International Journal of Progressive Sciences and Technologies (IJPSAT)
ISSN: 2509-0119.

https://ijpsat.org/
Vol. 47 No. 2 November 2024, pp. 636-644

Analysis Of Condition And Behavior Of Day-Old Chick Post Transportasi With Different Durations

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Abstract – The present study was conducted to analyze the condition and behavior of post-hatch transportation duration. A total of 300 day old female broilers (3 boxes) from 50 week old breeder hens of Cobb strain were produced by PT. Mega Satwa Perkasa. The vehicle used was a special doc truck. The observation was conducted directly after the DOCs arrived, with using 25 birds each treatment for condition obervation, and 5 birds for behavior observation. A Completely Randomized Design was applied, with 3 treatments and 5 replicates, and 1 bird each replicate. Data on behavior recording was carried out with 30 minutes duration when the DOC arrived at the rearing pens using CCTV. The recorded video was tested using the Continuous Recording Method, and transportation durations were divided into D1 (1 hour), D2 (12 hours), and D3 (24 hours). The parameters on the conditions of DOCs were injury and weight loss. Whilst the chick's behaviors were eating, drinking, resting, and locomotion. The findings showed that transportation duration for more than 12 hours caused dehydration, bruising and injury to the leg and hock and also caused weight loss by 4.91-8.50%. The transportation duration for 12 hours increased eating behavior by 34% more than the 1 hour and the 24-hour durations. The transportation more than 12 hours increased the drinking behavior by 70% compared to D2 (20%) and D1 (10%). The best resting behavior was at the shortest transportation duration (1 hour). The transportation for 12 hours increased locomotion behavior activity by 68% more than D3 treatment (19%) and D1 (13%).

Keywords – Transport, Condition, Behavior, Locomotion.

I. INTRODUCTION

Animal welfare is being hotly discussed even though it's not something new. Farmers as producers so far have only focused on marketed body weight. The low performance, especially body weight, is not solely due to management during rearing (on-farm) but the DOC (Day Old Chick) condition of the hatchery has a major contribution to subsequent performance.

After hatching in the hatchery, DOC undergo a grading process and various handling from the hatchery before heading to the rearing cage. From this series, improper handling during transportation allows dehydration and changes in conditions and behavior in DOC. This condition drains energy due to the loss of some body fluids during the trip (Bergoug et al., 2013; Jacobs et al., 2016). In addition, conditions that are not clearly visible during the handling and transportation process are DOCs experiencing stress which has a long-term negative impact, namely decreased productivity, but this process is still lacking attention (Donofre et al., 2014).

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ISSN: 2509-0119.
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https://ijpsat.org/
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The transportation process can cause livestock stress and interfere with animal growth. Fairchild et al. (2006) found that dehydration can cause problems for newly hatched and transported chicks for a long duration. Mortality often occurs in the first week of growth due to a combination of stress from the post-hatchery handling process in the hatchery, transportation and poor adaptation of livestock (Yassin et al., 2009). When the transportation distance of chickens increases from 50 to 300 km, the mortality rate also increases from 1.2 to 1.4% (Chou et al., 2004). Bergoug et al. (2013) also stated that livestock that underwent transportation for 10 hours experienced a significant increase in feed consumption after transportation compared to chickens that were transported less than or equal to 4 hours. In general, the location of the hatchery with the breeder's cage is quite far, so it requires the docs to go through quite a long journey. Inappropriate handling methods disrupt the welfare and comfort of the doc. These results decreased growth (Valros et al., 2008) and mortality of DOC (Chou et al., 2004). Even though the transportation process cannot improve the quality of DOC, the chicken transportation must be done properly. DOC preparation during transportation is one activity that isimportant in raising livestock. Deaths experienced by livestock often in the early stages of rearing are the result of a combination of post-hatching handling stress, transportation, and weak adaptability during the growth period (Heier et al., 2002). This means that the treatment in the hatchery has a long-term effect on the cognitive state of the animals, and thus their poor welfare

II. METHODOLOGY

The study used 300 female broiler DOC (3 boxes) produced by PT. Mega Satwa Perkasa Cobb 500 strain from 50 weeks old broodstock for 3 transportation durations (1 box each duration). Chicks are transported in a special vehicle doc. Observation of DOC conditions directly after DOC arrived used 25 individuals for each treatment, while observing behavior used 5 DOCs as samples. The study was carried out using a completely randomized design (CRD), with 3 treatments and 5 replications, and each replication consisted of 1 DOC. Behavior recording data was collected with a duration of 30 minutes when the DOC arrived at the rearing cage using CCTV. The results of the video recording were tested using the Continuous recording method, treatment of transportation duration; D1 (1 hour), D2 (12 hours), and D3 (24 hours). Parameters observed were condition (injury, weight loss) and behavior (eating, drinking, resting, and locomotion behavior) of DOC. Animal locomotion in ethology is any variety of methods used by animals to move from one place to another (Mujiono et al., 2019).

III. RESULTS AND DISCUSSION

DOC's physical condition

Figure 1 shows the physical condition of DOC after transportation with different durations. Travel for 1 hour (a), showed that the legs still look normal, different when the duration of transportation was longer, namely with a treatment of 12 hours (b), shows the DOC dehydrated with signs that the legs look red and the blood vessels appear very clear, the duration of transportation was 24 hours (c), showing a more severe condition, it was obvious that the leg on the hock had bruises and injuries. This is because the longer DOC in the vehicle, drinking water was not available, the temperature around DOC was above thermoneutral, causing dehydration and fatigue. During transportation, livestock not only face stress from the effects of heat, cold, and humidity, but also depletion of O_2, shock during travel, and rough treatment. The study by Bedanova et al. (2006) showed that the transportation process can affect the health of livestock, cause injuries, increased heat stress and lead to a decrease in meat quality. The mortality factor or Death on Arrival (DOA) varies greatly depending on the season, geographic location, length of trip, density of chickens in the box, health status and vehicle design. Temperature was the dominant factor causing stress on docs while they were in transportation (Jacob et al., 2016).

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(a) (b) (c)

Figure 1. Condition of DOC's feet after transportation for duration (a) 1 hour, (b) 12 hours, and (c) 24 hours

DOC Body Weight Loss

Transportation significantly affected body depreciation (P = 0.023), the longer the depreciation the higher (Table 1). Transportation for 24 hours DOC body weight decreased by 8.50%, while 12 hours by 4.91% and 1 hour by 0.66%. Khosravinia (2015) stated that the weight of the DOC decreased by 0.45 ± 0.3 grams for every increase of 100 km traveled. The longer the travel, the more they experience urination and defecation, so that the contents of the digestive tract and body water decrease. This is because the longer DOC is in the vehicle, drinking water is not available, the temperature around DOC is above thermoneutral, causing dehydration and fatigue. During transportation, livestock not only face stress from the effects of heat, cold, and humidity, but also depletion of O_2, shock during travel, and rough treatment. The work by Bedanova et al. (2006) showed that the transportation process can affect the health of livestock, cause injuries, increase heat stress and lead to a decrease in meat quality. The mortality factor or Death on Arrival (DOA) varies greatly depending on the season, geographic location, length of trip, density of chickens in the box, health status and vehicle design. And temperature was the dominant factor causing stress on docs while in transportation (Jacob et al., 2016).

Table1. Loss of body weight post transportation

Condition	Duration (hr)			F Value	Pr > F
Body weight (g)	D1 (1)	D2 (12)	D3 (24)		
Before	48.16 ±3.77	48.92 ±3.84	49.40 ± 2.59	2.55	0.085
After	47.84 ±3.50	46.52 ±4.62	45.20 ±2.84	3.97	0.023
Loss (%)	0.66	4.91	8.50		

The longer the transportation, the weaker the physiological state of the animal is because the environment during transportation does not provide comfort. Nawaz et al. (2021) argues that global heat changes have a negative effect on the function of the physiological conditions of chickens and broilers that are more sensitive to heat stress which will affect growth, efficiency and meat quality. Broiler transport distances are critical (dos Santos et al., 2020). The increase in high ambient temperature during the day transport due to the heat of the sun. Indonesia as a tropical area with high humidity, due to very humid conditions, the process of releasing body heat will be difficult. Stressed poultry livestock experience accelerated burning of carbohydrates, fats and proteins and as a result of these reactions, a certain amount of energy is released in the form of heat, carbohydrates and water vapor (Teyssier

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et al., 2022). Bergoug et al. (2013) showed differences in body weight between the group that was not transported and the group that was transported 4 hours and 10 hours. Decreased body weight after transportation due to delayed to get feed, consequently, then feed consumption was also less.

Post-Transportation Behavior Analysis

Duration of transportation significantly (P<0.05) affected all doc behavior after being placed in the rearing cage (Table 2).

Table 2. Analysis of behaviour post transportation

Behaviour	Duration (hr)			p-value
	D1 (1)	D2 (12)	D3 (24)	
Eating	20.6 ± 3.36^{b}	62 ± 28.21^{a}	42.2 ± 14.10^{ab}	0.0129
Drinking	4.6 ± 4.61^{b}	10 ± 13.98^{ab}	34.6 ± 25.20^{a}	0.0348
Resting	89 ± 7.74^{a}	19 ± 13.70^{b}	35.2 ± 12.44^{b}	<.0001
Locomotion	5.8 ± 2.59^{b}	29 ± 1.87^{a}	8 ± 0.45^{b}	<.0001

[ab] Different superscripts on the same line show significantly different P (<0.05)

Eating Behavior

Transportation has an effect on feeding behavior (P=0.0129) (Table 2). Transport D2 showed the highest feeding behavior 50% compared to D1 (16%) and D3 (34%) (Figure 2).

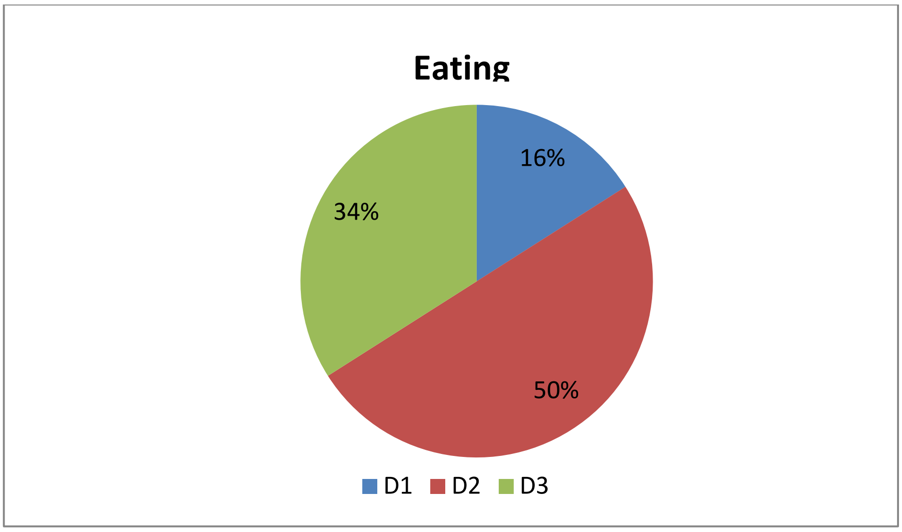

Figure 2. Proportion of eating behavior due to differences in transportation duration

Broiler chickens are intensively selected purebred chickens to produce high body weight and fast growth. In accordance with these characteristics, broiler chickens will try to consume more feed to meet basic needs (maintenance). During the brood period, the required broiler ambient temperature is 32-34 oC. High body weight requires more feed input.

Drinking Behavior

Transport duration affects drinking behavior (Table 2). Treatment D3 showed activity in drinking behavior, which was 70%, more than treatment D2, which was 20% and D1, which was 10% (Figure 3). The longer the duration of the transportation activity the greater the drinking behavior. High environmental temperatures cause broiler chickens to adjust their body temperature to the

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environment, one way is by increasing drinking water consumption. Water is one of the important components in life which is closely related to the thermoregulatory mechanism and the ability to survive at high environmental temperatures. During heat stress, a lot of blood circulation goes to the respiratory organs, while blood circulation to the digestive organs decreases so that it can interfere with digestion and metabolism (Bell and Weaver, 2002). Water consumption can be used objectively as a measure of poultry health and welfare (Manning et al., 2007).

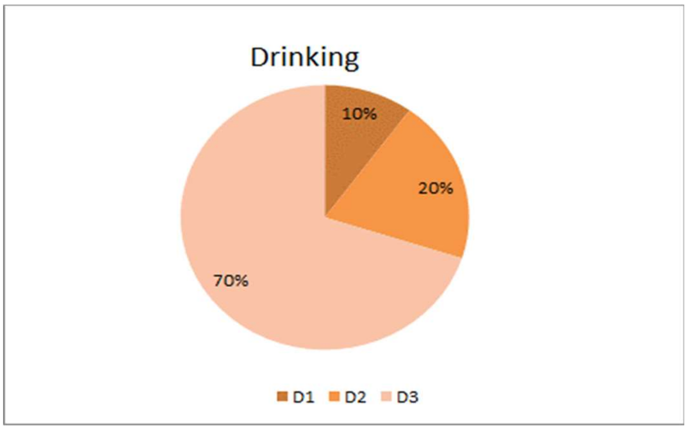

Figure 3. Proportion of drinking behavior due to differences in transportation duration

The dominant factor influencing drinking water consumption is that during transportation there is no access to drinking water and the microclimate temperature increases. According to Orakpoghenor et al. (2021) that several factors affect drinking water consumption, namely ambient temperature, water temperature, feed consumption, and body weight of chickens. Bruno et al. (2011) suggested that drinking water consumption of broiler chickens increased at higher ambient temperatures. Limited feeding and provision of drinking water ad libitum can also cause an increase in the frequency of drinking in poultry

Resting Behavior

Observation of resting behavior activities was carried out after the DOC arrived at the maintenance pen for 30 minutes. The results showed that the activity of resting behavior was affected by the duration of transportation ($P<0.05$). Treatment D1 showed resting activity of 62%, more than treatment D2 (13%) and D3 (25%)

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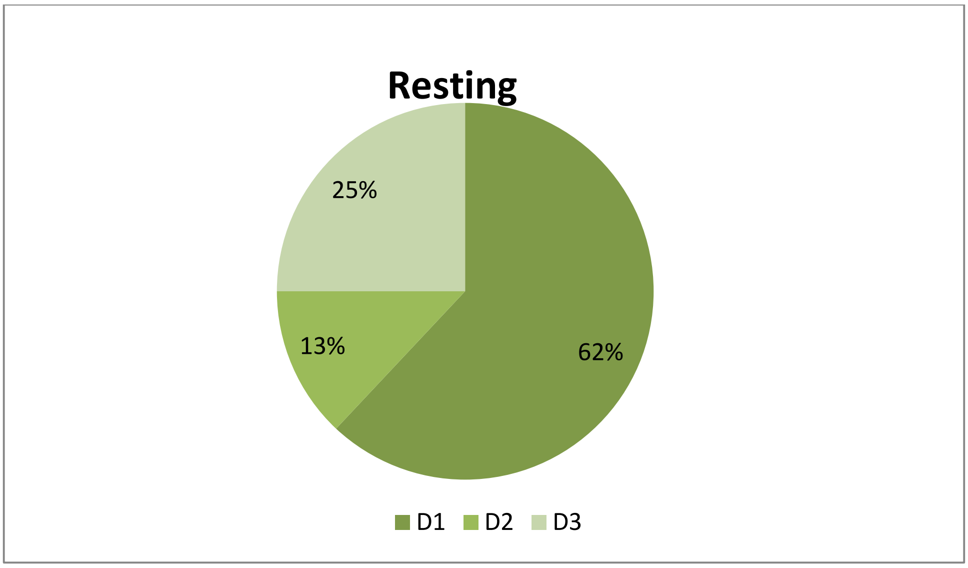

Figure 4. Proportion of resting behavious post transportation.

Treatment D1 led to higher resting behavior compared to D2 and D3 due to the time of arrival at the rearing house at night where birds generally carried out resting activities and a comfortable ambient temperature. Overall, the chickens did more resting activities in a sitting or lying position with their chest attached to the floor mat. A higher resting frequency in broiler chickens can cause high body weight because the energy produced by the body of broiler chickens is not wasted much to do other activities besides maintaining their body. Broiler chickens carry out activities during the day and rest at night because broiler chickens are diurnal animals. Zeman et al. (2001) proved that the hormone melatonin reduces heat stress. The active and resting phases are regulated by hormonal circadian rhythms. This behavior is often used by breeders for maintenance management. Breeders usually reduce the length of lighting at a certain age at night so that broiler chickens do more rest. Broiler chickens with high body weight are the result and accumulation of the level of consumption and the ability or efficiency of using feed which can be seen from eating and drinking behavior (ingestive behavior). Ingestive behavior is related to movement behavior (locomotion) and rest (resting behavior). Locomotion behavior is associated with movement to look for food or drink, while resting behavior is often found because consumption levels are met or because the ambient temperature is too high (Lara and Rostagno, 2013).

Locomotion behavior

Locomotion behavior at each transportation duration shows a very significant difference (Table 2). Treatment D2 showed locomotion behavior activity that was equal to 68%, more than D3 (19%) and D1 (13%) (Figure 5).

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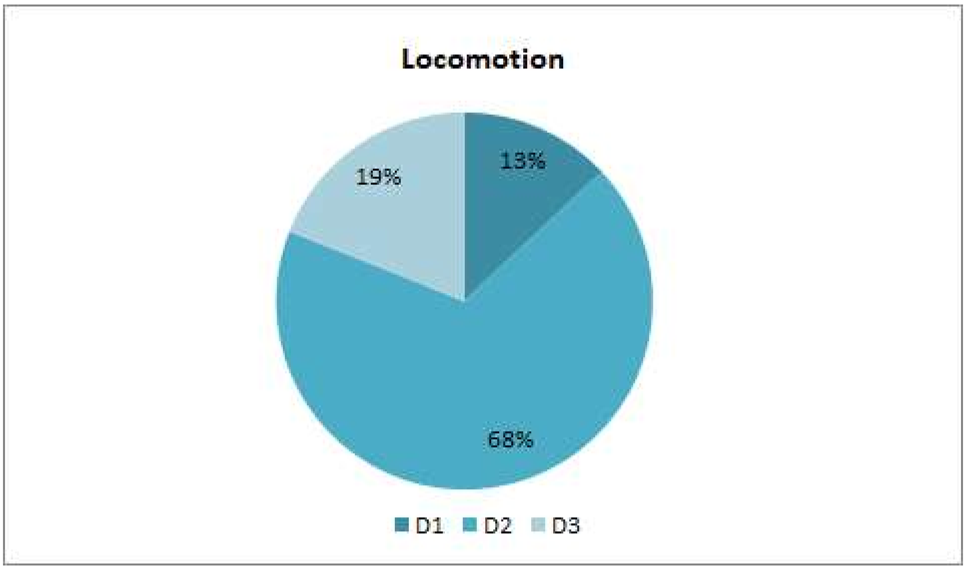

Figure 5. Proportion of locomotion behaviour due to different duration of transportation

Broiler chickens generally reduce locomotion to reduce body heat production. The longer the transportation, the locomotion behavior will increase. In this study, the locomotion activity on D1 and D3 showed no difference. This is due to the arrival time of the DOC almost at the same time, namely in the late afternoon, so that the temperature conditions greatly affect the locomotion activity. In treatment D2 who came during the day with a higher ambient temperature than in the afternoon and at night. Locomotion behavior is defined as the movement of chickens to carry out activities that move from place to place. Locomotion carried out by broiler chickens is part of the expression of the behavior of moving from one place to another, such as getting food or drinks. Locomotion behavior can also be seen when broiler chickens play with other broiler chickens (Lewis and Hurnik, 1990). The intensity of eating and drinking behavior of broiler chickens at less high temperatures, it can be assumed that the chickens move more often to do activities other than eating and drinking. These other activities can be in the form of play behavior, investigations, or even just moving or moving from one side of the cage to the other side of the cage.

IV. CONCLUSIONS

Loss of body weight and dehydration was the lowest at 1 hour of transportation duration, with the best behavior of eating, drinking, resting and locomotion. 12 hours of transportation was the maximum time for transporting docs from the breeding farm to their destination.

Further research needs to be done on the analysis of the physiological status of DOC transported with different durations

ACKNOWLEDGEMENT

The authors would like to thank the Director of PT Mega Satwa Perkasa for their valuable support to undergraduate students and providing access and facilities used for research. We also thank the staff of this company who are very helpful and friendly.

REFERENCES

[1] Arikan , MS, AC. Akin, A. Akcay, Y. Aral, S. Sariozkan, MB. Cevrimli MB and M. Polat. (2017). Effects of Transportation Distance, Slaughter Age, and Seasonal Factors on Total Losses in Broiler Chickens. *Brazilian Journal of Poultry Science*.19 (3): 421-428

[2] Bedanova I., E. Voslarova, V. Vecerek, V. Pistekova, and P. Chouplek (2006). *Effect ofreduction in floor space during crating on haemotological indices in broiler.* Berl. Munch.Tierarztl.Wochenschr. 119: 17-21.

[3] Bell, D. D. and W. D. Weaver Jr. (2002). *Commercial Chicken Meat and Egg Production*. 5th ed. Springer Science and Business Media Inc, New York.

[4] Bergoug H, Guinebretière M, Tong Q, Roulston N, Romanini CE, Exadaktylos V, Berckmans D, Garain P, Demmers TG, McGonnell IM, Bahr C, Burel C, Eterradossi N, and Michel V. (2013). Effect of transportation duration of 1-day-old chicks on post placement production performances dan pododermatitis of broilers up to slaughter age. *Poultry Science*. 92:3300-3309.

[5] Bruno LDG, A. Maiorka, M. Macari, RL. Furlan and PEN Givisiez. (2011). Water intake behavior of broiler chickens exposed to heat stress and drinking from bell or and nipple drinkers. *Brazilian Journal of Poultry Science*, 13 (2): 147-152

[6] Chou CC, DD Jiang, and YP Hung. (2004). Risk factors for cumulative mortality in broiler chicken flocks in the first week of life in Taiwan. *British Poultry Science*, 45:573–577.

[7] Donofre, A.C., I.J. Silva, A.C. Nazareno and I.E. Ferreira. (2017). Mechanical vibrations in the transport of hatching eggs and the losses caused in the hatch and quality of broiler chicks. *Journal of Agricultural Engineering,* 48, 36-41

[8] dos Santos, VM, BSL. Dallago, AMC Racanicci, A.P. Santana, RI, Cue, and FEM. Bernal. (2020). Effectof transportation distances,seasons and cratemicro climate on broiler chicken production losses.*PLoSONE* 15(4):e0232004.https://doi.org/10.1371/journal.pone.0232004

[9] Fairchild, B.D. J.K. Northcutt, J.M. Mauldin, R.J. Buhr, L.J. Richardson, and N.A. Cox. (2006).

[10] Influence of water provision to chicks before placement and effects on performance and incidence of unabsorbed yolk sacs. *Journal of Applied Poultry Research*, 15: 538-543

[11] Heier B T, H R Hogasen, and J Jarp. (2002). Factors associated with mortality in Norwegian broiler flocks. *Preventive Veterinary Medicine*. 53:147-158.

[12] Jacobs, L. E. Delezie, L. Duchateau, K. Goethals, B. Ampe, E. Lambrecht, X. Gellynck and F. A. M. Tuyttens. (2016). Effect of post-hatch transportation duration and parental age on broiler chicken quality, welfare, and productivity. *Poultry Science*, 95 :1973-1979

[13] hosravinia, H. (2015). Physiological Responses of Newly Hatched Broiler Chicks to Increasing Journey Distance During Road Transportation, *Italian Journal of Animal Science*, 14:3, DOI: 10.4081/ijas.2015.3964

[14] Lara, L.J and M. H. Rostagno. (2013). Impact of Heat Stress on Poultry Production. *Animals*, 3, 356-369; doi:10.3390/ani3020356

[15] Lewis NJ and J.F. Hurnik. (1990). Locomotion of broiler chickens in floor pens. *Poultry Science* 69(7):1087-93. doi: 10.3382/ps.0691087.

[16] anning, L. S.A. Chadd and R.N. Baines.(2007). Water consumption in broiler chicken: a welfare indicator. *World's Poultry Science Journal*, 63:1, 63-71, DOI: 10.1017/S0043933907001274

[17] Mujiono, N., Z. R. Mardliyah , V. W. Putri , A. E. Putri, dan R. Raffiudin.2019. Perilaku lokomosi, homing, dan kawin pada bekicot (Lissachatina fulica Bowdich, 1822). *Zoo Indonesia* 28(1): 21-32

[18] Nawaz Ali H., Amoah Kwaku, Y. Leng Qi, H. Zheng Jia, L. Zhang Wei., and Li. Zhang. (2021). Poultry Response to Heat Stress: Its Physiological, Metabolic, and Genetic Implications on Meat Production and Quality Including Strategies to Improve Broiler Production in a Warming World. *Frontiers in Veterinary Science* . 8 . URL=https://www.frontiersin.org/articles/10.3389/fvets.2021.699081

[19] Orakpoghenor, O., N. Ejum Ogbuagu, and L. Sa'Idu. 2021. Effect of Environmental Temperature on Water Intake in Poultry. *Advances in Poultry Nutrition Research* [Working Title]. doi: 10.5772/intechopen.95695

[20] Teyssier JR, G. Brugaletta, F. Sirri, S. Dridi, and SJ. Rochell. (2022). A review of heat stress in chickens. Part II: Insights into protein and energy utilization and feeding. *Front Physiology*. 8;13:943612. doi: 10.3389/fphys.2022.943612.

[21] Valros, A., R. Vuorenmaa, and A. M. Janczak. 2008. Effect of simulated long transportation on behavioural characteristics in two strains of laying hen chicks. *Applied Animal Behaviour Science.* 109:58–67.

[22] Yassin , H., A.G.J. Velthuis, M. Boerjan and J. van Riel. (2009). Field study on broilers' first-week mortality. *Poultry Science* 88 :798–804 doi:10.3382/ps.2008-00292

[23] Zeman , M. , J . Buyse , J., I . Herich o v á , and E . Decuypere. (2001): Melatonin Decreases Heat Production in Female Broiler Chickens. *Acta Vet. Brno* 2001, 70: 15-18

[24] Zhao ZG, Li JH, Li X, and J. Bao. (2014). Effects of Housing Systems on Behaviour, Performance and Welfare of Fast-growing Broilers. *Asian-Australas Journal of Animal Science,* 27(1):140-146. doi: 10.5713/ajas.2013.13167