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Addition of Glodokan Tiang Leaf Flour (*Polyalthia longifolia*) in The Diet on The Growth of Broiler Chickens

Wiwaha Anas Sumadja* and Siti Fitra Hani
Program Study of Animal Science, Faculty of Animal Science, Universitas Jambi. Jl. Jambi – Ma. Bulian KM 15 Mendalo Darat Jambi 36361
**Correspondent author :* wiwahasumadja@gmail.com

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Abstract

Polyalthia longifolia is a plant from India. In Indonesia, it is often called glodokan tiang which is one of the most popular plants with tall trees grows tall, has short branches. This plant contains several compounds such as *alkaloids, steroids, tannins, saponins* which can increase growth and feed efficiency, as well as improve the quality of livestock meat , *flavonoids* which is useful as an appetite enhancer, reducing feed intake, and increasing pigment. This study aims to determine the effect of the addition of leaf flour *Polyalthia longifolia* in the ration on the growth of broiler chickens. This research was conducted at the Farm Faculty of Animal Husbandry, University of Jambi for 5 weeks. This study used 200 DOC. The treatments given were P0 (the ration contains 0% leaf flour *Polyalthia Longifolia*), P1 (the ration contains 1% leaf powder *Polyalthia Longifolia*), P2 (the ration contains 2% leaf powder *Polyalthia Longifolia*) and P3 (the ration contains 3% leaf powder *Polyalthia Longifolia*). This study used a completely randomized design (CRD) with 4 treatments and 5 replications. The data collected were subjected to analysis of variance. The study's findings revealed the treatment had no significant ($P > 0.05$) influence on consumption ration, body weight gain, or ration conversion. It may be concluded that the addition of *Polyalthia longifolia* leaf flour to the diet up to 3% had no negative influence on ration consumption, body weight gain, or ration conversion.

Keywords : Body Weight Gain; Broiler Chickens; *Polhyalthia longifolia;* Ration Consumption; Ration Conversion

INTRODUCTION

Every year, the demand for chicken meat grows since the price is affordable to everyone (Wahyono dan Utami, 2018). Broiler chicken is one of the poultry commodities that contributes significantly to the Indonesian people's protein demands from animals of animal origin. It is derived from scientifically bred chicken lines with economic traits such as rapid meat production, a short harvest period, soft-fiber meat, a good supply of meat, larger breasts, and smooth skin (Miyumo *et al*. 2023). Aside from being a great chicken, it will yield best results if it is fed by high-quality feed.

Quality feed has sufficient nutritional value such as protein and energy. Giving the right feed will increase the growth of chickens so that there is an appropriate increase in body weight. The main factor that affects body weight gain is the content of food substances in the feed, especially the energy and protein content (Allama *et al*., 2012) . Broilers need sufficient nutrients to support the growth process in body tissues.

Feed selection is one of the factors that must be considered to support the growth of broiler chickens (Pauwels *et al*., 2015). Breeders usually use additional feed in the form of antibiotics

to support the growth of broiler chickens (Mehdi *et al*. 2018). Poultry feed given antibiotics with inappropriate doses and for a long time can have another impact, namely the presence of toxic residues in livestock products that can cause disease for consumers (Ghimpeţeanu *et al*. 2022).

One of the plants that can be used as a substitute for antibiotics is: *Polyalthia longifolia* (Babatunde *et al*. 2023). In Indonesia, it is often called *Glodokan Tiang* which is one of the most popular plants with tall trees grows tall, has short branches, and is an ornamental plant. This plant is included in the type of evergreen tree originating from India (Jothy *et al* .2013).

In Indonesia, especially in Jambi Province, this plant is widely planted on roadsides because this plant is able to reduce air pollution. In addition, glodokan also has many benefits. Some research (Ranjutha *et al*. 2023: Lavanya *et al*. 2018: Subramanion *et al*. 2013) on leaves *Polyalthia longifolia* carried out in the health sector of them to treat skin diseases, hypertension, fever and indigestion. This plant is reported to contain *alkaloids, steroids, tannins, saponins* which can increase growth and feed efficiency, as well as improve the quality of chicken meat, *flavonoids* which is useful as an appetite enhancer, reducing feed intake, and increasing pigment *(Magdalena et al. 2013; Chen et al*. 2021; Rajkumar *et a.l* 2021) . This plant too can function as antibacterial, antifungal, antidiabetic, antitumor, anti-ulcer, antioxidant, besides this plant is considered as a medicinal plant or phytobiotics which are now the object of interest in the field of livestock production research (Alagbe, 2017) .

Feed additives natural ingredients from plants that contain active substances that function for healing and preventing disease (Lestariningsi *et al*. 2012) . Herbal plants are currently widely used because There is concern about the use of antibiotics as growth promotors in poultry production because of their negative effects on human health. It is hoped that by giving leaf flour *Polyalthia longifolia* in broiler chicken rations can increase broiler chicken body weight gain.

MATERIALS AND METHODS

Place and Time

This research was carried out in the enclosure of Fapet Farm, Faculty of Animal Husbandry, Jambi University for 5 weeks.

Materials and Equipment

The material used in this research is 200 DOC (Day Old Chicks) The feed ingredients used are yellow corn, rice bran, soybean meal, fish meal, oil, lysine, methionine, premix, and leaf meal of *Polyalthia longifolia* .

The equipment used in this research is 20 cage units, incandescent lamps, plastic, feed containers, drinking water containers, digital scales, knives, boiling tools and hair removal tools.

Methods

Prior to conducting the research, firstly sanitation was carried out in the cage using a disinfectant to prevent disease in livestock, then 200 one-day old chickens were put in a cage where in each cage was filled with 10 broiler chickens. This research lasts for 5 weeks, before the chickens come mixed rations. Treatment rations that contain leaf flour *Polyalthia Longifolia* namely 0%, 1%, 2%, and 3%.

Cage Preparation

Cage to be used sanitized first use a disinfectant by spraying in the cage and around the cage and then left to dry. After drying, liming is done and left for one week to break the life cycle of disease germs before the DOC is entered. Places for feed and drinking water to be used are cleaned first to be free from germs, then followed by installing lights in each cage. After that, a few hours before the chickens come prepare drinking water and feed and turn on the lights that function as heaters. The cages were given a treatment code at random, then put the chickens into 20 units of cages with each cage containing 10 broiler chickens.

Diet Preparation

The diets used consisted of yellow corn, fish meal, bran, soybean meal, premix, oil, lysine, methionine and leaf meal of *Polyalthia longifolia*. The diets are prepared according to the nutritional requirements of broiler chickens.

Leaf flour *Polyalthia longifolia* obtained from plant leaves *Polyalthia longifolia* The results obtained are scattered in Jambi City without distinguishing the age of the plant and the type of young leaves or old leaves, separate the leaves from the tree branches. The leaves that have been obtained are then washed thoroughly and then dried in the air to dry and then made into flour to be added to the basal diet.

Making diets were done by mixing the ingredients in small quantities and with a finer texture first, then adding a large amount of ingredients little by little. Then the diets were mixed until homogeneous. The nutritional requirements of broiler chickens can be seen in Tables 1,2,3 and 4.

Table 1. Requirements for Nutrient Substances in Ration Chicken Broilers

Nutrients (%)	**Starter Phase (age 0- 3 weeks)**	**Finisher Phase (4-5 weeks)**
Crude protein	2 4	20
Crude Fat	4	4
Crude Fiber	4	4
Calcium	1.2	0.90
phosphorus	0.45	0.35
Lysine	1.10	1.00
Methionine	0.50	0.38
Metabolizable Energy (kcal/kg)	32 00	3000

Source: NRC (1994)

Table 2. Feed Nutrient Content of Ingredients for Basal Diet

No	Feed Ingredients	DM	EM	CP	CF	CF	Ca	P	Lisy	Meth
1	Yelow Corn	86, 74[a]	2934[a]	9.25[a]	1.77[a]	3.87[a]	0, 17[a]	2.00[a]	0,29[a]	0.18[a]
2	Soybean Meal	88.22[a]	3089[a]	43.25[a]	0, 56[a]	4.86[a]	0.3 5[a]	0, 99[a]	2.9[a]	0.6[a]
3	Rice Bran	8 8.59[a]	2 968[a]	7.49[a]	1.93[a]	28.09[a]	0,21[a]	0.96[a]	-	0,16[a]
4	Fish Meal	88.36[a]	2643[a]	49.68[a]	6.72[a]	9.25[a]	7.85[a]	2.46[a]	3.97[a]	1.3[a]
5	Mineral	-	-	-	-	-	32.5[b]	1 [b]	-	-
6	premix	-	-	-	-	-	5.34[c]	1.14[c]	-	-
7	Oil	-	8600	-	-	-	-	-	-	-
8	Liys	-	-	-	-	-	-	-	0.25	-
9	met	-	-	-	-	-	-	-	-	0.25

Source : a) Results of Lab analysis: Nutrition Science and Feed Technology, Faculty of Animal Husbandry, Bogor Agricultural University, 201 9 . b) Label composition content packaging Mineralmix . c) Label composition content packaging premix.

Table 3. Composition of ingredients for basal rations (%)

Ingredient	Starter Phase (%)	Finisher Phase (%)
Yellow Corn	46	44
Fish flour	12	7.5
Bran	14	22.5
Soybean meal	26.4	23
Mineral	0.1	0.5
premix	0.1	0.6
Oil	1	1
Lysine	0.2	0.5
Methionine	0.2	0.4
Amount	100	100

Table 4. Nutrient content of the basal diet.

Ingredients	Starter Phase (%)	Finisher Phase (%)
Dry Matters	86.19	85.02
Crude protein	22.68	19.42
Crude Fat	2.04	1.84
Crude Fiber	8.10	9.83
Ca	1.12	0.98
P	1.61	1.52
Lysn	1.37	1.09
meth	0.42	0.35
EM (kcal/kg)	2983.82	2953.46

Placement of Chicks in cages

The placement of broiler chickens and the provision of treatment rations were carried out randomly. Then randomization of treatment was carried out in the cage first with given a number along with the treatment code . Chickens are weighed to determine the body weight of the chicken and are numbered on the legs. Before being put into the cage, the body weight diversity test was carried out

first then the chickens are taken at random and placed in the cage. Each cage unit is filled with 10 broiler chickens. Maintenance starts from 1 day old chicken (DOC) up to 35 days old.

Data Collection

Data collection for body weight gain was carried out weighing body weight on the first day of DOC to determine initial body weight, then routine weighing is carried out every weekend. Weighing weight body conducted with method chicken be fasted more formerly for 8 o'clock before weighed. The feed consumption was calculated every week and then averaged.

Research Design and Data Analysis

The study used a completely randomized design (CRD) with 4 treatments and 5 replications. Each replication consisted of 10 chickens. The treatment given is;

T0 = 100% basal ration + 0% leaf meal Polyalthia longifolia

T1 = 100% basal ration + 1% leaf meal Polyalthia longifolia

T2 = 100% basal ration + 2% leaf meal Polyalthia longifolia

T3 = 100% Basal Ration + 3% leaf powder Polyalthia longifolia

Data were analyzed using analysis of variance according to the design used, namely Completely Randomized Design (CRD) (Steel, and Torrie, 1993).

RESULTS AND DISCUSSION

Feed Consumption

Based on the results of the study, the addition of leaf flour *Polyalthia longifolia* in the diet to Feed consumption can be seen in Table 5.

Table 5. Average feed consumption of broiler chicken given leaf flour *Polyalthia longifolia* (Mean ± SD)

Treatment	Feed Consumption (g/ chick / week)
T0	187.74 ± 33.08
T1	206.99 ± 26.90
T2	187.61 ± 30.17
T3	146.02 ± 44.23

The results of the analysis of variance showed that the addition of leaf flour *Polyalthia longfolia* in the ration had no significant effect (P>0.05) on the feed consumption of the diet. The average broiler feed consumption in the treatment was 187.74 (T0), 206.99 (T1), 187.61 (T2), 146.02 (T3). This is because almost the same energy and protein content contained in the treatment of diets. The energy contents of the diet were 2983.82 kcal/kg starter period and 2953.46 kcal/kg in the finisher period. This figure shows the energy content that is not much different between periods so it can be said that the increase Leaf flour addition level *Polyalthia longifolia* given give the same effect on the feed consumption.

The relationship between feed intake and dietary energy content in broiler chicks is an old theory, but modern broiler chicks need to be reviewed at different ages due to intense genetic selection for growth rate and increased appetite (polyphagia) and/or limited gut

capacity (Ataei *et al*., 2022). In fact, feed consumption is the most significant factor in raising broiler rate of growth (Abdollahi *et al*., 2018). and starvation (Applegate, 2012). According to the current study's findings on feed intake, dietary energy levels showed no significant effect (P > 0.05) on feed intake of broilers at 11 to 22 days (Abudabos *et al*., 2014) and 14 to 35 days (Chrystal *et al*., 2020). In contrast, Heger *et al*. (2014) shown that decreasing the density of ME in the diet enhanced feed consumption in all periods, including the growth period (11-24 d). In addition, contrary to the current study's findings, several authors found that dietary energy level influences broiler feed intake during the growth period (Mousavi *et al*., 2013)

Poultry consume diets to meet energy needs, if the energy available in the diet is high, the livestock will consume less of the diet. This is in accordance with the opinion Kamran *et al.* (2008) described the increase in feed consumption to the capacity of chicks to meet their caloric needs on low-energy feeds.

Also Suprijatna *et al*, (2005) which stated that the difference in feed consumption was thought to be the result of differences in nutrient content such as protein content and metabolic energy (EM) content in the diet. In this study, the diet energy used did not meet the needs of broiler chickens in accordance with the NRC (1994) which was 3200kcal/kg for the starter period and 3000kcal/kg for the finisher period. Feeds with low metabolic energy content cannot meet the basic needs of broiler chickens and their growth. The level of energy in the feed determines the amount of feed consumed and most of the feed consumed is used to meet the basic needs of life and growth. (Negoro *et al*. 2013) . The energy content of the ration will determine the amount of diet that will be consumed by broiler chickens. This is because chickens can regulate their energy consumption as needed (Classen, 2017).

The results in this study are lower than the research Razak *et al*. (2016) which stated that the consumption of broiler chicken rations given betel leaf flour was 250.31 (T0), 224.23 (T1), 218.80 (T2), 280.72 (T3), and 255.61 (T4). This difference is due to differences in environment, weather, and strain. When conducting research, a very dense smog is occurring, it is suspected that the smog is disturbing the health of livestock, causing decreased appetite, resulting in low consumption.

The decrease in P3 is thought to be because in P3 there are the most active compounds that can cause a decrease in ration consumption. On leaf flour *Polyalthia longif* oil contains active substances in the form of tannins 3.87 ppm, *Flavonoids* 59.1% *Alkaloids* 0.51% *Steroids* 1.19% and *Saponins* by 1.31% (Alagbe, 2017) . According to Astuti *et al*., (2016) Saponin content causes a bitter taste so that it will reduce palatability.

Weight Gain

Based on the results of the study, the addition of leaf flour *Polyalthia longifolia* in the ration on body weight gain can be seen in Table 6.

Table 6. Average body weight gain of broiler chickens given leaf flour *Polyalthia longifolia* (Mean ± SD)

Treatment	Weight Body Gain (g/ chick / week)
T0	81.87 ± 17.36
T1	114.18 ± 37.21
T2	118.59 ± 34.74
T3	76.59 ± 20.59

The results of the analysis of variance showed that the addition of leaf flour *Polyalthia longfolia* in the ration had no significant effect (P>0.05) on the increase in body weight of broiler chickens. In line with ration consumption which also had no significant effect, this was because the increase in body weight of broiler chickens depended on the amount of ration consumed to be converted into body weight. Fadli, (2015) which states that weight gain reflects the level of ability of broiler chickens to digest feed to be converted into body weight. There is no significant difference in body weight gain of broiler chickens, but the highest average body weight gain is found in P2 treatment of 118.59 grams/bird/week, while the lowest average was found in the P3 treatment of 76.59 grams/bird/week.

Table 6 shows a trend when the level of use of leaf flour *Polyalthia longfolia* 2% then the weekly body weight gain of chickens increased compared to T0 without flour leaf *Polyalthia longfolia* . Table 6 shows that the weekly body weight gain of broilers during the 5 weeks of the study was 118.59 grams/bird/week. This result is lower than that reported by Guler et al., (2006) who found the average daily body weight gain of broiler chickens after being reared for 6 weeks by consuming rations containing black cumin seeds (herbs containing antibiotics) was 71 grams/bird/day (2 or 3% black cumin seeds in the ration), 80 grams/bird/day (1% black cumin seeds in the ration) and 72 grams/bird/day (the ration without black cumin seeds). The difference in the results of this study, apart from being suspected to be due to differences in the active compounds contained in the herbs used, is also thought to be due to differences in strain, environment and quality of the rations given.

This researcher used rations with protein content of 22.68% (age 0 – 3 weeks) and 19.42% (aged 3 – 5 weeks). NRC (1994) suggested that the ration of broiler chickens aged 0-3 weeks contains 23% protein and aged 3-6 weeks contains 20% protein. Protein is needed by livestock for growth, tissue formation and replacing damaged or worn body tissues. Lack of protein provided in the ration will result in low protein that can be consumed, digested, absorbed and utilized by livestock so that growth will also be low (NRC, 1994).

Feed Conversion

Based on the results of the study, the addition of leaf flour *Polyalthia longifolia* in the ration to the feed conversion can be seen in Table 7.

Table 7. Average feed conversion of broiler chicken given leaf flour *Polyalthia longifolia* (Mean ± SD)

Treatment	Feed Conversion
T0	2.32±0.20
T1	1.94±0.56
T2	1.64±0.28
T3	1.92±0.29

The results of the analysis of variance showed that the addition of leaf flour *Polyalthia longfolia* in the ration had no significant effect (P>0.05) on the feed conversion. The feed conversion is related to feed consumption and body weight gain. The feed conversions in this study were 2.32 (T0), 1.94 (T1), 1.64 (T2), and 1.92 (T3). The feed conversion in this study was good in accordance with the opinion of Rosmiati, et al. (2017) which stated that feeding broiler chickens given gambir flour had a feed conversion value ranging from 1.58-1.86. Use of leaf flour *Polyalthia longfolia* as a feed additive can replace the function of antibiotics in increasing broiler productivity and feed efficiency.

Marwandana *et al*. (2016) states that anti-bacterial will be able to lyse toxins attached to the intestinal wall, so that the absorption of nutrients is better, as the mechanism of action of antibiotics as *growth promoter.* However, there was no significant change in feed conversion value between the various amounts of *Polyalthia longfolia* supplementation given for 5 weeks of broiler rearing. This shows that leaf flour *Polyalthia longfolia* provided does not work as expected. Palatability and process for processing leaf flour *Polyalthia longfolia* suspected to be the cause of the ineffectiveness of the active substance in the *Polyalthia longfolia* because in the manufacturing process carried out drying.

CONCLUSION

The addition of Polyalthia longifolia leaf flour to the diet up to 3% had no influence on ration consumption, body weight gain, or feed conversion.

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