UNIVERSIDAD NACIONAL DE COLOMBIA
SEDE MEDELLÍN
FACULTAD DE MINAS

DYNA
http://dyna.medellin.unal.edu.co/

Comfort and energy consumption in a hybrid tunnel-type broiler barn in different bioclimatic zones of Brazil

Robinson Osorio-Hernández [a], Lina Marcela Guerra-García [b] & Fátima de Jesús Folgôa-Baptista [c]

[a] *Facultad de Ingeniería, Universidad Nacional de Colombia, Bogotá, Colombia. rosorioh@unal.edu.co*
[b] *Grupo de Investigación Ingeniería Agrícola, Universidad Nacional de Colombia, Medellín. lina.guerra@uniagustiniana.edu.co*
[c] *Departamento de Engenharia Rural, Escola de Ciências e Tecnologia, Instituto de Ciências Agrárias e Ambientais Mediterrânicas, Universidade de Évora, Évora, Portugal. fb@uevora.pt*

Received: June 21st, 2018. Received in revised form: September 25th, 2019. Accepted: October 15th, 2018.

Abstract
Poultry production is influenced directly by its environmental conditions and, therefore, the conditions of comfort, animal welfare, and energy consumption of the facilities. The objective of this study was to carry out an assessment of the acclimatization needs of a negative pressure ventilated broiler barn (hybrid) in 12 Brazilian cities, located in the 8 bioclimatic zones of the country. It was found that cities located in bioclimatic zones 1 and 2 require a higher energy consumption of heating during the chicks phase (0-21 days), while zones 7 and 8 require more energy for cooling during the chickens phase (22-42days). The cities located in zones 3, 4, 5 and 6 present the best comfort conditions and the greatest energy savings for the two phases.

Keywords: bioclimate; climate classification; acclimatization; thermal comfort; poultry production.

Confort y consumo energético en galpón híbrido tipo túnel en diferentes zonas bioclimáticas de Brasil

Resumen
La producción avícola está influenciada directamente por sus condiciones ambientales, y por ende, las condiciones de confort, bienestar animal y consumo energético de las instalaciones. El objetivo de este estudio fue realizar una evaluación de las necesidades de climatización para un galpón de presión negativa en modo túnel (hibrido), en 12 ciudades brasileras ubicadas en las 8 zonas bioclimáticas del país. Se encontró que las ciudades ubicadas en las zonas bioclimáticas 1 y 2 requieren mayor consumo de energía para la calefacción durante la primera fase (0-21 días), mientras que las zonas 7 y 8, requieren más energía para enfriamiento durante la segunda fase (22-42 días). Las ciudades ubicadas en las zonas 3, 4, 5 y 6 presentan las mejores condiciones de confort y el mayor ahorro energético para las dos fases.

Palabras clave: bioclima; clasificación climática; climatización; confort térmico; producción avícola.

1. Introduction

The Brazilian poultry sector has made great efforts in the investment and use of tools to optimize the production of chicken meat [1], and its advances in genetics, nutrition and healthcare are indisputable. However, the great climatic variations in its territory, and sometimes, with facilities that do not favor an adequate ventilation and renewal of the air, can compromise its productivity [2].

The intensive production of chickens is directly influenced by their conditions of comfort and animal welfare. These conditions can cause difficulties to maintain the thermal balance and, therefore, affect the productive performance of the birds[3,4].

Since Brazil has a predominantly warm climate, its poultry industry opted to have facilities with little thermal insulation in side walls (of curtains made of polymeric materials). These facilities use natural ventilation, and

How to cite: Osorio-Hernández, R, Guerra-García, L.M. and Folgôa-Baptista, F.J, Comfort and energy consumption in a hybrid tunnel-type broiler barn in different bioclimatic zones of Brazil. DYNA, 86(211), pp. 167-173, October - December, 2019.