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Effect of Probiotic Fermented Cabbage Waste on Broiler Chicken Performance to Increase Production

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Abstract

Cabbage waste fermented liquid (Brassica oleracea) is a type of fermented liquid that contains lots of vitamins and other important nutrients that are beneficial for broilers. This study aims to determine the effect of adding fermented cabbage waste to the percentage of weight and length of the digestive organs of broilers including the weight of the proventriculus and ventriculus. This research was carried out from March to May 2021 at the Laboratory of UIN Agriculture Research and Development Station (UARDS) Faculty of Agriculture and Animal Husbandry, Sultan Syarif Kasim State Islamic University, Riau. The research material used 80 DOC broilers (CP 707). The research method was an experiment using a completely randomized design (CRD) with 4 treatments and 5 replications. The treatments consisted of P0 (control drinking water), P1 (2 ml of fermented cabbage waste/liter of drinking water), P2 (3 ml of fermented cabbage waste/liter of drinking water), and P3 (4 ml of fermented cabbage waste/liter of water). drinking water). The parameters measured were the percentage of weight of the proventriculus and ventriculus. The results of the analysis of variance showed that the administration of fermented cabbage waste in drinking water to broilers did not have a significant effect (P>0.05) on the percentage of weight and length of the digestive organs of broilers. The conclusion of this study is that the administration of fermented cabbage waste liquid to a level of 4 ml/liter of drinking water in broilers has not been able to increase the weight and length of the digestive organs of broilers.

1. INTRODUCTION

Broiler chickens are one of the livestock commodities that provide the main source of animal protein to meet people's needs. The consumption rate for broiler chicken meat is quite high because apart from being easy to obtain, it grows quickly and the price is affordable compared to meat from large livestock (Saniwati *et al.,* 2015). One of the breeders' efforts to improve the health of broiler breeds and increase production to be higher is by using Antibiotic Growth Promoter (AGP). However, the use of AGP will cause residues that are very dangerous for consumer health. Therefore, the government began to prohibit the use of AGP starting January 2018. The prohibition on the use of AGP (Antibiotic Growth Promoter) has been regulated in Law no. 18/2009 and Law no. 41/2014 concerning Animal Husbandry and Animal Health. Therefore, efforts are needed to find substitute ingredients that come from natural ingredients, such as microbes which are termed probiotics (Akhadiarto, 2010).

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Probiotics are ingredients containing live microbes that are used to regulate the balance of microbes in the digestive tract, so that they will improve the digestive process, digestibility of feed ingredients, absorption of nutrients and maintain livestock health (Pramudia *et al*., 2013; Agustina *et al.,* 2007). Probiotics are living organisms that are capable of providing beneficial effects on the health of their hosts when consumed in sufficient quantities (FAO/WHO, 2002). Probiotics can nourish the digestive tract and increase nutrient digestibility so that nutrient intake is met for livestock (Pramudia *et al.,* 2013). Probiotics can stimulate growth, thereby increasing body weight gain as well as broiler carcass weight. Sjofjan *et al.* (2003) stated that providing probiotics is useful in increasing productivity, preventing disease, and reducing the use of antibiotics and can even reduce the smell of ammonia in the cage.

The digestive tract of broiler chickens is a vital organ which has the function of digesting feed and immunological functions. Absorption of nutrients by the intestines can occur optimally if the intestines are healthy. Intestinal health is influenced by the population of microbes or bacteria that live in it. A healthy digestive tract of broiler chickens is characterized by the development of weight and length of the digestive tract as well as optimal development of intestinal villi so as to optimize nutrient absorption (Pertiwi et al., 2017).

One ingredient that can be used as a probiotic is cabbage waste fermentation liquid. Cabbage (Brassica oleracea) is a type of vegetable that grows widely in highland areas. Cabbage has a delicious and delicious taste, and also contains high nutrients for the health of the human body. Pramesti (2009) states that cabbage has many benefits because it contains lots of vitamins A, B, C and E and minerals such as calcium, potassium, phosphorus, sodium and iron. Cabbage is easily damaged and rotten. The waste produced from cabbage is leaf waste. Cabbage waste can be obtained from cabbage traders who always remove the outer layer of the leaves before marketing. If the outer layer of cabbage leaves is left to accumulate for too long, it will rot and become a place for bacteria to live, namely Lactobacillus plantarum, Lactobacillus debruckil, Lactobacillus fermentum and Lactobacillus brevis (Khumalawati and Ulfa, 2009). Fermented cabbage waste will produce cabbage waste fermentation liquid, which contains lactic acid bacteria, which is a type of bacteria that can be used as a probiotic (Edam, 2018).

Fermentation is a process of chemical change from complex compounds to simpler ones with the help of enzymes produced by microbes (Jay et al., 2005). Lactic acid fermentation takes place spontaneously, because it occurs naturally by paying attention to environmental conditions, namely anaerobic and the addition of sufficient NaCl salt (Khumalawati and Ulfa, 2009). In lactic acid fermentation, lactobacillus can grow quickly in the presence of salt and acid formation to inhibit unwanted microorganisms (Suprihatin, 2010). The salt content commonly used in the fermentation process is 2-10% (Swain et al., 2014). Based on the research results of Khumalawati and Ulfa (2009), it is known that fermentation of cabbage waste with the addition of NaCl salt as much as 3% of the weight of cabbage waste produces Lactic Acid Bacteria (LAB) as much as 13% of the total weight of the sample and is the best result compared to other treatments. According to Edam (2018), cabbage waste fermented with 3% NaCl content for 8 days, had a total LAB of 8.92 log/cfu.

Based on the description above, it is hoped that lactic acid bacteria produced from fermenting cabbage waste can be used as an alternative to AGPs, whose use has been banned by the government. Therefore, the author is interested in conducting research on the administration of fermented cabbage waste probiotics (Brassica oleracea) in drinking water on the weight and length of the digestive tract of broiler chickens.

2. METHODS AND MATERIAL

This research was carried out in April - May 2021. The production of fermented cabbage waste probiotics was carried out at the Nutrition and Feed Technology Laboratory and the application to broiler chickens was carried out in the UIN Agriculture Research and Development Station (UARDS) experimental pen and the Animal Production Technology Laboratory, Faculty of Agriculture and Animal Husbandry. Sultan Syarif Kasim Riau State Islamic University (UIN), Pekanbaru.

The materials used in this research were 80 DOC broiler breeds strain CP 707 without distinguishing gender (unsexing) and reared for 35 days, liquid from fermented cabbage waste which was mixed into drinking water, and commercial feed. Cabbage waste was obtained from the Panam Pekanbaru Tuesday MarketAlat

The tools used in this research were 20 cage units measuring 75 cm x 60 cm and 60 cm high. Each cage unit houses 4 broiler chickens and is equipped with a feeder, drinker and a 60 Watt lamp as a source of heat and lighting. Other equipment used is a digital scale to weigh final body weight, carcass weight and abdominal fat, litter, temperature controller, measuring cup, spray for disinfection, plastic and newspaper to collect feces, rags, knife, fan, camera, and stationery.

The method used in this research was an experiment using a Completely Randomized Design (CRD) according to Steel and Torrie (1993) with 4 treatments and 5 replications. The treatment dose for fermented cabbage waste refers to Rofi'i et al. (2017) as follows:

P0: Drinking water (control)
P1: 2 ml of fermented liquid from cabbage waste is added to 1 liter of drinking water per day
P2: 3 ml of fermented liquid from cabbage waste is added to 1 liter of drinking water per day
P3: 4 ml of fermented liquid from cabbage waste is added to 1 liter of drinking water per day

Variable

Proventriculus and ventriculus.

3. RESULT AND DISCUSSION

Proventriculus Weight Percentage

The average percentage of proventriculus weight (%/head) of broiler chickens aged 35 days given fermented cabbage waste liquid in drinking water is presented in Table 1.

Table 1. Average Proventriculus Weight Percentage (%/head) of Broiler Chickens Aged 35 Days

Treatment	Proventriculus Weight Percentage (%/head)
P0 (control)	0,38±0,06
P1 (2ml/liter)	0,34±0,08
P2 (3ml/liter)	0,33±0,05
P3 (4ml/liter)	0,31±0,06

Based on Table 1, it is known that the average percentage of proventriculus weight for broiler chickens aged 35 days in treatments P0, P1, P2 and P3 ranged from 0.31 ± 0.06 to 0.38 ± 0.06%. Analysis of variance (Appendix 2) shows that the provision of cabbage waste fermentation liquid has no significant effect ($P>0.05$) on the percentage of proventriculus weight in broiler chickens.

There was no actual difference in the percentage of proventriculus weight, thought to be because the amount of cabbage waste fermentation liquid given was too low so it was not able to influence the proventriculus weight. The low amount of cabbage waste fermentation liquid is thought to cause the concentration of bacteria in drinking water to be low. Based on the results of total BAL analysis, the lactic acid bacteria colonies produced from cabbage waste fermentation liquid were 53.25x106 CFU/mL. This number is in accordance with Rizal et al. (2016) which states that a product is said to be probiotic if the total LAB contained in the product is ≥ 106 CFU/mL.

Providing cabbage waste fermentation liquid aims to control the growth of pathogenic bacteria because in the cabbage waste fermentation liquid there are lactic acid bacteria. It is hoped that lactic acid bacteria will be able to control the growth of pathogenic bacteria, so that the digestive system of broiler chickens can work optimally. According to Lokapirnasari et al. (2018) lactic acid bacteria can produce bacteriocins which can reduce pathogenic bacteria in the digestive tract. Lactic acid bacteria can effectively increase the activity of enzymes that help the enzymatic process of digestion of food in the digestive tract, such as amylolytic, proteolytic, lipolytic and cellulolytic (Manin, 2010). In the proventriculus, only enzymatic digestion occurs, which is carried out by the enzymes pepsin and hydrochloric acid which are useful for digesting protein (Sari and Ginting 2012). The cranial part of the proventriculus borders the esophagus and the caudal part borders the ventricle. Glandular cells will secrete glandular fluid when food passes through the proventriculus with peristaltic movements (Teme et al., 2019). The higher the amount of cabbage waste fermentation liquid in the treatment will increase the concentration of lactic acid bacteria thereby increasing enzyme activity in the proventriculus and helping the performance of the proventriculus which results in the weight of the proventriculus increasing.

Ventriculus Weight Percentage

The average percentage of ventricular weight (%/head) of broiler chickens aged 35 days given fermented cabbage waste liquid in drinking water is presented in Table 2.

Table 2. Average Percentage of Ventriculus Weight for Broiler Chickens Aged 35 Days

Treatment	Ventriculus Weight Percentage (%/head)
P0 (control)	1,58 ± 0,14
P1 (2ml/liter)	1,55 ± 0,20

P2 (3ml/liter)	1,63 ± 0,23
P3 (4ml/liter)	1,56 ± 0,10

Based on Table 2, the average percentage of ventricular weight of 35 day old broiler chickens in treatments P0, P1, P2 and P3 ranged from 1.55 ± 0.20 to 1.63 ± 0.23%. Analysis of variance (Appendix 3) shows that the administration of cabbage waste fermentation liquid has no significant effect (P>0.05) on the percentage of ventricle weight in broiler chickens. Providing cabbage waste fermentation liquid through drinking water did not have a significant effect on the weight percentage of the ventricle, presumably because in the ventriculus only the mechanical digestion process occurred. The ventricles are composed of thick muscle tissue and do not produce digestive enzymes. The function of the ventricle is to digest feed mechanically with the help of grit and small stones in the ventricle which are swallowed by the chicken. This is similar to what was reported by Rizal (2006) where the function of the ventriculus is to grind and crush food into smaller particles which is usually assisted by grit. These rock particles function to reduce feed particles by contracting the ventricular muscles so that food can enter the small intestine (North, 1978). In this way, the opportunity for absorption of food substances can be more optimal, thus having an impact on increasing chicken growth

Administering cabbage waste fermentation liquid through drinking water did not have a significant effect on the percentage of ventricle weight, which is thought to be caused by the use of the same type of feed with the same texture and shape, which resulted in no different activity in the ventricle in each treatment. The harder texture of the ration due to the high crude fiber is thought to trigger ventricular growth. A ration that contains a lot of fiber will cause changes in the size of the digestive tract so that it becomes heavier, longer and thicker (Harianda, 2017). Deaton et al. (1977) stated that rations that have high levels of crude fiber cause ventricular contraction to increase and as a result, ventricular weight also increases.

4. CONCLUSION

Based on the research results, it can be concluded that administering fermented cabbage waste liquid through drinking water to a level of 4 ml/liter in drinking water can maintain the weight and length of the digestive tract of broiler chickens.

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