The Pharma Innovation Journal 2022; SP-11(8): 960-962

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(8): 960-962

www.thepharmajournal.com
Received: 23-05-2022
Accepted: 27-06-2022

Rajendra Kumar K
Assistant Professor, Department of Poultry Technology, College of Poultry Production and Management, Tamil Nadu Veterinary and Animal Sciences University, Hosur, Tamil Nadu, India

Chandirasekaran V
Associate Professor and Head, Department of Livestock Products Technology, Veterinary College and Research Institute, Tamil Nadu Veterinary and Animal Sciences University, Tirunelveli, Tamil Nadu, India

Selvaraj P
Professor and Head, Department of Veterinary Physiology, Veterinary College and Research Institute, Tamil Nadu Veterinary and Animal Sciences University, Namakkal, Tamil Nadu, India

Karthikeyan N
Associate Professor, Department of Food Business Management, College of Food and Dairy Technology, Tamil Nadu Veterinary and Animal Sciences University, Koduvalli, Chennai, Tamil Nadu, India

Raj Manohar G
Associate Professor and Head, Department of Poultry Engineering, College of Poultry Production and Management, Tamil Nadu Veterinary and Animal Sciences University, Hosur, Chennai, Tamil Nadu, India

Corresponding Author
Rajendra Kumar K
Assistant Professor, Department of Poultry Technology, College of Poultry Production and Management, Tamil Nadu Veterinary and Animal Sciences University, Hosur, Tamil Nadu, India

Influence of feed withdrawal, stocking density and transport distance on weight loss and carcass traits of broiler

Rajendra Kumar K, Chandirasekaran V, Selvaraj P, Karthikeyan N and Raj Manohar G

Abstract
A study was carried out to evaluate the weight loss and changes in carcass characteristics of slaughtered broiler when transported under two different stocking densities and three transport distances. The broiler birds were transported to 150 km, 250 km and 350 km with the stocking density 480 sq cm and 350 sq cm. There was a significant difference (p<0.01) in the body weight loss during the transport between stocking density of 480 sq cm and 350 sq cm. Stocking density of 350 sq cm had significantly higher weight loss compared to stocking density of 480 sq cm. The present study results showed that the yield of giblets per cent were significantly (p<0.05) higher in transported broiler when compared to control. There was no significant difference in head, feather and abdominal fat content of control and the broilers transported under different stocking density upto 350 km. Based on the above study concluded that the weight loss percentage in broiler chicken during transport increased with increasing of transport distance and when the birds are transported under high stocking density. The broiler chicken can be transported without any significant changes in dressing percentage upto 350 km with feed withdrawal of 4 hour and with rest of 4 hour before slaughter with stocking density of 480 sq cm.

Keywords: Feed withdrawal, stocking density, transport distance, weight loss and carcass traits

Introduction
Broiler industry is the one of the fastest growing sectors in India. Around 4.2 million metric tonnes of broiler chicken meat is currently produced in India. According to the livestock census the Poultry chicken meat production increased from 0.79 million tons to 4.2 million tons during the year 1980 and 2017. Proportionately the per capita availability also increased from 0.27 kg to 3.6 kg during the same year. The major contributor's states to the output of broiler chicken meat during 2017 are Tamil Nadu, Andhra Pradesh, Maharashtra and Haryana. Due to the intensive system of broiler production the chicken rearing is mostly being carried out in different geographical areas and to be transported by road over a long distance to urban areas or centralized processing plants. The transportation is an essential component of the poultry industry, but places enormous stress on birds because they have little space for behavioural thermoregulation. That leads to weight loss and mortality depending on the temperature. Sowinska *et al.* (2013) [1] and Vecerek *et al.* (2006) [2] reported that the increase in body weight loss was significant with increase in the transport distance. The purpose of current study was to determine the weight loss and changes in carcass characteristics of slaughtered broiler when transported under two different stocking densities and three transport distances.

Materials and Methods
The selected broilers were feed withdrawn for 4 hours before the transport, the birds were shifted manually and loaded in to the crates (Dimension: 88 cm x 52 cm). The crates were weighed after filling with the nine broilers per crate with the stocking density 480 sq cm (Indian standard 5238: 2001 Transport of poultry and -Code of Practice) in four crates and 13 broilers per crate with the stocking density of 350 sq cm (routine practice) in four crates. The initial temperature and relative humidity at the time of loading were noted. The time taken for travelling 150 km, 250 km and 350 km was noted. All the transport trial was conducted during the late evening time starting from seven o clock. The time taken for travelling 150 km, 250 km and 350 km was 3 hour, 5 hour and 7 hour respectively. During the transport wind velocity, temperature and relative humidity were recorded every 30 minutes during the

transport. After the transport crates along with the birds were weighed for measuring the weight loss. The birds were given rest for 4 hours before slaughter. The broilers were slaughtered and carcass characteristics were recorded. The birds were individually weighed and subjected to ante-mortem inspection and slaughtered by Jhatka method as per the standard slaughter procedure. Skin and feather was removed manually. After evisceration, a detailed post-mortem inspection was carried out and then the carcasses were fabricated. The edible and inedible offal were separated and weighed.

Results and discussion

The average temperature (ºC), relative humidity (%) and wind velocity (m/s) were 24.38±0.08, 61.42±0.30 and 10.63±0.19, respectively. The time taken for 150 km, 250 Km and 350 Km were 3 hr, 5 hr and 7 hr, respectively.

Transportation and weight loss

The results of body weight loss are given in the table1. The boilers transported with stocking density of 480 sq cm to 150 km, 250 km and 350 km had body weight loss of 2.49, 3.02 and 3.40 per cent, respectively. The boilers transported with stocking density of 350 sq cm to 150 km, 250 km and 350 km had body weight loss of 3.08, 3.14 and 3.80 per cent, respectively. There was a significant difference (p<0.01) in the body weight loss during the transport of 150 km, 250 km and 350 km under stocking density of 480 sq cm. There was a significant difference (p<0.01) in the body weight loss during the transport between stocking density of 480 sq cm and 350 sq cm. Stocking density of 350 sq cm had significantly higher weight loss compared to stocking density of 480 sq cm.

Table 1: Mean (± S.E.) weight loss per cent in broiler chicken during transport

Treatment	Transport distance (Km)			Overall mean of Stocking density
	150	250	350	
Stocking density 480 sq cm	2.49±0.42^{a}	3.02±0.16^{bc}	3.4±0.19^{c}	2.97^{A}
Stocking density 350 sq cm	3.08±0.50^{a}	3.14±0.34^{a}	3.8±0.18^{a}	3.28^{B}

^{abc}Means with different superscripts within a row wise differ significantly (p<0.01)

^{AB}Means with different superscripts within a column wise differ significantly (p<0.01)

The results of the current study agreed with the results of Gou *et al*. (2021) [3] they reported that the per cent body weight loss of the broilers transported for 3 hr was 2.20 per cent of the initial body weight. However, Hussnain *et al.* (2020) [4] observed that body weight loss was 1.99±0.12, 2.55±0.14 and 3.65±0.13 per cent respectively for the broilers transported 80 km, 160 km and 240 km respectively. The per cent body weight loss increased significantly (p≤0.05) with increase in transportation distance. Further the per cent body weight loss for the broiler under different crating density were 3.24±0.15 for low stocking density (0.050 m^2/bird), 2.96±0.14 for medium stocking density (0.042 m^2/bird) and 1.98±0.12 for high stocking density (0.033 m^2/bird). The per cent body weight loss decreased significantly (p≤0.05) with increase in crating density. Al- obaidy *et al*. (2020) [5] also reported that transporting broilers for 6 hours and 9 hours from farm to the slaughter house, the weight loss was 5.12 per cent and 5.63, respectively. Moreover, Ramakrishnan *et al*. (2021) [6] observed that body weight loss was 2.96 per cent for medium-growing broiler chickens up to 45 days with consistent body weight (1.52 ± 0.23 kg), when transported for 3 hours. The body weight loss significantly increased (P<0.01) with the duration of transport (linear, P<0.01).

Carcass traits

Table 2 & 3 shows the results of statistical analysis of carcass traits of the data collected on with feed withdrawal before transport and rest after transport with three transportation distance and two different stocking densities.

This study also revealed that neither transportation distance nor the crating densities and their interaction showed any significant effect (p>0.05) on dressing percentage. The current study results agreed with Zhang *et al.* (2014) [7] found that broilers transported for a 3 hour period had no significant (p>0.05) effect on dressing percentage, breast and thigh muscle yield, and abdominal fat yield, and meat quality of thigh muscle when compared with the broilers transported for 0.75-h, respectively. Moreover, Ramakrishnan *et al.* (2018) [8] revealed there was no significant difference in loss of weight, dead on arrival, types of injuries, tissue shrinkage and duration of transport between summer and winter season. In contrast to these studies Nijdam *et al*. (2005) [9] found that per cent decrease in body weight during transport was approximately 0.05 to 0.17 per cent/hour. When the broilers had access to feed until the moment of transport the mean decrease in final body weight was 0.12 per cent/hour. The per cent body weight loss was found to be greater broilers starved and transported when compared with chickens that were only starved for the same amount of time. Doktor and Połtowicz (2009) [10] showed that pre-slaughter transport of broilers was found to have an effect on dressing percentage. Control chickens had higher dressing percentage with giblets whereas the birds transported to the slaughterhouse had a 0.97 per cent lower dressing percentage (p>0.05). Utomo *et al.* (2019) [11] found that 180 km transportation distance significantly reduced the live weight, carcass weight and carcass percentage.

The present study results showed that the yield of giblets per cent were significantly (p<0.05) higher in transported broiler when compared to control. There was no significant difference in head, feather and abdominal fat content of control and the broilers transported under different stocking density upto 350 km.

The present study results showed that the weight of digestive tract (g) were significantly (p<0.05) lower in transported broiler when compared to control except broiler transported with stocking density of 480 sq cm. The weight of intestine of the broilers transported for 150 km, 250 km and 350 km with stocking density of 480 sq cm for group with feed withdrawn were 111±4.21, 115.83±7.39 and 163.17±11, respectively. The weight of intestine of the broilers transported for 150 km, 250 km and 350 km with stocking density of 350 sq cm for group with feed withdrawn were 105.83±5.60, 116.33±7.06, and 157.92±5.40, respectively. The intestine weight decrease significantly (p<0.05) initially during the transport of 150 km and 250 km, when compared with the control group. The broilers transported for 350 km with feed withdrawn had significantly higher (p<0.05) intestine weight.

Table 2: Mean ± SE of carcass traits of broiler chicken transported for 150 Km, 250 Km and 350 Km

Transport distance		Live weight	Dressed carcass weight	Weight of gizzard %	Weight of liver %	Weight of heart %	Weight of giblet %	Dressing Percentage
Control (without transport)		2117.5±48.70^{b}	1549.67±36.28^{c}	1.71±0.14^{a}	1.99±0.07^{a}	0.51±0.03^{a}	4.21±0.15^{a}	73.19±0.42
150 Km	480 sq cm	1814.67±63.96^{a}	1343.67±54.76^{ab}	1.79±0.07^{ab}	2.50±0.10^{ab}	0.56±0.01^{ab}	4.85±0.14^{b}	73.90±0.58
	350 sq cm	1745.08±72.2^{a}	1270.17±62.66^{a}	1.97±0.09^{abc}	2.78±0.32^{c}	0.61±0.03^{ab}	5.37±0.37^{c}	72.55±0.98
250 Km	480 sq cm	1793.67±84.85^{a}	1308.75±73.58^{a}	1.76±0.07^{ab}	2.28±0.08^{ab}	0.60±0.03^{ab}	4.63±0.08^{a}	72.65±0.85
	350 sq cm	1835.00±71.79^{a}	1345.17±58.78^{b}	1.99±0.09^{abc}	2.37±0.08^{ab}	0.61±0.03^{ab}	4.97±0.13^{bc}	73.17±0.64
350 Km	480 sq cm	2089.17±77.24^{b}	1508.58±63.39^{c}	2.07±0.12^{bc}	2.42±0.20^{ab}	0.64±0.07 ^{c}	4.86±0.22^{bc}	72.1±0.95
	350 sq cm	1948.42±54.47^{b}	1408.50±44.06^{b}	2.20±0.13^{c}	2.38±0.16^{ab}	0.56±0.04^{ab}	5.14±0.18^{bc}	72.27±0.83

Table 3: Mean ± SE inedible offal weight (g) of broiler chicken transported for 150 Km, 250 Km and 350 Km

Transport distance		Weight of blood (g)	Weight of Feathers (g)	Weight of Head (g)	Weight of Digestive tract (g)	Weight of Abdominal fat (g)	Weight of Shank and claw (g)
Control (without transport)		74.42±2.74^{a}	85.5±5.07	45.58±0.74	160.17±5.11^{b}	20.42±3.25	72.42±2.22^{c}
150 Km	480 sq cm	58.42±3.79^{b}	72.75±7.02	42.08±1.28	111.00±4.21^{a}	20.75±1.12	60.17±2.58^{a}
	350 sq cm	54.25±2.72^{b}	73.00±6.26	45.75±2.17	105.83±5.60^{a}	19.83±2.56	59.25±2.25^{a}
250 Km	480 sq cm	55.42±4.76^{b}	71.67±3.67	47.08±1.88	115.83±7.39^{a}	15.54±2.11	60.58±2.36^{a}
	350 sq cm	53.33±4.37^{b}	72.92±3.47	47.42±1.96	116.33±7.06^{a}	20.92±2.23	63.17±2.44^{ab}
350 Km	480 sq cm	72.08±4.33^{a}	73.00±4.08	48.75±2.16	163.17±11.7^{b}	22.17±2.95	77.42±3.50^{c}
	350 sq cm	64.67±4.22^{b}	74.08±3.48	44.50±1.20	157.92±5.40^{b}	22.17±1.53	70.08±2.76^{bc}

Mean ± SE with at least one common superscript within classes do not differ significantly (p>0.05). n =12 for each treatment

The weight of intestine (per cent) for the broilers transported for 150 km, 250 km and 350 km with stocking density of 480 sq cm for group with feed withdrawn were 6.51, 6.40 and 8.02 per cent, for group without feed withdrawn were 6.61, 6,89 and 8.28 per cent, for the group without transport is 7.57 per cent. The intestine weight decrease significantly (p<0.05) initially during the transport of 150 km and 250 km, when compared with the control group. The broilers transported for 350 km with feed withdrawn had significantly higher (p<0.05) intestine weight.

Based on the above study concluded that the weight loss percentage in broiler chicken during transport increased with increasing of transport distance and when the birds are transported under high stocking density. The broiler chicken can be transported without any significant changes in dressing percentage upto 350 km with feed withdrawal of 4 hour and with rest of 4 hour before slaughter with stocking density of 480 sq cm.

Reference

1. Sowinska J, Wojcik A, Pomianowski JF, Chorazy L, Mituniewicz T, Witkowska D, *et al*. Effects of different variants of pre-slaughter transport on body weight loss and meat quality in broiler chickens. Medycyna weterynaryjna. 2013;69:420-423.
2. Vecerek V, Grbalova S, Voslarova E, Janackova B, Malena M. Effects of travel distance and the season of the year on death rates of broilers transported to poultry processing plants. Poultry Science. 2006;85:1881-1884.
3. Gou Z, Abouelezz KFM, Fan Q, Li L, Lin X, Wang Y, *et al*. Physiological effects of transport duration on stress biomarkers and meat quality of medium-growing Yellow broiler chickens Animal: The international journal of animal biosciences. 2021;15(2):100079.
4. Hussnain F, Mahmud A, Mehmood SI, Jaspal MH. Effect of Broiler Crating Density and Transportation Distance on Preslaughter Losses and Physiological Response During the Winter Season in Punjab, Pakistan. Brazilian Journal of Poultry Science. 2020;22(2):001-010.
5. Al-obaidy AH, Shanoon AQ, Al-Hassani DH. Evaluation of the stress of transporting broiler chickens in Iraq on some productive, physiological and economic characteristics. Iraqi Journal of Agricultural Sciences. 2020;51(3):752-759.
6. Ramakrishnan C, Karthiga S, Chilambarasan M. Physiological effects of transport duration on meat quality of Indian broiler chickens. The Pharma Innovation Journal. 2021;10(7):403-405.
7. Zhang L, Li JL, Gao T, Lin M, Wang XF, Zhu XD, *et al*. Effects of dietary supplementation with creatine monohydrate during the finishing period on growth performance, carcass traits, meat quality and muscle glycolytic potential of broilers subjected to transport stress. Animal. 2014;8(12):1955-62.
8. Ramakrishnan C, Narendra Babu R, Appa Rao V, Robinson Abraham JJ, Tensingh Gnanaraj P, Wilfred Ruban S, *et al*. Economic loss due to live weight shrinkage and mortality during broiler transport in summer and winter season in Chennai city International Journal of Chemical Studies. 2018;6(1):816-819.
9. Nijdam E, Delezie E, Lambooij E, Nabuurs MJ, Decuypere E, Stegeman JA. Feed withdrawal of broilers before transport changes plasma hormone and metabolite concentrations. Poultry science. 2005;84:1146-52.
10. Doktor J, Połtowicz L. Effect of transport to the slaughterhouse on stress indicators and meat quality of broiler chickens. Annals of Animal Science. 2009;9(3):307-317.
11. Utomo MCC, Sarjana TA, Suprijatna E, Kismiati S, Nasoetion MH, Atmomarsono U, *et al*. The influence of transportation distance during the dry season on broiler chickens' carcas traits. 1st International Conference of Animal Science and Technology (ICAST) 2018 IOP Conf. Series: Earth and Environmental Science. 247, 2019, 012036.