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C Ramakrishnan
M.V. Sc., Scholar, Department of
Livestock Products Technology,
Meat Science Madras Veterinary
College, Chennai, Tamil Nadu,
India

R Narendra Babu
Professor and Head, Department
of Livestock Products
Technology, Meat Science,
Madras Veterinary College,
Chennai, Tamil Nadu, India

V Appa Rao
Dean, College of Food and Dairy
Technology Kduveli, Chennai,
Tamil Nadu, India

P Tensingh Gnanaraj
Registrar, Tamil Nadu
Veterinary and Animal Sciences
University, Madhavaram Milk
Colony, Chennai, Tamil Nadu,
India

R Vimal
M.V. Sc., Scholar, Department of
Veterinary Anatomy, Madras
Veterinary College, Chennai,
Tamil Nadu, India

Corresponding Author:
C Ramakrishnan
M.V. Sc., Scholar, Department of
Livestock Products Technology,
Meat Science Madras Veterinary
College, Chennai, Tamil Nadu,
India

Estimation of broiler production losses due to transportation distances, seasons and birdcage microclimate in Chennai city

C Ramakrishnan, R Narendra Babu, V Appa Rao, P Tensingh Gnanaraj and R Vimal

Abstract

The study aims to estimate the production loss in the broiler sector at the time of transportation by measuring live weight losses and the mortality rate due to transport, and evaluate the microclimate (temperature, relative humidity) of broiler cages in trucks at every 5 km transport distances. A total of 24 visits from different farms to retail outlets in the winter and summer seasons and data were collected for study. Summer was the more critical period for broiler transport and observed no significant difference in the mortality rate. But bruising on carcasses will be found irrespective of season and distance traveling. This study estimated the live weight shrinkage in summer and winter respectively 2.36% and 3.01%, the mortality percentages were 0.43% and 0.53%, and the average weight loss per bird is 55.42 ± 5.65 and 70.98 ± 6.01 grams respectively. In summer, truckload birdcage and its microclimate changes during transport cause significant economic losses. Hence, it is necessary to care for birds before and after transportation.

Keywords: live birds, transportation, weight loss, mortality

Introduction

The broilers transportation is a crucial point in the production chain. Because, Long-term water and feed deprivation have been correlated with yield losses at slaughter (Denadai *et al.*, 2002) ^[1]. Truck vibration, road noise during transport cause more stress results losses of yield parameters. In addition, variations in climatic conditions during transport, such as changes in temperature, relative humidity and air flow inside the broiler trucks, are important stressors for broilers (Mitchell M, 2009) ^[2]. Losses from broiler transport are economically significant for the industry. The number of dead broilers recorded on arrival at a slaughterhouse is estimated to be associated with the dynamics of temperature and humidity inside the truck and the duration and distance of transport (Voslarova *et al.*, 2007) ^[3]. A high mortality rate and greater body weight loss have been observed in loads that travelled long distances with long transport periods. However, studies have been carried out mainly in temperate countries, with few references showing the thermal profiles of loads in a tropical climate or correlating potential losses with the location of the broilers within the truck trailer (Vecerek *et al.*, 2006) ^[4].

Studies aiming to elucidate the dynamics of bioclimatic variables within broiler transport are necessary. The degree of compromise of the thermal comfort of broilers due to environmental conditions and factors such as transport distance and duration is a crucial point in the explanation of yield losses at slaughter. Thus, the objective of this study was to evaluate the microclimate of commercial transport of broiler chickens transported over different distances during the summer and winter seasons and the effect of microclimate on slaughter weight, body weight loss, mortality rate and occurrence of bruises on broiler carcasses. We hypothesized that longer distances, longer transport duration and longer lairage duration can affect broiler chicken performance at slaughter, resulting greater body weight losses. We also hypothesized that broiler chicken transportation, during the summer, can result greater mortality rate and greater bruises on carcass.

Materials and methods

Experimental procedures

Overall, 24 shipments were monitored from catching to slaughter during the daytime. For this, 24 broiler farms were used, the microenvironment like temperature (°C), relative humidity

(%), and barometric pressure (mmHg) data during the trial were collected. The digital hygrometers were equally distributed such that each section of the truck body (i.e., front, center, and rear). Total of 24 visit were covered by two seasons with same vehicle, distance, number of birds and average initial body weights.

Parameters taken for production loss

To evaluate the initial weight (Wi), all the 24-time before transport birds were weighed by using a digital calibrated scale. To measure the final weight (Wf), birds were weighed after arrival at the slaughterhouse before being unloaded. The difference (DifW) between two measurements were calculated. The mortality rate (%) or death on arrival (DOA) was obtained by dividing the number of dead birds per crate on arrival by seven (initial number of birds per crate/bird cage) and then multiplying the quotient by 100. The number of dead birds was recorded after each unloading of the 24 crates in this study. The total mortality in each transport was also recorded with the support of the slaughterhouse team. The total mortality (%) for each load was calculated as the ratio of the number of dead birds to the total number of birds transported for slaughter, multiplied by 100. Also bruises rate were evaluated after plucking and evisceration of broilers.

Estimation of Enthalpy Comfort Index (ECI)

The ECIs were categorized into comfort (35.0 to 48.0 kJ/kg), warning (48.1 to 57.6 kJ/kg), critical (57.7 to 66.1 kJ/kg), and lethal (66.2 to 90.6 kJ/kg) zones for broilers beginning at the sixth week of age based on (Queiroz *et al.*, 2012) [5].

$$h = 1.006t + \frac{RH}{p_b} 10^{(7.5t/237.3+t)} \cdot (71.28 + 0.052t)$$

Where

h = Enthalpy index (kJ/kg of dry air);

t = Crate temperature (T crate in °C);

RH = Relative humidity (RH crate in %);

pb = Local barometric pressure (mmHg).

Result and discussion

Analysis of microclimatic variables

The Microenvironment of cages during transportation were resulted the mean temperatures in summer was 29.01 ± 0.48 C and winter was 27.23 ± 0.55 . Thus, broilers were subjected to heat stress during transport and the heat produced by the broilers tends to accumulate inside the load, increasing the internal temperature. Similarly, during long journeys, an increase in internal temperature occurs because the travel duration could be too long to not allow adequate return to homeostasis and thus may produce greater stress in the broilers. Thus, the broilers do not recover from the thermal stress caused by catching and loading, and they maintain an elevated body temperature during transportation, promoting an increase in microclimate temperature. In tropical countries like India the variation in temperature during summer and winter is minimal. Increase in microclimate temperature could be deleterious for broiler thermal comfort. Similarly, the ECI indicates the environmental condition in relation to animal heat stress, and as the ECI increases, comfort decreases. The highest ECI, which was observed during the tropical region is 70.8 ± 6.2 kJ/kg, exceeded the broiler comfort zone and was therefore considered within the lethal zone according to Queiroz *et al.*, 2012 [5]. In addition, the current practices

recorded in the present study revealed that the birds before transportation were wetted by pouring sufficient quantity of water from top of the trucks after loading of birds especially during summer season which might be the major reason for decreased loss of weight during transportation. The practice of wetting was less during winter season as compared to summer. Also estimated the live weight shrinkage in summer and winter respectively 2.36% and 3.01%, the mortality percentages were 0.43% and 0.53%, and the average weight loss per bird is 55.42 ± 5.65 and 70.98 ± 6.01 grams respectively.

Conclusions

The current practices adopted by the processors for transport of birds from farms to wholesale / retail outlets have been found to cause losses in weight as well as injuries. This can be effectively reduced by either setting up of central processing facilities near the major production sites or by proper designing of crates and vehicle so as to minimize losses and increase profitability. The highest ECI and higher body weight after transported over longer distances which reflect significant body weight loss and mortality. Thus, load microclimate can compromise broiler chicken welfare without necessarily impair broiler productivity. The prevalence of bruising on carcasses was not affected by the interaction between season and distance. Broiler chicken performance, during transport, can be also related to road conditions, being hard to evaluate the actual impact of seasons and distances on animal welfare.

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