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Dietary Bioherbal in Commercial Feed on the Growth Pattern of Broiler Chickens

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Abstract:

Attempting to substitute antibiotic growth promoter (AGP), different natural feed additive products are being employed as alternative options. The commercial product known as Bioherbal can be classified as a natural growth promoter (NGP) and used as a feed addition. The primary objective in the rearing of broiler chickens is to produce a significant increase in body weight. The growth pattern characteristics were assessed in experiments investigating the inclusion of Bioherbals in commercial diets. A total of 200 broiler chickens were utilized in the experimental tests, which consisted of four different treatments and were replicated five times. The research employed descriptive analysis to examine the parameters of Body Weight Estimation (BWE), Body Weight Gain (BWG), and Relative Growth Rate (RGR). The findings of the study indicate that the incorporation of Bioherbal into commercially available feed leads to enhanced production performance, as seen by the growth curve pattern observed in broiler chickens. In summary, it can be inferred that Bioherbal exhibits the capacity to function as a growth stimulant in broiler chickens.

Keywords **—Bioherbal, Broiler Chikens, Growth Pattern**

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I. INTRODUCTION

An antibiotic growth promoter (AGP) is a type of feed additive that is administered in small amounts to eradicate harmful bacteria in the small intestine, hence promoting more efficient growth. An issue that develops due to the extensive utilization of AGP is the development of bacterial resistance to antibiotics [1]. Sweden was the first nation to compile regulations regarding AGP consumption. Subsequently, in 2006, the European Union enforced a comprehensive prohibition on all AGP. The United States is not only imposing restrictions on the use of AGP but also actively working towards a substantial decrease in the overall utilization of antibiotics in industrial food animal production [2]. Brazil and China banned Colistin in 2016 as part of their ongoing efforts to restrict the use of AGP [3],[4]. India has established a policy that requires a specific period for medication withdrawal in livestock production [5]. Additionally, Bangladesh, Bhutan, Indonesia, Myanmar, Nepal, Sri Lanka, and Thailand have declared restrictions on the use of AGP [6].Considering the issues related to AGP utilization, it is essential to find an alternative substance that may perform the same function without giving rise to comparable complications.

Phytobiotics can potentially replace AGP due to their diverse range of phytochemicals with many effects. Phytobiotics can be used in broiler feed as additives to enhance the immune response and productivity. Phytobiotics contain active compounds that possess antibacterial properties. Multiple studies have revealed the inhibitory effects of bioactive compounds found in plant extracts on harmful microorganisms. According to research, the essential oils in ginger play a part in the digestive

tracts of chickens as antibacterial agents [7]. Another study indicated that the presence of phytobiotics in fermented garlic had a significant impact on the appearance of broiler chickens, such as carcass percentage, liver percentage, and cooking loss [8].

Bioherbal is a liquid feed additive that can be added to commercial feed and is suitable for all chicken strains. Two varieties of Bioherbal exist: Bioherbal G, which is made from a blend of plant leaves (*Andrographis paniculata, Piper betle, Moringa oleifera, Carica papaya*), photosynthetic bacteria, lactic acid bacteria, *Actinomycetes*, and *Saccharomyces cerevisiae* respectively. Bioherbal Y is composed of a blend of rhizomes (*Kaempferia rhizoma, Curcuma xanthorrhiza, Zingiber officinale,Curcuma domestica*), lactic acid bacteria,photosyntheticbacteria, *Actinomycetes*, and *Saccharomyces cerevisiae*[9].

Bioherbals can be an acceptable replacement for AGP due to their bioactive components, which possess inhibitory capabilities against pathogenic bacteria and promote the growth of broiler chickens. Bioherbal aims to replace the utilization of antibiotic growth promoters (AGP) in broiler feed as a means of stimulating growth. The efficacy of Bioherbal in enhancing the performance of male-layer chicks [10] and laying hens [9] has been experimentally shown. Based on prior research findings, it is believed that Bioherbal can be employed as a feed addition in broiler chickens to enhance their performance. This research aims to see the effect of adding Bioherbal to broiler chickens regarding growth patterns for 35 days.

II. MATERIALS AND METHODS

A. Materials

The broilers utilized in the study were 200-day-old chicks of the Lohmann Platinum MB 202 strain, with an average body weight of 40.71 ± 1.76 g and a coefficient of variation of 4.31%. Vaccination of day-old chicks has been carried out at the hatchery. Table 1 displays the nutritional composition of commercial feed

B. Methods

The research employed a field experimental method with 4 treatments and 5 replications, resulting in 20groups, each consisting of 10 chickens. Feeding and drinking are provided without restriction.The treatment employed in this investigation involved the adding of Bioherbal at a dosage of 4 ml per kg of commercial feed. The following are the treatment's details: T0: control treatment; T1: complete feed + Bioherbal G; T2 complete feed + Bioherbal Y; T3: complete feed + Bioherbal G (days 1 to 21), complete feed + Bioherbal Y (days 22 to 35).

C. Parameters

The parameters examined in this study pertain to the growth patterns observed through analyzing body weight data and the rate of body weight gain in broiler chickens. The body weight data were taken weekly from the beginning of rearing until

Table 1. Nutritional content of commercial complete feed

Nutrition	Percentage		
	Pre-Starter (0 – 7 day)	Starter (8 – 21)	Finisher (22 – 35)
Moisture content (max)	13.00%	13.00%	14.00%
Crude protein (min)	22.00%	21.00%	22.00%
Crude fiber (max)	4.00%	5.00%	5.00%
Crude fat (min)	5.00%	5.00%	5.00%
Ash (max)	8.00%	8.00%	8.00%
Calcium	0.80 – 1.10%	0.80 – 1.10%	0.80 – 1.10%
Total phosphorus (max)	0.50%	0.50%	0.50%
with phytase enzymes	≥400 FTU/kg	≥400 FTU/kg	≥400 FTU/kg
Total aflatoxin (max)	50µ/kg	50µ/kg	50µ/kg
Urea	-	-	-
Amino acid			
- Lysine (min)	1.30%	1.20%	1.20%
- Methionine (min)	0.50%	0.45%	0.45%
- Methionine+Cystine (min)	0.90%	0.80%	0.80%
- Threonine (min)	0.80%	0.75%	0.75%
- Tryptophan (min)	0.20%	0.19%	0.19%

Source: Feed tag

harvest using a digital scale in grams.The parameters calculated are Body Weight Estimate (BWE), Body Weight Gain (BWG), and Relative Growth Rate (RGR)

D. Data analysis

The obtained data were subjected to descriptive analysis, which involved the presentation of body weight, estimated growth rate, and relative growth rate (%). The growth rate of broiler chickens is determined and presented as a curve on a line graph. The formula utilized for calculating the relative growth rate is as follows, (Kurniawan et al., 2023):

$$\text{Relative growth rate} = (Wt\text{-}Wo)/Wo \times 100\%$$

Description:
Wt = body weight at age t2
Wo = body weight at age t1

Estimating the optimal growth following formula:

$$Wt = Wo \times e^{kt}$$

Description:
Wt = body weight at age t (g)
Wo = body weight age 0 (g)
t = age (week)
k = growth rate coefficient
e = constant (2.7183)

The growth rate coefficient (k) was calculated using the formula:

$$k = (\mathit{In}Wt\text{-}\mathit{In}Wo)/((t2\text{-}t1))$$

Description:
K = growth rate coefficient
*ln*Wt = body weight at age t2
*ln*Wo = body weight at age t1
t1 = age one week before weighing
t2 = age at weighing

III. RESULT AND DISCUSSION

The results of Bioherbal additions in broiler chickens can be seen in Table 2. Table 2 shows the results of growth pattern analysis on each treatment for 35 days with parameters Body Weight Estimation (BWE), Body Weights Gain (BWG), and Relative Growth Rate (RGR).

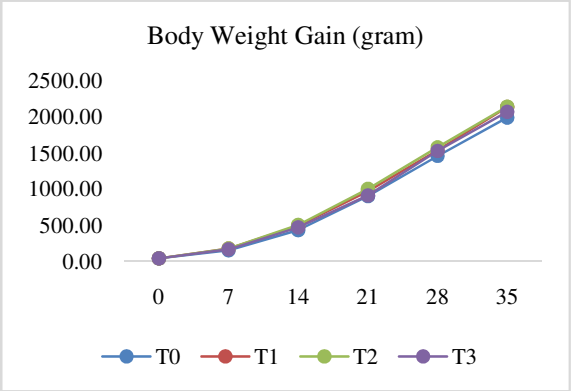


Fig. 1presents a comparative analysis of body weight growth among broiler chicks across different treatment groups.

The addition of Bioherbals to commercial feed has been proven to increase BWG. Figure 1 shows the comparison curve between treatments. Based on observations, T2 showed the highest BWG in weeks 1 to 5, although the initial weight was not the highest. T2 is the best treatment seen from BWG, followed by T1, T3, and T0.

The primary focus of the broiler farming industry is BWG. The utilization of Bioherbal can achieve the augmentation of body weight gain (BWG), as its bioactive components have the potential to boost overall performance. This enhancement mainly displays in improved digestibility and the mitigation of stress levels. Curcumin is a bioactive compound derived from turmeric and curcuma, with potential medicinal properties.

According to prior studies, the utilization of curcumin derived from turmeric has demonstrated advantageous effects in the realm of poultry nutrition. The combined effects of curcumin and turmerone, which are derived from lipophilicturmeric, have been demonstrated in broiler chicks in terms of growth, antioxidant activity, and antibacterial activity [12]. In broiler chickens, dietary curcumin can withstand coccidiosis challenged by *Eimeria sp*. by boosting

body weight, decreasing intestinal lesions caused by fecal oocysts, and boosting immunity [13]. According to findings from another study, adding Moringa oleifera leaves could raise BWG without influencing feed intake or feed conversion ratio (FCR) via increasing villi height and surface area [14].

The enhancement of histomorphological quality has significant implications for improved digestibility, particularly in relation to amino acids. Based on prior studies, it has been found that the inclusion of lysine in animal feed has a notable impact on the growth of body weight, carcass percentage, and the deposition of lysine in chest muscles [15]. Methionine is classified as an indispensable amino acid in broiler chickens, serving a crucial function in the process of protein synthesis. Consequently, a shortage in methionine can lead to a decline in performance and the disruption of metabolic processes [16].

Figure 2 illustrates the comparative relationship between body weight estimate (BWE) and body weight gain (BWG). All treatments exhibited similar patterns, although variations were observed in the weight gain (BWG) values relative to body weight at the age of 14 to 28 days. In the experimental group, the inclusion of Bioherbal resulted increase between days 14 and 28, whereas the control only exhibited this effect at day 21. The physiological impact of Bioherbal on broiler chicks, particularly during the early stages, is the reason behind this observation.

The initial phase of broiler chicken development, known as the pre-starter period, lasting from 0 to 7 days, is considered a crucial stage. During this period, the primary emphasis is on the proliferation of cells, leading to the formation of intricate tissues. The significance of early growth in broiler chickens gets more pronounced as the duration of their growth period diminishes [17]. The influence of broiler chicken starts on the growth performance of broiler chickens was observed by researchers, and it was determined to have an impact on the overall performance of broiler chickens during all growth phases. During the initial phases following hatching, the maturation of the gastrointestinal system is still underway, resulting in limited digestive and absorptive capabilities [18].Therefore, it is necessary to provide suitable and enough formulations. In this instance, adding Bioherbal to commercial feed can raise the rate of growth.

Table 2. Analysis of the effects of adding Bioherbals to diet on the broiler chickens' body weight gain (BWG), body weight estimation (BWE), and relative growth rate (RGR)

Treatment	Parameters	Age (Week)					
		0	1	2	3	4	5
T0	BWE (g)	41,14	153,85	479,12	853,54	1486,51	2973,03
	BWG (g)	41,14	153,85	432,60	903,20	1459,20	1991,10
	RGR (%)	0,00	2,74	4,55	5,64	6,25	6,62
T1	BWE (g)	41,20	176,66	495,19	812,66	1484,51	2969,02
	BWG (g)	41,20	176,66	491,20	970,20	1536,60	2137,10
	RGR (%)	0,00	3,29	5,07	6,04	6,63	7,02
T2	BWE (g)	41,07	179,35	504,46	827,58	1511,39	3022,78
	BWG (g)	41,07	179,35	504,60	1003,60	1581,20	2143,00
	RGR (%)	0,00	3,37	5,18	6,17	6,74	7,10
T3	BWE (g)	40,77	167,83	490,03	785,29	1443,15	2886,30
	BWG (g)	40,77	167,83	471,80	912,80	1531,40	2072,32
	RGR (%)	0,00	3,12	4,93	5,86	6,54	6,89

Description: “BWE” Body Weight Estimation,”BWG” Body Weight Gain, “RGR” Relative Growth Rate

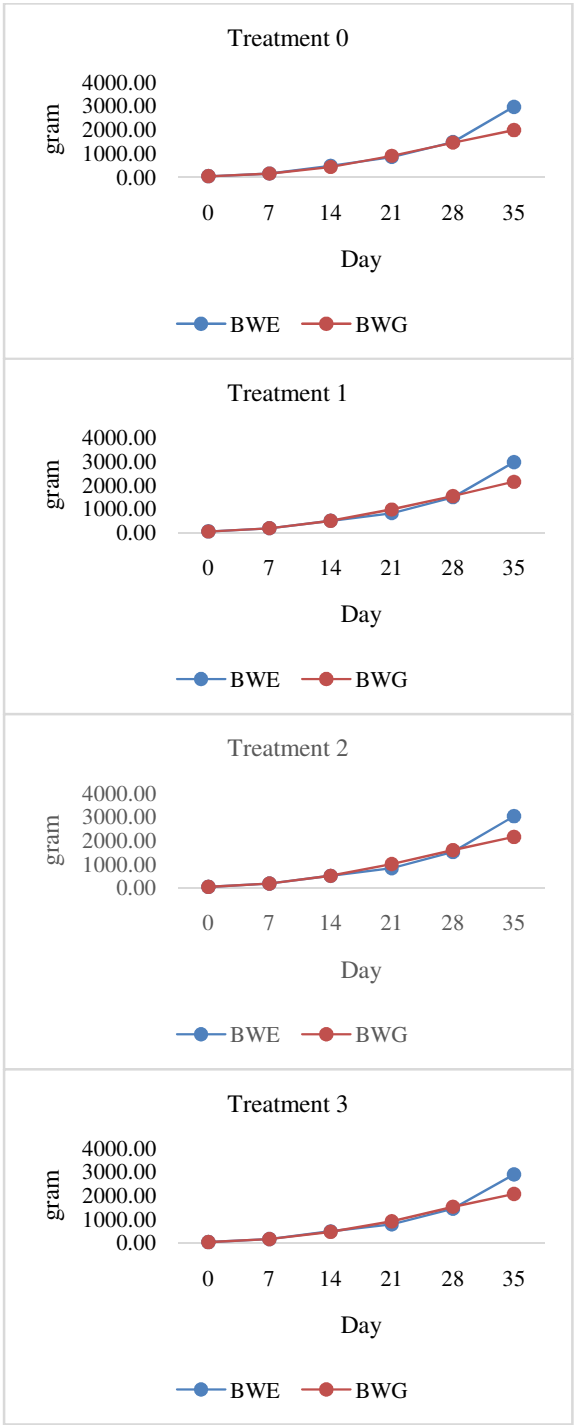
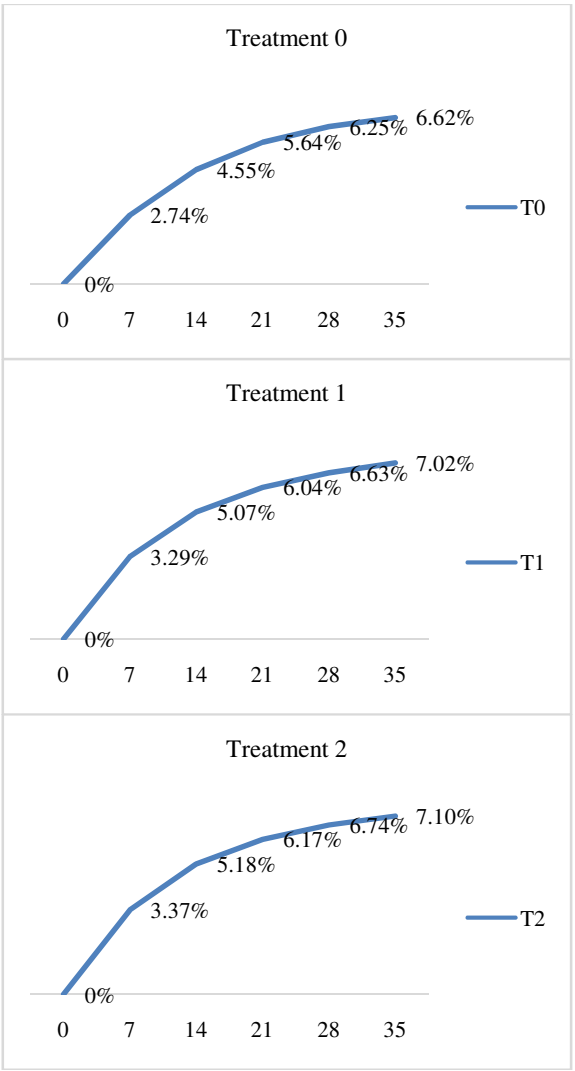
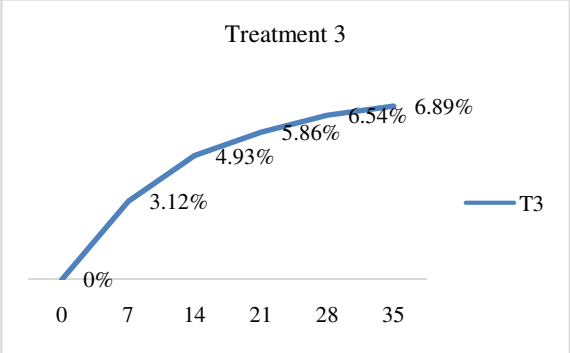


Fig. 2A comparison between body weight estimate (BWE) and body weight growth (BWG)

Based on the RGR data, T2 has the highest value and represents the most favorable treatment, followed by T1, T3, and T4. During the pre-starter stage (0-7 days), there is an escalation of growth in broiler chickens, approximately around 3%. The growth rate of broiler chickens, as seen by the RGR curve during the first seven days, initiates at an RGR of 0% on day 0. The growth pattern of broiler chickens will see a decrease in escalation value starting from the second week and onwards. Nevertheless, the percentage will consistently increase. The optimum shape of the RGR curve can be shown in Figure 3.





. Fig. 3 Relative growth rate (RGR) value for eachtreatment

IV. CONCLUSIONS

The adding Bioherbals into commercial feed can potentially enhance the growth pattern observed in broiler chickens. Bioherbal Y is the most promising treatment for the highest values for all parameters

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