

The Effect of Probiotic *Streptococcus thermophilus* and *Bacillus cereus* on Body Weight, Weekly Body Gain, and Carcass Weight of Magelang Duck

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ABSTRACT

This study was aimed to observe the effect of the mixture of probiotics of *Streptococcus thermophilus* and *Bacillus cereus* in water on body weight, weekly body gain, and carcass weight of male Magelang Duck aged 50 days from DOD. This study used a combination of the various percentage of probiotic *Streptococcus thermophilus* and *Bacillus cereus* in the liquid form given administered in the water of male Magelang duck kept in 50 days. The treatments in the study were P0: no probiotic administration, P1: 100% *Streptococcus thermophilus*, P2: 75% *Bacillus cereus* + 25% *Streptococcus thermophilus*, P3: 50% *Bacillus cereus* + 50% *Streptococcus thermophilus*, P4: 25% *Bacillus cereus* + 75% *Streptococcus thermophilus* and P5: 100% *Bacillus cereus*. The method used in this study was Completely Randomized Design (CRD) by 6 treatments and 4 repetitions which flock unit contained 4 male Magelang Ducks. Data from the study were analyzed using ANOVA, and if the results were significant, the results would be analyzed using Duncan's Multiple Range Test. The analysis results showed that administering a mixture of *Streptococcus thermophilus* and *Bacillus cereus* in various percentages did not significantly affect body weight, weekly body gain, and carcass weight of male Magelang Duck. It is concluded that the administration of a mixture probiotic of *Streptococcus thermophilus* and *Bacillus cereus* in water did not yet capable of increasing body weight, weekly body gain, and carcass weight of male Magelang Duck on 50 days kept.

Keywords: Probiotic, *Streptococcus thermophilus*, *Bacillus cereus*, bodyweight, weekly body gain.

1. INTRODUCTION

Researchers have widely carried out research on probiotics as feed additives to replace chemical feed additives, which leave harmful residues in humans as end consumers of livestock products. Probiotics have an excellent effect on broiler chickens because they can increase body weight [1]. In addition, giving probiotics in drinking water is also known to have a good effect on local ducks because it can reduce ration consumption without showing differences in body weight in controls that are not given probiotics. [2].

Probiotics work in the digestive tract and improve the microorganism ecosystem of the digestive tract. So the intestinal health is improved, and digestive functions are in good condition. The use of probiotics can reduce

the population of *Escherichia coli* as a type of digestive microorganism that can be harmful in the digestive tract in an excess population. The reduction is due to the production of acid produced by probiotic bacteria, which can suppress the growth of pathogenic bacteria in the digestive tract [3]. This is also seen in the research reported the decrease of bacteria [4], it is said that probiotics can suppress the growth of harmful *Escherichia coli* bacteria in the digestive tract. Supported by research results [5], probiotics can reduce pathogenic bacteria *Escherichia coli* in the digestive tract, which can be seen from the increase in acid (pH) in the small intestine and an increase in the probiotic bacteria *Lactobacillus* in the digestive tract of Kerinci ducks.

This condition will improve the digestion of feed ingredients in the digestive tract of livestock. In research [6], by adding probiotics to drinking water, it was found that the administration of probiotics improved feed digestion because probiotics could increase the efficiency of rations (EFR). This improvement in feed digestion is caused by the presence of probiotic bacteria that change the condition of the digestive tract for the better, so that feed conversion will be better [7].

This study wanted to determine the effect of a mixture of two types of probiotics that have different characteristics on male Magelang ducks. *Streptococcus thermophilus* is a lactic acid bacteria (LAB) that can produce lactic acid, suppressing the growth of pathogenic bacteria in the digestive tract. This opinion is supported by the research results [8], which states that *Streptococcus* bacteria produce lactic acid, which can suppress the growth of pathogenic bacteria, especially the types of bacteria that usually attack the intestinal epithelial layer. *Bacillus cereus* is a type of probiotic bacteria that is proteolytic or breaks down protein which is expected to help break down the protein in feed. [9] also revealed that *Bacillus* bacteria is one of the bacteria known for its ability to produce proteinase or proteolytic enzymes, which will help protein digestion in the digestive tract of male Magelang ducks.

The combination of these two types of probiotics is expected to be able to produce a synergy or symbiosis with *Streptococcus thermophilus* suppressing the growth of pathogenic bacteria [10] and *Bacillus cereus* increasing feed digestion as found in non-ruminant animals [11].

2. MATERIALS AND METHODS

2.1. Probiotics and Duck

This study used 96 male Magelang ducks, which were kept for 50 days. Probiotics were made separately in liquid form media, with the main ingredients being soybean meal and molasses for *Streptococcus thermophilus* (ST) and fish meal and sugar for *Bacillus cereus* (BC). The method of making probiotics refers to the method of making probiotics by using a fish meal and soybean meal [12]. The liquid media that has been overgrown with probiotic bacteria is then mixed according to the percentage in the treatment. The percentage of probiotics used is shown below:

- P0: without the addition of probiotics
- P1: 100% ST
- P2: 25% ST + 75% BC
- P3: 50% ST + 50% BC
- P4: 75% ST + 25% BC
- P5: 100% BC

2.2. *Streptococcus thermophilus* preparation

10 ml of sterile soybean meal and molasses extract were put into a petri dish that had been grown with pure *Streptococcus thermophilus* culture, shaken until the bacterial colony layer was separated from the media. The solution was mixed into 250 ml of soybean meal extract and sterile molasses in a flask Erlenmeyer. The final mixture of bacteria and soybean meal extract and molasses was incubated for 24 hours at 37°C. The final bacterial count in the mixed solution after incubation was more than 10⁶ bacterial cells.

2.3. *Bacillus cereus* Preparation

Fish meal extract and sterile sugar as much as 10 ml were put into a petri dish which has a pure culture of *Bacillus cereus* grown, then shaken until the bacterial colony layer was removed from the media. The resulting solution was then mixed into 250 ml of sterile fish meal extract and sugar in an Erlenmeyer flask. The final mixture of bacteria and fish meal, and sterile sugar was incubated for 24 hours at 37°C. The final bacterial count in the mixed solution after incubation was more than 10⁶ bacterial cells.

2.4. Probiotics Preparation

After the solution and bacteria were incubated, mixing was carried out according to the percentage in each treatment. The combination of probiotics is stored and administered ad libitum in drinking water as much as 10 ml per 1 liter of drinking water [10]. Mixing this combination of probiotics is carried out in the amount of 1 L (1000 ml). The amount of probiotics in 1000 ml is explained as follows:

- P0: without the addition of probiotics
- P1: 1000 ml ST
- P2: 250 ml ST + 750 ml BC
- P3: 500 ml ST + 500 ml BC
- P4: 750 ml ST + 250 ml BC
- P5: 1000 ml BC

Table 1. Nutrient composition table

Nutrient Ingredients	Percentage (%)
Metabolic energy (2,709 kkal)	
CP	20.03
EE	5.54
CF	5.09
Ca	1.05
P	0.62
Lysine	1.19
Methionine + Cystine	0.80

The rations used in this study were prepared individually. The rations are given twice a day. Feeding was carried out in the morning at 09.00 WIB and in the afternoon at 17.00. The composition of the rations is shown in table 1. The research data was obtained by weighing body weight, carried out once a week, then tested using ANOVA Completely Randomized Design (CRD).

3. RESULTS AND DISCUSSION

The results of this research are shown in Table 2.

3.1. Body Weight

The data on the average body weight of the results of the study are presented in table 2. The statistical tests showed that the administration of a combination of probiotics *Streptococcus thermophilus* and *Bacillus cereus* in different percentages of 10 ml in drinking water did not affect the bodyweight of male Magelang ducks. This happened because probiotic is not nutrient content, as it is just feed additive affecting the intestinal microbial condition, probiotic can work as indirect for the health of the animal improved, hence better product can be obtained [10]. [13] also added that further effects of probiotic bacteria tend to be shown when animals are fed by low nutrition content. The amount and content of nutrients given were relatively the same for all treatments. This study used one type of ratio for all treatments so that the nutrition obtained by livestock was the same. Similar results showed that probiotic supplementation in duck drinking water did not significantly affect body weight [14].

The lowest average body weight was found in the administration of 100% *Bacillus cereus* probiotics, and the highest average body weight was found in the administration of 50% streptococcus + 50% *Bacillus cereus*. These results indicate that although there is no statistically significant effect of giving various percentages of probiotics on body weight, it can be seen that the 50% *Streptococcus thermophilus* + 50% *Bacillus cereus* treatment resulted in the highest mean body weight among all other treatments. This means that the essential functions of probiotics in drinking water still appear to have a good effect on ducks [10]. Probiotics can improve the microbial balance of the

digestive tract [15] to improve digestion in the digestive tract of ducks.

3.2. Weekly Body Weight Gain

Data on the average body weight gain are presented in table 2. The statistical results showed that the combination of probiotics with *Streptococcus thermophilus* and *Bacillus cereus* did not affect the body weight gain of male Magelang ducks. These results were similar to [16]. The addition of probiotics did not affect the growth of ducks. It was stated that this could be due to the relatively low age of the ducks at the time of observation so the ducks had not shown their actual performance at the time of observation. The age of the ducks observed in this study was 50 days, while the peak production age of Magelang ducks was 159 days [17].

The average weekly body weight gain results also showed that the highest weekly weight gain was seen in treatment 3, namely the combination of 50% *Streptococcus* + 50% *Bacillus cereus*. Statistical testing was not significantly different, and it was also seen that the role of probiotics was still visible in the P3 average results compared to the control. The combination of probiotics can increase duck body weight gain because probiotics can produce digestive enzymes that can help digest feed in the digestive tract, increasing digested feed and absorbed nutrients [18].

3.3. Carcass Weight

The administration of mixed probiotics *Streptococcus thermophilus* and *Bacillus cereus* in the water had no effect ($P > 0.05$) on the carcass weight of male Magelang ducks. This indicates that probiotics have not been able to increase the carcass weight of Magelang ducks. [19] stated the same thing that the use of probiotics has not been able to increase broiler carcass weight.

This result related to body weight which was also not affected by the administration of probiotics. The nutrient content of the ration and the quality of the ration also affected the carcass weight; it was known that there was a significant effect of the energy and protein content of the ration on the carcass weight. [20]

Table 2. Body weight, weekly body gain, and carcass weight average 50 days age of male Magelang Duck

Variable	Treatments					
	P0	P1	P2	P3	P4	P5
Body weight (g)	1,015.15	1,006.75	1,010.81	1,057.81	1,051.75	990.02
Weekly body weight gain (g)	139.65	135.04	136.91	142.72	141.41	133.49
Carcass weight (g)	7,915.00	8,005.70	8,181.70	8,005.70	7,195.00	9,038.00

stated that the content of crude protein and amino acids in the ratio greatly affected body weight, body weight gain and had an effect on carcass weight.

4. CONCLUSION

Giving probiotic combinations of *Streptococcus thermophilus* and *Bacillus cereus* at various percentages has not been able to increase body weight, weekly body weight gain, and carcass weight of male Magelang Ducks in 50 days of rearing.

AUTHORS' CONTRIBUTIONS

Mikael Sihite contributed to data analysis and writing and Pradipta Bayuaji Pramono contributed to the writing and proofreading of the manuscript.

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