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Evaluation of Kandis Acid Seed Flour (G*arcinia cowa*) as Feed Aditive on Broiler Performance

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Abstract**—***This study aims to implement kandis acid seed flour (Gracinia cowa) as a feed supplement to the performance of broiler production. The total of two hundred 200 DOC of Lohmann strains which were not differentiated by gender (Straight run or Unsex) and were maintained for 35 days. The variables observed were body weight gain, feed intake, feed conversion, production index and carcass weight. The design used in this study was a Completely Randomized Design consisting of five treatments with five replications, each replicate placed randomly into the entire experimental plot. The five types of treatments are: P0: Basal feed without Kandis Acid seed flour, P1: Basal feed plus 0.25% kandis acid seed powder, P2: Basal feed plus 0.5% kandis acid seed powder, P3: Basal feed plus 0 , 75% of kandis acid seed powder and P4: Basal feed plus 1% acid kandis seed powder. The data obtained in this study were analyzed using Variance Analysis (Analysis of Varience). If there are significant differences, proceed with the Duncan test. The results showed that there were no significant differences (P> 0.05) on feed intake, body weight gain, feed conversion, induction production and carcass weight. Based on the value of the variable variation information, when compared to the treatment of kandis acid seed control is still within the normal range and indicates a physiological process that is not experiencing interference, which means that the nutritional status is good. Conclusion shows that by giving kandis acid seed flour up to 1% does not cause a negative effect on broiler performance production*.

Keywords**—** *Gracinia cowa, Broiler, flavonoid, performance production*.

I. INTRODUCTION

Antibiotics are added to animal feed initially to treat or prevent infection and increase chicken growth and production, but due to the absence of policy in use that causes bacterial resistance in humans, antibiotic resistance causes disease in humans [1]. So that there is a ban on the use of antibiotics in the Minister of Agriculture Regulation of the Republic of Indonesia Permentan number 14 of 2017 that the use of drugs for livestock including antibiotics starts from January 1 2018. Based on data from [2] that in 2017 there was increased to the broiler production. The livestock industry is developing in accordance with the progress of global poultry so that it can compete with products from abroad.

One substitute for antibiotic is phytobiotic. Fitobiotics are compounds that derived from plants which are added to the feed to increase livestock productivity through improved feed, phytobiotics are translated from their origin and processing. Like herbs, essential oil spices or oleoresins [3].

Garcinia cowa Roxb. (Guttiferae, Cluciaceae), commonly known as forest mangosteen or kandis in West Sumatra and cha muang in Thailand [4]. Species Garcinia which specimens reached 64 species (Garcinia sp.) Kalimantan were the highest diversity (25 species) when compared to other islands in Indonesia [5]. Kandis acid is used for its fruit, sour fruit taste, while the skin tastes kelat acid and is used as kitchen spices, jams, and fresh fruit to be made pickles and used in dishes from western Sumatra such as rendang, pindang ikan and pindang Daging. fruit seeds have been used as treatment and supplementary feed for livestock. Similar plants, Garcinia Kola, have been used as additional feed to increase broiler growth [6]. Kandis Acid (Garcinia cowa) is a compound with very high antimicrobial activity [7], with secondary metabolites (phytochemicals) which will be safe and effective against certain bacteria so that for growth and protection of health [8], [9]. [10] in addition to his research also found that tamarind seeds can improve reproductive performance and pig production.

Meanwhile, the Kandis Acid seeds contain antinutrient substances which can inhibit the absorption of nutrients, namely tannins and saponins [11]. Based on observations in the field of kandis tamarind seeds have not received an easy and effective treatment as the utilization of Spice byproducts as a feed for animal feed. Through research, it is expected to be able to consider the use of kandis acid seeds as feed additives according to the needs and production of broilers.

II. MATERIALS AND METHODS

A. Research Material

In this study, broiler DOC was used as many as 200 Lohmann strains which were not distinguished by their sex (Straight run or Unsex) and maintained for 35 days. The cage used is a litter system enclosure totaling 20 plot;pan of 70 x 80 x 70 cm which is equipped with a feeder, drinker, an electric lamp with 25 watts of power, and pan with litter. On the side of the enclosure closed with newspapers during the starter period, intended to keep the heat in the cage.

Feeding and drinking water are given in ad libitum. The starter feed period is given starting from DOC until the age of 3 weeks (21 days), while the finisher period feed is given from the age of 3 weeks (22 days) to 5 weeks (35 days).

TABLE I. Nutrient content of basal diet.

Nutrient content (%)	Calculated value
Dry matter (%)	86
Ash (%)	4,72
Crude Protein (%)	20,36
Ether extract (%)	5,68
Crude fiber (%)	4,54

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B. Research Methods

This research method is a field experiment method with Completely Randomized Design (CRD). The treatment given was 5 treatments with 5 replications. Each replication consisted of 8 broilers used as a sample of 200 broiler.

Treatment given:

P0: Basal feed without kandis acid seed flour
P1: Basal feed plus 0.25% kandis acid seed flour
P2: Basal feed plus 0.5% kandis acid seed flour
P3: Basal feed plus 0.75% kandis acid seed flour
P4: Basal feed plus 1% kandis acid seed flour

C. Research Variable

The variable observed in this study was the appearance of broiler production which included:

1. The amount of feed given is reduced by the remaining feed or a number that shows the average amount of feed that can be consumed by a chicken according to the maintenance period

   Feed intake (g / tail) = leftover feed.

2. Body weight gain

   Difference in body weight at a certain end with the original life weight.

   PBH = BB weekends - BB beginning of the week

3. Feed conversion

   The division between the amount of feed consumed in a given week and the body weight gain achieved that week.

   $$\text{Feed conversion} = \frac{konsumsi\ pakan\ (g)}{PBH\ (9)}$$

4. Indeks production

   Chicken farm business productivity performance was assessed from the comparison of chicken's life power and average body weight when harvested with ration conversion and average harvest age.

   $$\text{Performance Index (IP)} = \frac{(100 - M) \times BB}{FCR \times (A/U)} \times 100$$

5. Carcass Weight

   Carcass weight = live weight - (hair, head, legs, viscera, blood and neck)

D. Data Analysis

Data obtained from this study were analyzed using Analysis of Variant (ANOVA) from Completely Randomized Design (CRD) with 5 treatments and 4 replications. If there are differences in influence between treatments then proceed with Duncan's Double Distance Test [12].

III. Results And Discussion

The average effect of the treatment of the use of kandis acid seed powder on feed on the appearance of broiler production is presented the next Table.

TABLE II. Effect of the use acid kandis seed powder (*garcinia cowa*) as feed aditive on performance of broiler.

Variable	Treatment				
	P0	**P1**	**P2**	**P3**	**P4**
Average feed intake (g)	3, 376.5 ± 65.4	3,408.2 ± 33.4	3,420.7 ± 78.0	3,275.2 ± 133.1	3,132.3 ± 223
Average body body weight gain (g)	2,127.46 ±100.63	2,046.34±14.88	2,137.76±75.95	2,105.80± 76.14	2,085.65± 00.36
Feed conversion ratio	1.592 ± 0.05	1.666 ± 0.01	1.583 ± 0.05	1.556 ± 0.08	1.513 ± 0.07
Index production	394.46 ± 44.2	342.15 ± 20.4	355.19± 57.6	370.64 ± 42.3	394.69 ± 11.9
Carcass weight	1,689.72 ± 50.2	1,668.20 ± 25.7	1,706.40 ± 61.1	1,634.25± 103.9	1,698.50 ± 80.9

A. Feed Intake

Based on the analysis of the variety of research data shows that the treatment effect on feed intake does not show a significant change in the administration of kandis seed powder in the lowest feed intake is 3,132.3 g (P4) and the highest is 3,420.7 g (P2) increasing concentration of powder Tamarind seeds given will reduce feed intake in broilers. Decrease in feed intake can be caused by concentrations of phytobiotic fertilization in feed. Feed intake is the amount of food consumed by animals if feeding is carried out in ad libitum within a certain period of time indicating palability at the level of animal consumption.

The lower protein-feed content will affect higher feed intake so that protein-energy requirements for growth can be achieved [13]. Tamaris acid powder has an energy content that can meet the needs for growth so as to increase the quality of feed. [14] states that feed which has a low metabolic energy content will increase the amount of feed consumed and vice versa, a feed which is high in metabolic energy content will cause a decrease in the amount of feed intake.

The use of kandis tamarind seed powder up to 1% use does not affect the decrease in feed intake and also there are no factors that can cause the presence of factors that can affect chickens to reduce feed intake. This gives an opportunity for kandis tamarind seed powder to be used as feed ingredients that can give results from the utilization of agricultural byproducts without reducing the effect on the level of consumption of chicken feed but can produce good body weight. The greater use of kandis acid seed powder will reduce feed intake but not significantly.

B. Body Weight Gain

The average results of the study on the effect of using kandis acid seed powder as an alternative antibiotic substitute for body body weight gain are presented in Table I. Things that affect the growth rate are feed intake, Based on the results of analysis of research that has been done that the average body weight gain does not produce different difference values real (P> 0.05). The results of body body weight gain that were not significantly different were suspected because they were influenced by the quality of feed and maintenance management that was good [15], [16]. So that the administration of antibiotics cannot provide significant results if chickens are maintained in clean maintenance conditions and high feed digestibility.

The active compound in the seeds of candis acid in the form of flavonoids in general will play a role in affecting the

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nervous system, digestive conditions, metabolism and immunity. Fitobiotics in the body will function due to sensory factors that affect feed intake because the smell and taste produced will stimulate the central nervous system and saliva and the secretion of digestive juices from the stomach, pancreatic liver and small intestine until pH can be controlled according to the effectiveness of enzyme work digestive enzymes so that it affects the digestion of food substances. Increased digestive enzymes due to increased digestive fluid production will regulate microbial activity in the digestive tract [16]. Livestock needs for food ingredients must be adjusted to good feed composition. One very important role in preparing feed is the balance of protein and energy. If there are advantages and disadvantages of energy and protein intake in the body of livestock will affect the power of livestock production, if the energy consumed is higher then it will be used as an energy reserve in the form of body fat [17], [18].

C. Feed Conversion

The results of the variance analysis showed that the treatment had no significant effect in the treatment (P> 0.05). Feed conversion ratio (FCR) is a benchmark for assessing the efficiency of feed use. The smaller the FCR value, the higher the level of efficiency of feed use. The value of feed conversion produced is higher compared to the research conducted by [19] that the FCR results produced by broilers given by herbal plants are 1.2. While the FCR value generated by the addition of sesame seeds was examined by [20] which was as much as 2.64.

Feed Conversion Ratio (FCR) is a measure of how livestock changes feed intake to life weight and provides indicators of management performance, as well as profits on each cost of feed given. Feed conversion is influenced by genetics, feed quality, disease, temperature, cage sanitation, ventilation, treatment, and cage management. Lighting in the cage also has an influence on feed conversion, besides that it also affects the rate of travel of feed in the digestive tract, physical form of feed and nutrient composition of feed [21] Decrease in feed conversion is estimated by the presence of tannin in the candis acid seed powder which becomes antinutrient in broiler body. According to [22] the deposition of proteins can occur from the presence of a number of functional groups on tannins, besides forming complexes with food proteins, tannins also bind to mucosal proteins thus affecting the absorption of nutrients.

D. Production Index

Based on the average results generated from the calculation of the production index, it was found that there was no significant difference (P> 0.05) from the administration of kandis acid seed powder to broilers. It was found that this index increased in treatment P4, namely 394,693 while treatment P1 was the treatment with the lowest value of 342,153. According to [23] there are 4 factors that can influence that are related to the assessment of the appearance of production, namely the life span of the chicken, the time interval between the period of chicken life, the season and the density of stocking. The production index or maintenance success index is divided into 3 categories, with values ≤ 253 (less), 254-330 (moderate) and ≥ 331 (high). This shows that each treatment produces a high value of production efficiency, this is caused by appropriate management and feeding.

The IP factor is used as a reference because in addition to considering body weight and feed conversion, it also considers the percentage level of mortality and the length of maintenance [24] P2 treatment has a higher mortality compared to other treatments, but it can be improved through body weight.

E. Carcass Weight

The average effect of the treatment of using kandis tamarind powder on broiler carcass weight is presented in Table I. The results of the variance analysis showed that the treatment did not show that the treatment of the use of kandis tamarind seed powder showed no significant effect (P> 0.05). This result is proportional to the body weight gain of chickens in maintenance for 35 days. This study is in accordance with the research conducted by [25] that the flavonoids contained in alpha-alpha did not have a significant effect on chicken carcass weight but increased the average carcass weight value.

The increase in carcass weight from treatment P0 is likely influenced by the seeds of kandis acid through the flavanoid content increasing the efficiency of digestion and absorption of feed nutrients in the digestive tract for growth and development resulting in higher carcasses. Based on research conducted by Ouyang [25] that giving flavanoids can increase the carcass weight in broilers even though it does not have a significant effect. Increasing carcass weight may be caused by flavone can increase regulation of the combination of growth hormone and liver growth hormone receptors and then produce growth factors such as insulin from increased concentration, which encourages animal growth. In addition, isoflavones can increase protein synthesis in muscles and encourage growth [26].

IV. Conclusion

Based on the results of the research that has been carried out, it can be concluded that kandis acid seeds contain food substances that can be used in animal feed. Giving Acid Kandis Seed Powder up to 1 percent does not affect the appearance of broiler livestock production.

V. Suggestion

Through this research, it can be continued with the use of kandis acid seeds as feed ingredients, to reduce the anti-nutrient ingredients, we can treat feed processing

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