effect on the evaluation parameters as feather retention and defeathering time was seen to decrease with increase in scalding temperature. The plucking efficiency increased with increase in scalding temperature up till 70°C and reduces afterwards. The highest plucking efficiency of 98.5% was obtained at 360 rpm rotor speed and  $100^{\circ}$ C scalding temperature. Based on physical evaluation and the results obtained, speeds of 280 rpm or higher were recommended to operate the machine and the scalding temperature of  $70^{\circ}$ C is recommended.

**Keywords:** Defeathering, Defeathering time, Feather retention and Plucking efficiency, Rotor speed, Scalding temperature

**Contact Address:** Ademola Adenigba, The Federal Polytechnic Ilaro, Ogun State Nigeria, Agricultural and Bioenvironmental Engineering, Federal Polytechnic Ilaro Ogun State, 111101 Ilaro, Nigeria, e-mail: demydeabillions@ gmail.com