Indian Vet. J., February 2024, 101 (2) : 10 - 14

Influence of *Mauritia flexuosa* L. on Broiler Carcass Mass and Digestive Organs Temperature-Exposed Body Mass

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(Received : October, 2023 **201/23** Accepted : February, 2024)

Abstract

Heat stress conditions can affect the decline in antioxidant production in the body, health condition and cause cell damage. The content of *Mauritia flexuosa* L. as an antioxidant can reduce the detrimental effects of heat stress. This study aims to determine the effect of *Mauritia flexuosa* L. on carcass weight and digestive organs of broilers exposed to heat stress. A total of 20 broilers aged 22-35 days were kept in individual cages. Broilers in the treatment group were given heat stress induction at a temperature of 35 ± 1°C. Broilers were randomly selected in 4 treatment groups divided into K- (normal temperature + complete feed), K + (heat exposure + complete feed), P1 (heat exposure + complete feed + Mauritia flexuosa L.2% of total feed gr / head / day) and P2 (heat exposure + complete feed + Mauritia flexuosa L.4% of total feed gr / head /day). This experiment was studied for 35 days and tested for normality using analysis of variance with a significance level ($p < 0.05$). The results showed a significant difference in the carcass weight, but not significantly different from the weight of the broiler digestive organs.

Key words: broiler, *Mauritia flexuosa* L., carcass weight, digestive organ weight, heat stress, good health.

Broiler is a group of poultry genetically as a potential meat producer (Azizah *et al*., 2017). The lipid and protein content of broiler meat is high (Mentari *et al*., 2016). The protein content per kilogram of broiler meat is 23 percent (Ravindran, 2004). The community's high demand for chicken meat has not been mirrored by an increase in population or broiler production. The success rate of broiler maintenance is dependent on the cage used; consequently, the cage's conditions must be carefully considered, particularly in terms of temperature, humidity, and air circulation (Umam, 2015). The optimal finisher phase broiler temperature is between 26 and 27 degrees Celsius (Czarick and Fairchild, 2008). According to Miller and Madsen (2011), high daytime temperatures in the tropics cause heat accumulation in the body, resulting in heat stress among livestock. Increased environmental temperature can also lead to oxidative stress in the body. Excessive free radical compounds disrupt several functions of the body's organs, such as the digestive organs, which aid enzymes and microbes in nutrient absorption, resulting in a decrease in carcass weight and digestive organs (Miller *et al*., 2011). Mishra and Rajesh (2019) found that when physiological conditions are perturbed, the resulting antioxidant enzymes do not function optimally to protect the body from free radicals. Antioxidants are

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compounds that combat free radical reactions in the metabolism of broilers (Surai, 2007). Antioxidants can reduce oxidative stress and play an important role in immunocompetence by enhancing humoral antibody protection, bacterial infection resistance, and cell immunity (Lobo, 2010). The herb Mauritia flexuosa L.contains numerous bioactive compounds. This bioactive substance is an essential component of antioxidant compounds. Carotenoids in the form of beta-carotene, the tocopherol group in the form of alpha-tocopherol, and flavonoids make up the antioxidant content (Freire, 2016). Antioxidant compounds can be added to nutrition to enhance the physiological response to oxidative stress (Panda *et al*., 2007). This study was conducted to ascertain whether the herbal feed additive derived from Mauritia flexuosa L.can reduce heat stress as an antioxidant.

Materials and Methods

The research design was experimental with the Completely Randomized Design (CRD) method. The experiment was carried out using 20 broilers which were treated at the age of 22-35 days divided into 4 groups, namely K-, K +, P1 and P2. Broilers were kept in individual cages with treatment in group K- not given heat stress induction and giving *Mauritia flexuosa* L, group K + were given complete feed without mixed *Mauritia flexuosa* L.and heat stress induction using a gasolec heater with a temperature of 35 ± 1°C for 4 hours starting at 10.00 am to 14.00 pm. Group P1 was given heat stress induction and feed mixed with *Mauritia flexuosa* L.as much as 2% of the total feeding grams/head/day and group P2 which was given heat stress induction and giving *Mauritia flexuosa* L.as much as 4% of the total feeding grams/head/day. Feeding is done every morning at 06.00 and afternoon at 16.00, while drinking water is given ad libitum. The carcass and digestive organs were weighed after the broilers were necropsied after the treatment period.

The data obtained from the calculation results will be tested with Univariate Analysis of Variance and followed by the Duncan test if there is a significant difference ($p < 0.05$).

Results and Discussion

Carcass Weight :

Table I. The average broiler carcass weight was fed according to each treatment.[1]

Groups	Mean(gram) ± SD
K-	$1406,7^{c}$ ± 73,47
K+	$1115,2^{a}$ ± 98,65
P1	1264^{b} ± 107,24
P2	$1321,1^{bc}$ ± 43,76

[1] Different superscripts in the same column showed significantly different results ($p<0.05$)

ANOVA test results showed that the data were normally distributed and the application of Mauritia flexuosa L. to broilers exposed to heat stress showed a significant difference ($p < 0.05$) between treatment groups. The average carcass weight of each treatment was K- of 1406.7 ± 73.47 grams, K + of 1115.2 ± 98.65 grams, P1 of 1264 ± 107.24d grams and P2 of 1321.1 ± 43.76 grams.

The results of the analysis showed a significant difference between the control group and the treatment group ($p < 0.05$). The resulting carcass weight is by the opinion of Iskandar (2005) which states that carcass weight is influenced by livestock age, ration, live weight and sex. A larger live weight will result in a large percentage of carcass which will be followed by an increase in carcass weight (Metzger *et al*., 2003; Tamzil, 2015). Mauritia flexuosa L.has the main active compound in the form of tocopherol which has antioxidant properties (Mesquita, 2020). The tocopherol compounds in Mauritia flexuosa L.are absorbed by the small intestine and then transported to the liver by chylomicrons, from the liver α-tocopherol compounds are transported by Very Low Density Lipoprotein (VLDL) into plasma, then in plasma α-tocopherol is received by receptors of peripheral cells Low-Density Lipoprotein (LDL) and enters the cell membrane so that it can suppress the oxidation of unsaturated fatty acids and can help maintain cell membrane function in tissues which increase muscle mass (Almatsier, 2002; Winarno in Nadiyah, 2019).

The existence of a significant difference in broiler carcass weight is also thought to be

caused by the consumption of broiler feed. The high consumption of feed results in an increase in protein, which affects the final broiler weight (Abro, 2012; Napirah, 2020). Another factor that affects the growth of broilers is crude fiber in a feed (Prawitasari, 2012). Mait *et al*. (2019) stated that the crude fiber content in poultry feed can help peristalsis in the small intestine and stimulate the development of the digestive organs. The flavonoid content in Mauritia flexuosa L.functions as an antibacterial that works to inhibit the growth of pathogenic bacteria in the digestive tract so that it can improve digestibility and absorption of substances in the body (Hidayat *et al*., 2011).

Syahruddin (2012) argues that giving natural antioxidants to animals can maintain the immune system so that it can suppress the negative effects of environmental stress. Antioxidants work as anti-free radicals caused by heat stress by donating hydrogen ions to hydroperoxide (H_2O_2) which is a stable molecule and antioxidants inhibit lipid oxidation, especially in muscle tissue formation matrix cells (meat) so that it can maintain metabolism in the body (Surai, 2007; Dilaga dalam Rahayu, 2014).

Digestive Organs Weight :

Table II. Average weight of the digestive organs of broilers that were fed according to each treatment.[1]

Groups	Mean (gram) ± SD
K-	53,20^{b} ± 2,280
K+	48,60^{a} ± 2,074
P1	54,80^{b} ± 1,095
P2	55,20^{b} ± 0,837

[1] The same superscript in the same column showed results that were not significantly different (p> 0.05).

The ANOVA test results showed that the data tested were normally distributed with the results not significantly different (p> 0.05) between the treatment groups, so that further tests could be carried out using the Duncan test. Based on the results of the study, the weight of the digestive organs in broilers that were given Mauritia flexuosa L. and exposed to heat stress in the K + treatment of 240.4 ± 15.33 grams was not significantly different from K- of 263.5 ± 37.87 grams and P1 of 248.2 ± 14.12 grams was not significantly different from P2 of 254.0 ± 15.47 grams. The K + treatment group did not have a significant difference between P1 and P2.

The liver and pancreas are digestive organs that have an important role in the digestive process (Isroli, 2019). The liver has many functions, in the process of digestion, the liver works as a producer of bile which is poured into the intestines of the duodenum and as an emulsifier of fat (lipids). Pure lipids in the ration will be broken down into simpler compounds, namely glycerol and fatty acids. Short-chain fatty acids are a source of energy for the epithelium cells in the intestine, making the organs heavier (Kaczmarek *et al*., 2016). Normally, cells will adapt to maintain a state of homeostasis when exposed to certain exposures (Arimbi *et al*., 2015). Exposure to excess heat causes the body to work optimally to maintain a normal body temperature which results in decreased liver function due to lack of oxygen intake and interference with cellular energy regulation so that the performance of the livestock digestive system increases (Tamzil, 2014; Reczek and Chandel, 2015) .

Mauritia flexuosa L., which acts as an antioxidant, has an indirect effect on the weight of the digestive organs. The flavonoids in Mauritia flexuosa L.can help the process of increasing the duodenal villi in chickens. The increase in the intestinal villi results in a wider surface of the absorption area so that absorption of nutrients is more optimal where the digestibility of nutrients in the form of protein will increase (Fard *et al*., 2014). Increased protein digestibility affects the growth of epithelial cells in the small intestine. The more epithelial cells cause the surface of the small intestine to become wider and increase the number of villi so that the weight of the small intestine will be heavier (Ketaren, 2010).

Based on the data analysis, the results of the study with the digestive organ weight variables showed that the results were not significantly different from the control group with the treatment group (p> 0.05). The weight gain of the digestive organs is not significantly different according to the opinion of Amrullah (2003) which explains that the weight and length of the digestive tract of poultry are not static

quantities, changes can occur due to decreased palatability during the growth and development process. The factors that affect the palatability of chickens are the smell, taste, color and texture of the feed (Herlina *et al.*, 2015). The addition of Mauritia flexuosa L.in the feed causes the feed to go rancid faster. Rancidity can be interpreted as changes in odor and flavor in fatty foods because these materials are very easily oxidized so that it affects changes in palatability in chickens which have an impact on decreasing organ weight (Lumbantoruan, 2005; Retnani *et al.*, 2010).

Conclusions

Provision of Mauritia flexuosa L. can maintain carcass weight and broiler digestive organs that are exposed to heat stress with a dose of 4% of the total feeding grams/head/day.

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