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Effect of Poultry-Bs probiotic on broiler performance

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Abstract

The ban on antibiotic growth promoters (AGPs) in poultry production has increased the need for safe and effective alternative feed additives to maintain broiler productivity. Poultry-BS probiotic shows potential as a substitute for AGPs. This research examined how the inclusion of Poultry-BS probiotics within the drinking water supply influences broiler productivity metrics, with a focus on determining the most efficacious supplementation levels. Eighty day old broiler chicks (strain CP 707) served as the primary subjects for this investigation, conducted at the Udayana University Faculty of Animal Science Sesetan Farm. A Completely Randomized Design (CRD) was applied with four treatments and five replications, each consisting of four broiler. The treatments included a control group without probiotic supplementation (P0) and probiotic supplementation at levels of 0.25% (P1), 0.5% (P2), and 0.75% (P3) of body weight per week. The measured parameters included feed intake, water intake, body weight gain, final body weight, and feed conversion ratio (FCR). Statistical inference, conducted via Analysis of Variance (ANOVA) and Duncan's post-hoc testing, confirmed that Poultry-BS integration did not yield observable shifts in broiler performance ($P>0.05$). Specifically, feed consumption, fluid intake, weight accrual, and final body mass remained stable across all supplemental concentrations (0.25–0.75%). However, supplementation at these levels significantly improved the FCR compared with the control group ($P<0.05$).

Keywords: Broiler; Poultry-BS probiotic; Performance; Feed conversion ratio; Antibiotic growth promoters

1. Introduction

The broiler industry has developed rapidly along with the increasing population and demand for animal protein [1]. Broilers have several advantages, including a relatively short production period (4–5 weeks), high productivity, affordable prices, and continuously increasing market demand [2]. Broilers are the result of crossbreeding various chicken strains with high productivity as a source of animal protein [3]. To improve production performance, farmers commonly add feed additives to the diet. The enhancement of broiler productivity often relies on feed additives low inclusion substances designed to trigger physiological growth, as noted by [4]. Traditionally, Antibiotic Growth Promoters (AGPs) represent the most frequent application of these agents to ensure superior feed utilization and performance [5]. However, the use of AGPs may trigger bacterial resistance in both livestock and humans [6]. A nationwide ban on AGPs in Indonesia was officially enacted on January 1, 2018. This prohibition stems from the legal framework of Law No. 18/2009, which was later amended by Law No. 41/2014, and subsequently enforced through the Ministry of Agriculture Regulation No. 14/2017.

Growth inhibition and deteriorated feed conversion efficiency (FCR) have emerged as the primary negative outcomes for broilers following the implementation of this prohibition [7]. Production has even been reported to decline by more than 40% following the discontinuation of AGPs [8]. Therefore, safe and effective alternatives are required. Probiotics can serve as substitutes for AGPs because they are able to balance intestinal microflora and suppress pathogenic

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bacteria without leaving harmful residues [9]. The mechanism of probiotics differs from antibiotics, as probiotics improve the digestive system rather than indiscriminately eliminating microorganisms [10]. Poultry-BS is a probiotic based on lactic acid bacteria *Lactobacillus casei* formulated from natural ingredients [11]. Improvements in broiler productivity, manifested through significant weight accrual and a concurrent reduction in FCR values, have been widely reported as a direct outcome of probiotic integration [12, 13].

The present experiment was designed to evaluate the efficacy of Poultry-BS probiotic supplementation via drinking water at varying concentrations (0.25%, 0.50%, and 0.75%) on broiler productivity parameters.

2. Materials and methods

2.1. Materials

This investigation took place over a two-month timeframe (August–September 2025) at the Udayana University Faculty of Animal Science's Sesetan Farm research site in Denpasar, Bali. A total of 80 broiler at one day of age were used in the study. The broiler belonged to the CP 707 commercial line supplied by PT Charoen Pokphand Indonesia Tbk, with an average initial body weight of 42.28 ± 2.28 g (unsexed). Poultry-BS, a probiotic innovation formulated by the P2MW Bio-Safe team within Udayana University's Faculty of Animal Science, was integrated into this study as the primary experimental supplement. Drinking water was provided ad libitum and sourced from a well. To guarantee nutritional sufficiency during development, eighty broilers were maintained in twenty colony battery units and supplied with a CP 511B commercial ration

2.2. Metode

2.2.1. Experimental Design

The research followed a CRD (Completely Randomized Design) protocol involving a 4 x 5 arrangement, where four experimental treatments were each tested in five separate replications. An aggregate of eighty broiler chickens was partitioned into replicates, each containing a density of four broiler per unit. The experimental treatments involved different levels of Poultry-BS probiotic supplementation provided through drinking water.

The treatments were as follows:

- P0: Drinking water without probiotic (control)
- P1: Drinking water + 0.25% Poultry-BS probiotic of body weight/week
- P2: Drinking water + 0.5% Poultry-BS probiotic of body weight/week
- P3: Drinking water + 0.75% Poultry-BS probiotic of body weight/week

2.2.2. Research Procedure

The preparation of Poultry-BS probiotic involved various natural components, namely molasses, Javanese ginseng, turmeric, tofu by-products, papaya leaves, dragon fruit, moringa leaves, mango, and orange. All solid ingredients were cleaned, chopped into small pieces, and blended until a homogeneous mixture was obtained. The mixture was then combined with molasses and inoculated with *Lactobacillus casei* as a fermenting agent. The entire mixture was placed in a plastic drum and fermented under anaerobic conditions for seven days. During the fermentation process, the container was tightly closed to maintain anaerobic conditions and ensure optimal microbial growth. After seven days, the fermented solution was filtered to separate the liquid probiotic from the solid residues. The resulting liquid probiotic was then administered to the broilers through drinking water according to the respective treatment levels. Before the experimental treatments were applied.

During the rearing period, broilers were maintained under standard management practices in accordance with commercial broiler production guidelines. Feed and drinking water were provided ad libitum throughout the experimental period.

2.3. Variabels Evaluated

The variables observed in this study were as follows:

2.3.1. Initial and Final Body Weight

The baseline body mass of the broilers was documented at the study's inception, followed by a subsequent weighing at the terminal stage of the trial to establish the final body weight.

2.3.2. Body Weight Gain

The total net gain for each bird was established by deducting the starting baseline weight from the final measurements taken upon the completion of the experiment. This approach ensures an accurate representation of developmental progress over the brooding and finishing stages.

$$\text{Body Weight Gain (g)} = \text{Final Body Weight (g)} - \text{Initial Body Weight (g)}$$

2.3.3. Feed Intake

The amount of feed consumed was established by calculating the variance between the total quantity of rations supplied and the uneaten portion remaining at the end of the observation period.

$$\text{Feed Intake (g)} = \text{Total Feed Offered (g)} - \text{Remaining Feed (g)}$$

2.3.4. Drinking Water Intake

Daily water ingestion was derived from the difference between the initial water offered and the unconsumed portion, providing a precise measure of intake during the course of the investigation

$$\text{Drinking Water Intake (mL)} = \text{Total Water Provided (mL)} - \text{Remaining Water (mL)}$$

2.3.5. Feed Conversion Ratio (FCR)

Analyze the productivity across treatments, established FCR values by calculating the ratio between the mean dietary intake and the cumulative weight gain of the broilers.

$$\text{FCR} = \text{Total Feed Intake (g)} / \text{Total Body Weight Gain (g)}$$

2.4. Data Analysis

Experimental data were subjected to analysis of variance (ANOVA). When the analysis revealed significant treatment effects ($P < 0.05$), Duncan's Multiple Range Test (DMRT) was conducted at a 5% level of significance to determine differences among the treatment averages.

3. Experimental Findings

The results of the study on the administration of Poultry-BS probiotic through drinking water on the performance of four week old broilers are presented in Table 1.

Table 1 The effect of Poultry-BS probiotics through drinking water on the performance of 4 week old broilers

Variables	Treatment[1)]				SEM[2)]
	P0	P1	P2	P3	
Initial body weight (g/bird)	42.3^{a}	42.3^{a}	42.4^{a}	42.35^{a}	0.11
Final body weight (g/bird)	1652.75^{a}	1673.8^{a}	1635.8^{a}	1592.25^{a}	29.43
Body weight gain (g/bird)	1610.45^{a}	1631.5^{a}	1596.75^{a}	1558.35^{a}	27.65
Feed intake (g/bird)	2358.55^{a}	2278.37^{a}	2285.19^{a}	2232.60^{a}	55.25
Water intake (ml/bird)	3788.63^{a}	3705.43^{a}	3569.57^{a}	3582.11^{a}	107.20
Feed convertion ratio	1.43^{a}	1.34^{b}	1.38^{b}	1.37^{b}	0.01

Note : 1) P0: Drinking water without probiotic (control), P1: Drinking water + 0.25% Poultry BS probiotic of body weight/week, P2: Drinking water + 0.5% Poultry-BS probiotic of body weight/week, P3: Drinking water + 0.75% Poultry-BS probiotic of body weight/week, 2) Standard error of the mean. Values followed by different letters in the same row indicate significant differences ($P<0.05$).

The addition of Poultry-BS probiotics did not produce any marked fluctuations in average feed consumption. Across all treatment levels (0.25%, 0.50%, and 0.75%), the values were comparable to the control group, with statistical analysis confirming a non-significant variance (P>0.05). This is because the Poultry-BS probiotic is not a source of nutrients but rather a feed additive, so supplementation through drinking water is not sufficient to influence the total nutrient content or the energy–protein balance, which ultimately provides the same influence on feed consumption. The absence of significant variations in feed intake parameters within this study corroborates previous findings by [13], which indicated that the application of Probio Balitani probiotics resulted in consumption responses comparable to those of the control group. [14] also stated that the addition of prebiotics and probiotics provided the same influence on broiler consumption. [15] stated that probiotic administration did not significantly affect broiler feed consumption.

The average feed consumption of broilers from week 1 to week 4 can be seen in Table 1. The administration of Poultry-BS probiotic showed the same response in feed consumption as broilers receiving the control treatment. This is suspected because the administration of Poultry-BS probiotic in the initial phase has not been effective in increasing microbial growth in the digestive tract. The impact of Poultry-BS probiotic administration was only seen in week 2, although statistically it was not significantly different in lowering feed consumption.

Dietary inclusion of Poultry-BS probiotics at concentrations of 0.25%, 0.50%, and 0.75% yielded final body weights and growth trajectories that did not differ significantly (P>0.05) from the untreated control, confirming the stability of growth metrics across treatments. Average final body weight and body weight gain of broilers can be seen in Table 1. The administration of Poultry-BS probiotic has not been able to increase feed consumption to support broiler growth. Rapid growth is generally followed by increased consumption. As presented in Table 1, where feed consumption decreased with the addition of Poultry-BS probiotic which was followed by a decrease in final body weight (Table 1) and a decrease in body weight gain (Table 1). Rapid growth is generally followed by increased consumption. This study is in line with [16] who stated that the administration of prebiotics, probiotics, and synbiotics has not been able to increase body weight gain and final body weight. This statement is supported by [17] who said there was no significant difference in final body weight and body weight gain between the probiotic group and the control group during a 42-day period.

Broiler water consumption showed non significant results (P>0.05). The average broiler water consumption for weeks 1-4 can be seen in Table 1. This is because the administration of *Poultry-BS* probiotic through drinking water at levels of 0.25%, 0.5%, and 0.75% has not been able to exert an influence on water consumption. The hydration needs of broilers are primarily governed by a combination of biological and climatic elements. Specifically, ambient temperatures and the nature of the ration consumed, as well as the animal's developmental stage and overall vigor, serve as the primary drivers for fluctuating water consumption levels. This study is in line with [18] who stated that probiotic administration has not been able to influence water consumption.

The Feed Conversion Ratio (FCR) value of broilers receiving the Poultry-BS probiotic treatment at levels of 0.25%, 0.5%, and 0.75% exerted a significantly different influence (P<0.05) compared to the control treatment (P0). The average FCR value each week can be seen in Figure 1. It can be seen that broiler FCR values starting from week 2 in broilers given the treatment were lower compared to broilers not given the treatment; this means that the administration of Poultry-BS probiotic at 0.25% - 0.75% through drinking water influences the efficiency of feed use (Table 1). This is caused by the administration of probiotics, which are beneficial microorganisms (bacteria) in the digestive tract that play a major role in optimizing feed consumption so that nutrient absorption proceeds perfectly. This study is in line with [13] who stated that Probio-Balitani probiotic administration at a level of 0.02% can lower FCR values.

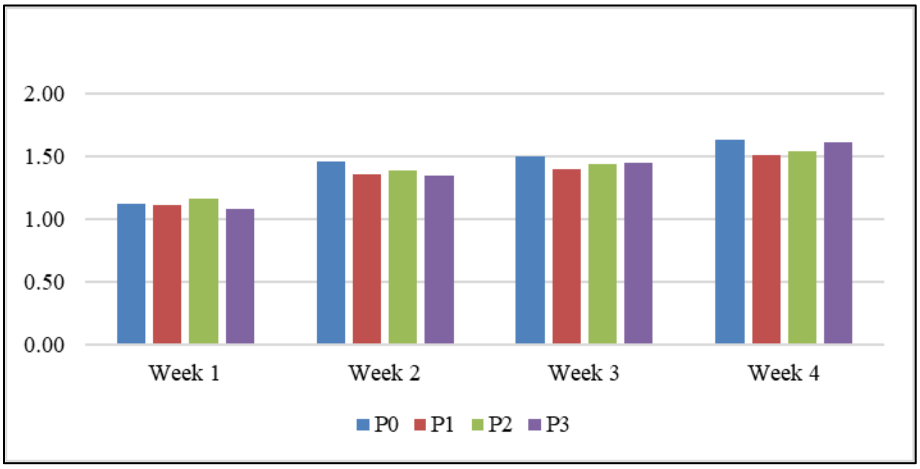

Figure 1 Mean Feed Conversion Ratio (FCR) of Broiler

This is closely related to the role of molasses and rice water as prebiotic sources in Poultry-BS which support the viability of Lactobacillus casei within the broiler's digestive tract. The presence of this probiotic works synergistically with phytochemicals from turmeric, papaya leaves, and moringa leaves to balance gut microflora, so it can increase digestive enzyme activity and ultimately will be able to increase the digestibility and absorption of food substances. This is proven by the Poultry-BS probiotic treatment through drinking water with a dose of 0.25% - 0.75% being able to improve nutrient digestibility, specifically increased protein digestibility, which is reflected in the decrease of the FCR value compared to the control. According to [19], supplementation with Lactobacillus casei can significantly increase intestinal villi height and suppress pathogenic bacteria populations such as E. coli, which impacts the optimization of nutrient absorption. Furthermore, [20] stated that the combination of probiotics with herbs (such as turmeric) is effective in stimulating the secretion of endogenous digestive enzymes such as amylase and protease, so that feed protein can be hydrolyzed more perfectly. Broiler FCR values can be substantially lowered by supplementing diets with encapsulated Japanese papaya leaf extract, as suggested by [21]. This treatment also promotes a healthier gut microbiome by elevating LAB levels and facilitating better protein digestion. [22] stated that moringa leaf extract supplementation in drinking water up to a certain level is effective as a growth antibiotic replacement (AGP's) which is able to increase nutrient digestibility, thus lowering the feed conversion ratio (FCR).

4. Conclusion

Based on the outlined data, this investigation establishes that the implementation of Poultry-BS probiotics in broiler husbandry is proven to *Poultry-BS* probiotics at levels of 0.25%, 0.5%, and 0.75% through drinking water significantly improved feed efficiency, as evidenced by a decrease in the Feed Conversion Ratio (FCR) value compared to the control group. However, the supplementation of *Poultry-BS* probiotics did not show a significant effect on feed intake, water consumption, final body weight, or body weight gain in 4-week-old broilers.

Compliance with ethical standards

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Disclosure of conflict of interest

The author states that this study was conducted without any financial or personal relationships that could potentially bias the research outcomes or their interpretation.

Statement of Ethical Approval

All procedures involving the use of broilers in this study received approval from the Animal Ethics Committee, Faculty of Veterinary Medicine, Udayana University.

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