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RELATIVE WEIGHT AND LENGTH OF INTESTINE AND BODY WEIGHT GAIN INFLUENCED BY LOW DOSAGE AFLATOXIN CONTAMINATED IN THE FEEDING CHICKEN FEED DURING GROWER PERIOD

DIO PUTRA PRATAMA, BENJAMIN CHRISTOFFEL TEHUPURING, HANA ELIYANI, SOEHARSONO, EMMANUEL DJOKO POETRANTO, WIWIEK TYASNINGSIH AND GRACIA ANGELINA HENDARTI*

Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia

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ABSTRACT

The purpose of this study was to determine the effect of 9.58 ppb contaminated aflatoxin feed on the relative weight and length of the duodenum, jejunum and ileum as well as the weight gain of laying hens in the early growth period. Thirty-six laying hens that had been adapted for 14 days were divided into two groups namely 18 as control (K0, K20 and K40) and 18 for treatment (P0, P20, P40). The control group throughout the study was given basal feed CP 521 and CP 524. Since day 21, the treatment group was given food contaminated with aflatoxin 9.58 ppb / g with a proportion of 20% of the total feed. The treatment group was adapted to feed for 7 days before the 21st day followed by the application of the same treatment feed for 20 days for P20 and up to 40 days for P40. Experimental animals, 6 animals each from the control group and the treatment group were euthanation. Periods for taking body weight data and surgery for duodenal, jejunum and ileum collections were carried out when chickens were 20 days old (K0 and P0), 40 (K20 and P20), and 60 days (K40 and P40). Data were analyzed by ANOVA and continued with Duncan Test. Exposure to 9.58 ppb aflatoxin per gram of feed in the proportion of 20% of the total feed for 20 to 40 days has no impact on the weight and length of the duodenum, jejunum or ileum. The exposure also did not reduce the weight gain of laying hens during the maintenance period between the ages of 21 to 60 days. The conclusion of this study was the administration of aflatoxin at a dose of 9.58 ppb in 20% of the total feed; does not reduce the relative weight and length of the small intestine and also does not reduce weight gain during administration of 20 and 40 days in laying hens aged 21-60 days.

KEY WORDS: Aflatoxins, Body weight, Chicken.

INTRODUCTION

Laying hen is a common term for a female, grown chicken that is kept primarily for laying eggs**.** The period of growth is time for preparing and determining the ability of animals to reach peak production optimally. Feed quality during early growth needs attention and proper handling appropriately (Unutio *et al*., 2016; Walukow *et al.*, 2016).

Feed quality in the tropics is exposed to the risk of aflatoxin contamination. Aflatoxin (AF) is a secondary metabolite product of the fungus type *Aspergillus* spp (Liu, 2002; Singh and Mandal, 2014; Valchev *et al*., 2017). A case of feed containing aflatoxin between 5.49 ppb and the highest level of 176.54 ppb in Blitar, East Java (Puspitasari, 2018). The content of low aflatoxin levels between 15-30 ppb has been able to provide toxic effects because of its accumulative nature in the body (Rawal *et al.*, 2010). Aflatoxin mainly causes hepatotoxicity and also inhibits the growth of the body and various organ systems (Maryam *et al.*, 2003).

The effect of low levels of aflatoxin contamination on laying hens for starters and early growers will be observed in this study to investigate their effects on

the small intestine biometrics as organs that have important correlation with metabolizing feed.

MATERIALS AND METHODS

Materials and Research Materials

The experimental animals for this study were 36 Isa Brown strains, adapted to the age of 14 days. During adaptation maintenance, chickens were given CP 521 and CP 524 basal feed. After 15 days, control chickens still received basal feed, whereas treatment chickens began to be adapted for a week by being fed a ration in the proportion of 20% aflatoxin contaminated feed plus 80% basal feed). The contaminated feed in question is the old stored feed which is then ditera in the test laboratory and obtained the results of the aflatoxin content of B1, B2, G1, G2 worth 9.58 ppb/g.

After 21 days of age, chickens are kept in individual cages. Eighteen poultry, P0, P20 and P40 (6 each) were differentiated based on the duration of the contaminated feed application, ie for 0, 20 and 40 days, with a note that 7 days had been adapted for each trial. Whereas 18 chickens (6 each) accompanied as control (K0, K20 and K40). Treatment and control chickens were each slaughtered after 6 chickens received 0 days (P0), 20 (P20) and 40 days (P40) treatment feed. Drinking water is given ad libitum with a mixture of multivitamins.

Data collection at each sacrifice period (on days 0, 20 and 40 treatments), was taken through weight measurement. Furthermore, animals are operated on for collection of digestive organ compartments which include esophagus proventriculus, ventriculus, duodenum, jejunum, ileum, and caecum as well as the liver. All of the organs were weighed and specifically for the duodenum, jejunum, ileum, the length was also measured. The relative weight as organ weight based on the proportion of body weight is determined according to Christy (2019).

Data analysis

Data analysis was processed by two-way Analysis of Variant (ANOVA) based on time intervals. If there is a significant difference the data is evaluated further with the Duncan test at a significance of 5% ($p < 0.05$). The analysis program is SPSS 20 Software for Windows.

RESULTS AND DISCUSSION

Statistical analysis showed that the relative weight of jejunum and ileum between control (K0) and treatment (P0) was significantly different ($p < 0.05$), meaning that after receiving feed contaminated with aflatoxin even though it was only 1 week, the animal tried to respond quickly through the relative weight of the absorbed organs increased . In this condition, the duodenum shows a different response. Furthermore, both control (K20 and K40) and treatment (P20 and P40) by observing the

Table 1. Mean and standard deviation (SD) of Relative weight (%) small intestine, lenght and body weight gain of laying hens be fed by 20% of aflatoxin-contaminated feed during 21-60 days.

	Organ	Group	Relative Weight (%) On the long of treatment (days)			Length (cm) On the long of treatment (days)		
			0	20	40	0	20	40
1.	*Duodenum*	K	0.25 ± 0.07^{b}	0.12 ± 0.03^{a}	0.10 ± 0.02^{a}	15.02 ± 1.53^{a}	17.70 ± 1.27^{b}	21.73 ± 1.75^{c}
		P	0.30 ± 0.12^{b}	0.12 ± 0.03^{a}	0.10 ± 0.02^{a}	17.17 ± 1.33^{b}	18.37 ± 0.73^{b}	21.00 ± 1.76^{c}
2.	*Jejunum*	K	0.58 ± 0.11^{b}	0.27 ± 0.05^{a}	0.26 ± 0.04^{a}	51.58 ± 4.90^{a}	62.27 ± 8.69^{b}	83.30 ± 9.38^{c}
		P	0.98 ± 0.24^{c}	0.30 ± 0.06^{a}	0.25 ± 0.04^{a}	60.67 ± 9.03^{ab}	67.23 ± 9.20^{b}	78.20 ± 5.13^{c}
3.	*Ileum*	K	0.06 ± 0.01^{b}	0.05 ± 0.02^{ab}	0.03 ± 0.01^{a}	7.78 ± 0.71^{a}	12.25 ± 1.95^{bc}	11.72 ± 1.11^{b}
		P	0.13 ± 0.02^{c}	0.04 ± 0.01^{a}	0.04 ± 0.01^{a}	11.48 ± 1.37^{b}	10.98 ± 1.44^{b}	13.45 ± 1.47^{c}

			Body Weight Gain*) (gram) On the long of treatment (days)		
4.	PBB		0	20	40
		K	76.05 ± 6.95^{a}	280.8 ± 30.98^{b}	571.05 ± 69.21^{c}
		P	73.37 ± 7.03^{a}	302.20 ± 41.32^{b}	564.05 ± 51.75^{c}

Note: in the rows and columns for each organ variable, if the Superscript is different, then the relative weight/length/body weight gain shows a significant difference ($p < 0.05$).

duodenum, jejunum and ileum, both showed the same trend. In the application period of 20 and 40 days, organ weight increased, so that the relative weight decreased, but this did not differ significantly ($p > 0.05$). The results of these observations actually explain that changes in the absorption of organ weights are not caused by the application of aflatoxin but rather due to factors increasing age.

Statistical analysis showed that the length of duodenum, jejunum and ileum between control (K0) and treatment (P0) was significantly different ($p < 0.05$), meaning that after receiving feed contaminated with aflatoxin even though it was only 1 week, the animal tried to respond quickly by increasing the absorption of this organ length .

Furthermore, both control (K20 and K40) and treatment (P20 and P40) by observing the duodenum, jejunum and ileum, both groups showed the same trend. At 40 days, the length of the organ seems to be more pronounced ($p < 0.05$). However, the results of these observations actually explain that the change in the absorption of the organ's long weight is not caused by the application of aflatoxin but rather due to the factor of increasing age.

Exposure to 9.58 ppb aflatoxin per gram of feed in the proportion of 20% of the total feed for 20 to 40 days has no effect on the weight and length of the duodenal jejunum or ileum. This level of dosage, although not too large, still requires caution if taken for a long time.

Different circumstances Compared to the research of Yunus, *et al.* (2011) that giving aflatoxin for 3 weeks to chickens was able to show a decrease in intestinal weight, but the length tended to increase. this is caused by the gastrointestinal tract is the initial entry of aflatoxin into the body. Aflatoxin direct contact with the gastrointestinal tract causes damage to the mucosal structure and change the relative weight of the gastrointestinal tract. Microscopically it is seen in increasing the depth of the kripta and decreasing villi height. The thickness of the epithelium also changes so that it expands the surface of the intestinal mucosa (Yunus *et al*., 2011).

The structure of the usushalus tissue consists of epithelial layers, lamina propria and glands, and the muscular layer. This layer forms intact morphology of intestinal tissue (Peng *et al.*, 2014). The epithelium has a role in maintaining the balance of intestinal tissue between the damaged intestinal villi and the proliferation of crypts. Aflatoxin is very likely to directly or indirectly influence the mechanism of apoptosis in the gastrointestinal tract as research conducted by Peng, *et al.* (2014) in broiler chickens so that pathological conditions cause inhibition of jejunal cellular proliferation. This indication shows that decreasing cell proliferation and or increasing cell death will reduce cell quantity.

In the research conducted this time, it showed a level of 9.58 ppb although initially it gave a significant response, but after the digestive organs grew optimally on the 21st day, then exposure to aflatoxin could still be compensated for by the body. Matur (2010) said that the administration of low levels of aflatoxin actually triggers pancreatic enzymes including amylase, tryspin, and chymotrypsin, although this increase is pathological. Previously Applegate, *et al.* (2009) reported that the compensatory mechanism for aflatoxin exposure caused poultry to increase energy supply related to decreased nutrient intake.

The administration of aflatoxin has no effect on weight gain because of this. a dose of 9.58 ppb in 20% of feed has not been a bad influence on weight gain. This situation is in accordance with the study of Ahangaran and Noosha (2013) aflatoxin in broiler chickens for 4 weeks did not have a significant effect between the treatment and control groups. Even in previous studies by Kermanshahi, *et al.* (2007) feeding of aflatoxin as much as 1.2 mg/kg body weight over the age of 0-42 days did not provide a significant change in body weight of broiler chickens because of the body's hormonal ability (Diaz *et al*., 2008).

Although young birds are very sensitive, they are still able to react to low doses of aflatoxin in the range of 15-30 ppb (Rawal *et al.*, 2010).

CONCLUSION

Based on the results and discussion, it was concluded that the feeding of aflatoxin contaminated feed of 9.58 ppb with the proportion of 20% for 20 to 40 days did not affect the relative weight and length of the duodenum, jejunum, or ileum and also to the weight gain of laying hens if given in the early period of growth (age 21-60 days).

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