

***Adenanthera pavonina* leaf extract supplementation on production performance of Jowo Super (Joper) Chickens at the starter phase**

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Abstract. *Adenanthera pavonina* leaf extract contains several bioactive compounds and serves as a potential Natural Growth Promotor (NGP) for poultry. Phytobiotics can enhance production performance as well as the health conditions of poultry. This research was conducted to evaluate the production performance of Jowo Super (Joper) chickens during the starter phase (1-4 weeks) with dietary supplementation of phytobiotic *Adenanthera pavonina* leaf extract. One-hundred-day old chick (DOC) Joper chickens were randomly allocated into four treatments, and each treatment consisted of five replicates, with five chickens in each replicate. The treatments are T0: Basal diet without supplementation of phytobiotic; T1, T2, and T3: Basal diet with supplementation of phytobiotic *Adenanthera pavonina* leaf extract 0.25%, 0.50%, and 0.75%, respectively. The parameters observed were feed and water consumption, weight gain, and feed conversion ratio (FCR). The data were analyzed using a Completely Randomized Design (CRD), and data with significant differences ($P < 0.05$) were further analyzed using the Duncan Multiple Range Test (DMRT). The results indicated that supplementation of *Adenanthera pavonina* leaf extract significantly affected ($P < 0.05$) the feed consumption, water consumption, and FCR, though weight gain did not significantly differ ($P > 0.05$). In conclusion, supplementation of phytobiotic *Adenanthera pavonina* leaf extract at 0.5 and 0.75% on Joper chicken feed had a positive effect to improve feed efficiency.

1 Introduction

The consumption per capita weekly of native chicken meat in Indonesia has shown a significant increase. According to [1] average meat consumption from 1.65 kg/capita/week in 2023 to 4.56 kg/capita/ week in 2024. This upward trend presents a promising opportunity

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for the expansion of native chicken farming. However, the productivity of native chicken remains lower compared to that of broiler chicken. Therefore, represented a challenge production for native chicken farmer in Indonesia. To improve performance genetic selection and cross-breeding have been employed resulting in known as Jowo Super chicken (Joper), which is produced by crossing female laying hens with local roosters. Joper chickens have a higher growth rate and productivity compared to regular native chicken [2]. Therefore, the goal joper chicken were expanded in Indonesia to increase the supply of meat production [3].

Starter phase of Joper chickens are chickens raised for four weeks, with the characterized of having good feed efficiency and a positive correlation with body weight gain [4]. Joper chicken can weight 0.6-1.0 kg/head at 8 weeks of age [5]. This is higher than that of other native chicken such as Kampung Unggul Balitbangtan (KUB) chicken at the same age, which weight around 0.3 kg per head at 6 weeks of age and 0.4-0.5 kg/head at 8 weeks of age [6]. Despite these advantages, a disadvantage of Joper chicken is their relatively small body weight and slower growth rate compared to broiler chicken [7]. Therefore, feed additive supplementation is provided to the feed to maximize potential and minimize existing disadvantages.

Feed additive, such as probiotic for native chicken can improve growth performance and immune system [8]. Another type of feed additive that can be utilized is phytobiotic. Phytobiotic utilize natural plant as a substitute for Antibiotic Growth Promoter (AGP), offering antibacterial, antioxidant, and anti-inflammatory properties [9][10]. Phytobiotics provide benefits in the form of increased growth, meat and egg quality, and improved poultry health [11]. One plant with the potential to be developed as a phytobiotic is *Adenanthera pavonina* leaf (saga leaf). Extracts of *Adenanthera pavonina* leaves used as phytobiotics have demonstrated antibacterial effectiveness against *Escherichia coli* [12]. The antioxidant potential of *Adenanthera pavonina* leaf extract is significant due to the presence of metabolites, namely pentadienoic acid, triterpenoid glycosides, and three tamarixetin glycosides, based on the results of the evaluation of the antioxidant activity test 2,2-diphenyl-1-picrylhydrazyl (DPPH) [13]. Other bioactive compounds found include flavonoid, which act asanthelmintics (anti-worms agents) while optimizing nutrient absorption [14]. *Adenanthera pavonina* leaf extract is non-toxic and considered safe for consumption [13]. Furthermore, *Adenanthera pavonina* leaf extract as a Natural Growth Promoter (NGP) with the correct dosage, it is considered capable of improving the production performance of broiler chickens.[15]. Therefore, this study aims to evaluate the effect of *Adenanthera pavonina* leaf extract supplementation as a phytobiotic on the performance of joper chicken during at the starter phase.

2 Materials and Methods

2.1 *Adenanthera pavonina* leaf extract methods

The *Adenanthera pavonina* leaf extract was prepared at the Feed Technology Laboratory, Politeknik Negeri Jember. The production of the phytobiotic began with fresh *Adenanthera pavonina* leaves, which were first air-dried under sunlight for 2 hours. Subsequently, the leaves were dried using an oven at a temperature of 40°C for 24 hours. The dried leaves were then ground using a grinder to produce *Adenanthera pavonina* leaf powder. The extraction was performed using the maceration technique. The leaf powder was dissolved in 96% ethanol with a ratio 1:4 and stored in an incubator shaker for 72 hours [16]. The solution was then filtered using whatman filter paper and evaporated using a rotary evaporator at 80 rpm for 40 minutes at a temperature of 70°C [17]. A screening test for flavonoid content involved adding H₂SO₄ to the extract which resulted in an orange color indicating the presence of

flavonoids [18]. Based on the result of laboratory test at the Faculty of Pharmacy, University of Jember, the flavonoid content of the *Adenanthera pavonina* leaf extract used in this research was 5.049±0.107 mg/g QE.

2.2 Experimental materials and design

The research was conducted at the Politeknik Negeri Jember farm. A total of 100 Day Old Chicken (DOC) of the joper chicken were used in this study during the stater phase (1-28 days). The average initial body weight of the DOC was 32.44 g/chick. Feed and water were provided ad libitum according to the nutritional requirements listed in Table 1. The Joper chickens were randomly divided into 4 treatments with 5 replications, each replication consisting of 5 joper chickens. Before treatment, all chickens were vaccinated. The dietary trearments were as follow T0: control with basal diet, T1: basal diet with supplementation of 0.25% phytobiotic *Adenanthera pavonina* leaf extract, T2: basal diet with supplementation of 0.50% phytobiotic *Adenanthera pavonina* leaf extract, and T3: basal diet with supplementation of 0.75% phytobiotic *Adenanthera pavonina* leaf extract.

Table 1. The basal diet of treatment

Ingredients	Proportion (%)
Yellow meal	55.00
Rice brand	8.00
Soybean meal	21.00
Fish meal	13.00
Palm oil	1.0
CaCO3	0.50
Vitamin Premix	0.80
L-Lysin HCl	0.20
DL-Metionin	0.20
NaCl	0.30
Total	100
Calculated Nutrient Value	
Metabolizable energy (ME Kcal/kg diet)	2928.90
Crude protein (%)	21.37
Crude fiber (%)	4.65
Crude fat (%)	5.30
Calcium (%)	1.76
Phosphor (%)	0.97
Lisin (%)	1.28
Metionin (%)	0.53

Note: Feed formulation using trial error method

2.3 Collection of performance data

Data collection included daily measurement of feed and water intake. Body weight was recorded weekly, and Feed Conversion Ratio (FCR) was calculated on research.

2.4 Data analysis

The research used a one-way Analysis of Variance (ANOVA) with Completely Randomized Design (CRD and followed by Duncan’s Multiple Range Test (DMRT) if the data significantly different (P<0.05). Data analysis was conducted using statistical software IBM SPSS Statistics version 23 for windows.

3 Results and discussion

The statistical analysis indicated significant differences in feed and water intake, and feed conversion ratio (FCR), and not significant on body weight of Joper chicken during the starter phase (1 to 28 days). The data are presented in Table 2.

Table 2. Growth performance of Joper chicken with supplementation of phytobiotic of *Adenanthera pavonina* leaf extract

Variable	Treatment			
	T0	T1	T2	T3
Feed intake (g/head/day)	20.41±0.25 ^b	20.63±0.79 ^b	16,31±0.69 ^a	16.58±0.33 ^a
Water intake (ml/head/day)	51.76±4.88 ^b	51.10±3.93 ^b	40.81±2.54 ^a	41.67±2.06 ^a
Weight gain (g/head/day)	8.41±0.39 ^{ns}	8.22±0.76 ^{ns}	8.34±0.43 ^{ns}	8.24±0.43 ^{ns}
FCR	2.43±0.97 ^b	2.52±0.17 ^b	1.96±0.65 ^a	2.02±0.14 ^a

Note :
^{ab}: Different letter superscripts in the same column for each treatment mean significantly different (P<0.05)
^{ns} Non-significant difference (P>0.05)
T0: control with basal diet, T1: basal diet with supplementation of 0.25% phytobiotic *Adenanthera pavonina* leaf extract, T2: basal diet with supplementation of 0.50% phytobiotic *Adenanthera pavonina* leaf extract, and T3: basal diet with supplementation of 0.75% phytobiotic *Adenanthera pavonina* leaf extract

The addition of the *Adenanthera pavonina* leaf extract to the Joper diet significantly effect on the cumulative feed intake of Joper chicken (P<0.05). To assess feed consumption, we calculated the difference between the amount of feed provided and the amount of feed remaining over 28 days of rearing period. The treatments T2 and T3, with 0.5 and 0.75 phytobiotics of *Adenanthera pavonina*, respectively, resulted in decrease the total feed consumption of Joper chickens by 16 g/head/day, and treatment T1 with supplementation of 0.25 extract yields similar results to the control treatment (T0), which is 20 g/head/day during the starter phase. The finding lower than [19], which stated that the total feed consumption of Indonesian chickens in the starter phase (1-4 weeks) is 30 g/head/day. The results indicate that supplementation of phytogenic feed additive for poultry can improve both feed quality and animal health, thereby optimizing feed efficiency and enhancing poultry growth performance. [20] reported that the *Adenanthera pavonina* extraction contain bioactive compounds such as flavonoids, which antifungal, antioxidant, and antibacterial activity. [10] explained that supplementation of phytobiotics as a feed additive can enhance gut morphology and overall intestinal health in broiler chickens. These beneficial conditions not only improve gut integrity but also boost nutrient digestion and absorption, ultimately increasing feed efficiency.

Supplementing the diet with phytobiotic *Adenanthera pavonina* leaf extract significantly reduces the water intake of Joper chicken (P<0.05). Joper chickens treated with T2 and T3 had lower water consumption of 40.81 and 41.67 ml/head/day, respectively, compared to T1,

which had 51.10, and the control T0, which consumed 51.76 ml/head/day. These results align with [21] stated that water intake is closely influenced by the feed intake. Significant difference in feed intake corresponds with similar results on water intake. Typically, total water intake in poultry is approximately twice that of the feed intake on a weight basis. [22] explained that chickens consume twice as much water as feed. Water is the largest component in the poultry body, and it plays an essential role in regulating body temperature, distributing nutrients, and eliminating waste [23]. The amount of water consumed can impact various aspects of poultry production, such as litter conditions, carcass quality, and overall animal welfare. Furthermore, the quality of water can influence feed intake, thereby influencing chicken performance.

The supplementation of phytobiotics in feed did not lead to a significant effect in the daily weight gain of Joper chicken ($P>0.05$). The results show that supplementation of the bioactive component of *Adenanthera pavonina* leaf extract cannot enhance Joper chicken body weight. The daily weight gain for the treatment groups T0, T1, T2, and T3 was 8.41, 8.22, 8.34, and 8.24 g/head/day, respectively. These data are similar to those reported by [24], who noted that the daily weight gain of Joper chicken with the treatment of organic waste flour was approximately 8 g/head/day. [25] also reported no significant difference in the supplementation of phytobiotic on body weight gain of native chicken. Different result is reported by [22] that explain supplementation with phytobiotics can enhance the poultry digestive system to absorb nutrient content of the feed and promote rapid body weight gain. The body weight gain in chickens is affected by a combination of genetic and environmental factors [26]. The body weight gain aligns with the standard body weight of Joper chicken. The result indicates that the genetics of Joper chicken cannot increase body weight significantly.

Different levels of phytobiotic supplementation significantly affect the feed conversion ratio (FCR) of Joper chicken ($P<0.05$). The FCR of Joper chicken is influenced by both total feed intake and body weight gain. Supplementation diet with phytobiotic *Adenanthera pavonina* leaf extract resulted in better feed efficiency compared to the control group. The group with supplementation phytobiotic 0.50 and 0.75% (T2 and T3) showed lower FCR values of 1.96 and 2.02, than supplementation with 0.25% phytobiotic (T1), and the control had FCR values 2.52 and 2.43. A more efficient utilization of feed to produce body weight of Joper chickens results in a lower FCR, indicating improved feed efficiency. These results were aligned with research conducted by [27], who added fermented phytobiotic leaf extract, also found significant differences in FCR, but the values were higher, ranging from 2.78 to 3.26. [10] explained that natural feed additives derived from plant bioactive compounds positively affect weight gain, feed efficiency, and nutrient absorption in broiler chickens. These benefits occur through various mechanisms, including the stimulation of digestive enzymes and the modulation of appetite-regulating pathways.

4 Conclusion

The supplementation of phytobiotic *Adenanthera pavonina* leaf extract at 0.5 and 0.75% on Joper chicken feed had a positive effect to improve feed efficiency, with decreased feed intake and water intake, and thus reduced FCR value during the starter phase (1-4 weeks). These results indicated that phytobiotic *Adenanthera pavonina* leaf extract can be effectively used as a feed additive for Indonesian native chicken, especially Joper chicken.

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