PROTECTIVE EFFECT OF JALOH EXTRACT COMBINED WITH PROBIOTICS ON BODY WEIGHT GAIN, TOTAL COLONY OF E. coli AND CORTISOL LEVEL IN BROILERS

SUGITO, NURLIANA, ERDIANSYAH and T.M. LUBIS
Veterinary Medicine Faculty, Syiah Kuala University, Banda Aceh, Indonesia
sugitofkhunsiyah@gmail.com

ABSTRACT

The study was conducted to determine the protective effect of administration of jaloh extract in combination with probiotics on body weight gain, the number of colonies of E. coli and cortisol level of broiler chickens exposed to heat stress. A total of 16 female broiler chickens aged 20 days were randomly divided into 4 treatments. The research was conducted using completely randomized design. The treatments are as follows: (1) chicken without exposing to heat stress and without receiving jaloh extract and probiotics (T–1); (2) chickens exposed to heat stress and without receiving jaloh extract and probiotics (T–2); (3) chickens exposed to heat stress and were receiving jaloh extract 1,000 mg/liter of drinking water (T–3); and (4) chickens exposed to heat stress, receiving jaloh extract 1000 mg/liter of drinking water and probiotics 10⁸ cfu/liter of drinking water (T–4). Provision of heat stress by increasing the temperature in the poultry house at 33 ± 1ºC for 4 hours per day within 15 days as well as administration of the jaloh extract or its combinations. Jaloh extract and probiotics discontinued after 1 degree of temperature are lowered in the house. Weighing was performed on day 16, prior to slaughtering. The results of this study indicate that administration of jaloh bark extract combined with probiotics in the drinking water of chickens exposed to heat stress reduced loss of body weight, growth of E. coli in the duodenum, and also suppressed release of the serum cortisol hormone.

Key words: Heat Stress, Jaloh, Probiotics, Cortisol

INTRODUCTION

Heat stress exposed to chickens not only causes less efficient growth, but also changes in the growth of some types of microorganisms, including pathogenic microorganisms in the digestive tract (Lan et al., 2004; Tollba et al., 2004). Several researchers have reported that administration of probiotics can improve the performance of broiler or other fowls (Onol et al., 2003; Tollba et al., 2004; Rahimi and Khaksefidi, 2006). Providing multi-strain probiotic in feed on broiler given heat stress can increase the performance and immunity (Asli et al., 2007), whereas administration of Lactobacillus in feed can reduce the effects of heat stress caused by cage temperature 36ºC (Zulkifli et al., 2000).

Previous studies showed that administration of the Jaloh extract for chickens given heat stress can reduce impact of heat stress. Jaloh extract would reduce decline in body weight and improve health of the chickens (Sugito et al., 2007 and Sugito et al., 2010). Based on the potential use of Jaloh extract in reducing impact of heat stress, it is necessary to do further research to know the synergistic effect of Jaloh extract and probiotics. This study was conducted to determine the extent of protective effect of Jaloh extract in combination with probiotics on body weight gain, number of colonies of E. coli and cortisol levels of broiler given heat stress.

MATERIALS AND METHODS

Materials and equipment

In this study female broilers of Cobb strain aged 20 days were used. Feed given was commercial feed for broiler starter type (511). Chicken were placed in litter-floored houses with length of 150 cm, width 100 cm, and height 70 cm. Provision of heat stress was carried by raising the temperature in heated houses by using a heater made of nikelin wire.
components having power 1000 Watts. As the temperature controller, on the heater was mounted a scale termoregulator from 0 to 40ºC. The temperature in the heated houses was raised gradually starting at 09.00 am and kept stable at a temperature of 33 ± 1ºC for 4 hours.

Research methods

The research was conducted by based on completely randomized design, using 16 broiler chickens. Chickens were divided into 4 treatments, namely: Treatment I (T-1) was chickens without heat stress and treatment of Jaloh extract (positive control). Treatment II (T-2) was chickens with heat stress and without administration of both Jaloh extract and probiotics (negative control). Treatment III (T-3) was chickens given heat stress and Jaloh extract. Treatment IV (T-4) was chickens given heat stress and Jaloh extract combined with probiotics 108 cfu/liter of drinking water. Jaloh bark powder was extracted by maceration method using 70% ethanol and get extract is done by rotary evaporator. Provision of heat stress by increasing the temperature in the house at 33 ± 1ºC for 4 hours per day within 15 days. Each treatment consisted of four replications. Measurement of body weight and blood sampling (for serum) was done before slaughtering. Duodenal organ sampling in each treatment performed immediately after slaughtering.

Calculation colonies of Escherichia coli in the duodenum

Isolation was done by dissolving the contents of the duodenum in physiological saline. Then, the solution of duodenal contents was cultured in Methylene Eosin Blue Agar (EMBA) with the casting method as much as 1 ml, and incubation at 37ºC for 48 hours. Calculation method used in this study were: dilution Most Probable Number (MPN). Counting of the number of bacteria was carried in dilution 10-1, 10-2, 10-3, 10-4, 10-5, and 10-6 by counting the number of colonies in 1 ml of sample.

Measurement of serum cortisol hormone levels

Measurement of levels of the serum cortisol used the Cortisol Enzyme Immuno Assay (EIA) kit, products DRG Instruments GmbH, Germany, catalog number EIA-1887. The reading was done by using ELISA (enzyme-linked immuno-sorbert assay) reader mikroplate Bio-rad Model-550 at a wavelength of 450 nm.

Statistical analysis

To determine the effect of treatment was carried out statistical analysis of variance test completely randomized design. When the results showed the effect of treatment, analysis was followed by different test (Duncan).

RESULT AND DISCUSSION

Body weight gain

Average increasing of body weight in chickens given heat stress and were not given heat stress and followed by administering the Jaloh extract was presented in Figure 1. Provision of heat stress without being given Jaloh extracts and their combinations (the treatment of T-2) appear to lose the body weight of 29.4% when compared to the body weight of chicken in the treatment of T-1 (which is not given heat stress). Rate of decline in body weight in this study is higher than those reported by Kuczynski (2002). Kuczynski (2002) reported that the rearing of the broiler until the age of 35 days at temperatures above 31ºC causes a decrease in body weight up to 25% compared to the rearing at temperatures from 21.1 to 22.2ºC. The state of relatively high temperature in the heated houses during recent research causes a decline in final body weight compared to the weight of 35-day old broiler chickens reared at 31ºC temperature range (Naseem et al., 2005). The results of this study showed that the growth of chickens given heat stress and fed Jaloh bark extracts separately or combined
Figure 1. The average body weight gain (g) of broiler treated with heat stress, Jaloh extract and combined with probiotics for 15 days. Different letters in the chart indicate significantly different (P < 0.05)

with probiotics can equal the growth of chickens not given heat stress (T-1). This indicates that the administration of Jaloh extract combined with probiotics can reduce the loss of body weight due to heat stress, so that their body weight gain is equivalent to control treatment (T-1). According to Lan et al. (2004), Oyetayo and Oyetayo (2005), Lactobacillus sp. probiotics can improve the performance and digestibility of nutrients in the small intestine of chicken so that absorption of nutrients can be better. Furthermore Rahimi and Khaksefidi (2006) reported that the administration of probiotics can improve the performance of broiler chickens or other fowls.

**Growth of Escherichia coli** in the duodenum

In the treatment group of broiler given heat stress without any Jaloh extract and combined with probiotics (treatment T-2) showed that the average number of colonies of *E. coli* is many more than other treatments (can be seen in Figure 2). The number of colonies of *E. coli* in the treatment of T-1, T-3 and T-4 is much less than that in the treatment of T-2. Increasing the number of colonies on the T-2 treatment due to the impact of stress in chickens, causing an interruption to normal intestinal microflora growth. Lan *et al.* (2004) and Tolliba *et al.* (2004) explained that in the chickens experiencing heat stress, there is an increase in the growth of some types of microorganisms in the digestive tract, including *E. coli*.

In Figure 2, shows that the Jaloh extract combined with probiotics (T-4) can suppress the growth of *E. coli*. Thus the condition of the impact of heat stress on the growth of *E. coli* can be reduced by administering Jaloh plant extracts and probiotics. Reduced number of colonies of *E. coli* in the duodenum is a positive effect of probiotics added to the feed on the growth of these bacteria. Moreover, it cannot be separated from the function probiotics itself in maintaining the balance of intestinal microflora. In addition, it is also alleged that the Jaloh extract has compounds that can inhibit the growth of *E. coli*. According to Hussain *et al.* (2011) that the extract of some plant species *Salix* sp. contains compounds that can inhibit the activities of several types of bacteria (antibacterial). When there is colonization in the surface of gastrointestinal tract, lactobacilli prevent the growth of fungi and suppress the growth of *E. coli* and other gram-negative pathogenic bacteria in the small intestine. Lactobacillus can maintain the balance of bacteria population in the small intestine. Pathogenic bacteria in chicken feces dwindle after being given Lactobacillus regularly (Lan *et al.*, 2004; Vicente *et al.*, 2007).
Serum cortisol level

In Figure 3 it can be seen that the extract Jaloh combined with probiotics can significantly suppress the release of the serum cortisol (P < 0.05) compared to other treatments. Declining of cortisol levels in the treatment 4 (T-4) away from the level of cortisol in the treatment of T-1. Increased cortisol levels in serum showed that chickens were in a state of stress so that their body responded to the formation of cortisol hormones and its levels in serum also increased. This is in agreement with a report from Sujatha et al. (2010).

According to Hillman et al. (2000), in chickens experiencing heat stress, level of glucocorticoids in their bodies increases. Increased glucocorticoid hormones trigger increased metabolism, including energy forming. The high energy requirement is

![Figure 2. Average number of Escherichia coli in the duodenum (colonies/ml), calculated at 10^2 dilution](image)

![Figure 3. Average level of serum cortisol (pg/ml) of broiler chickens given Jaloh extracts and combination with probiotic. Different letters in the chart indicates significantly different (P < 0.05)](image)
intended to offset heat release from the body and the other body activities. The increase of power generation is causing higher heat loads for broiler chickens and to reduce energy demand these chickens will reduce their activities, such as eating and increase water intake. Decrease in eating activity will affect the growth of broiler chickens. Their growth is distracted and cannot be optimal. According to Borges et al. (2004) in broilers which older than 21 days, the optimum environmental temperature for growth ranged from 20 – 25°C with relative humidity ranging from 50 – 70%. Hillman et al. (2000) explain the relatively high increase in temperature beyond the range of the comfortable temperature zone causing heat stress.

**CONCLUSION**

Administration of Jaloh extract combined with probiotics on broilers chickens exposed to heat stress can reduce the loss of body weight, growth of *E. coli* in the duodenum, and also can suppress the release of the serum cortisol hormone.

**REFERENCES**


