Simulation of the Microclimate in Poultry Structures in Kenya

Abstract:

A computer model based on the thermodynamic principles was developed for simulating the internal temperature responses in a naturally ventilated broiler chicken house. The model used transient thermal analysis with suitable initial and boundary conditions. Developed relationships had the input parameters: outside air temperature; total solar radiation; mass rate of airflow; properties and dimensions of the constructional materials; number of broilers and their average weight as well as the air properties to predict hourly internal air temperature. The mathematical model of the internal temperatures was implemented using a computer program written in Visual BASIC. The program solves analytically the temperatures of the building with the results presented, which compare the model with experimental measurements made in a naturally ventilated poultry house. Experiments were performed using a physical model to test and verify the model at the University of Nairobi, Department of Animal Production at Kabete Campus, between January and May 2009. Results showed no significant difference between the internal air temperatures obtained by simulations and observed measurements. Statistical analysis indicated that the model adequately simulated the internal environment of the building with good linear regression with a coefficient of determination of 0.978.