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Jurnal Peternakan Integratif

The Effect of *Lumbricus Rubellus as* a Substitution for *Antibiotic Growth Promotor* (AGP) on the Performance of Ayam Kampung Super : Infection by *Salmonella Sp*

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Abstract. Currently the demand for Ayam Kampung Super chickens is increasing, both meat and eggs. This is because it tastes delicious. This study aims to investigate the use of worm flour of *Lumbricus rubella* as an additive in feed in order to replace the use of Antibiotic growth promoter (AGP). The study parameters were consumption feed, body weight, and conversion feed of Ayam Kampung chicken. This study was conducted from January to April 2022. A random complete design (CRD) was used for study research design with 5 (five) treatments and 6 (six) replications, where every treatment had 5 (five) of chicken. Treatments includes P0 Control (No infection); P 1: Without Antibiotics + Infection ; P 2: Antibiotics Trimizyn -s + Infection ; P 3: 50 mg/kg Earthworms flour + Infection ; P 4: 100 mg/kg Earthworm flour + Infection. The results show that the average consumption ratio (g/head/week) P0, P1, P2, P3, and P4 was 322.18; 303.97; 310.57; 313.80, and 315.09 respectively, increments body weight (g/ head) was 821.92; 712.71; 777.08; 773.49 and 780.87 respectively. Conversion rations is 3.50; 3.52; 3.85; 3.57 and 3.74. It can be concluded that worm flour of *Lumbricus rubella* is capable replace *Antibiotic growth promoter* (AGP) in rations of Ayam Kampung Super.

Keyword: Antibiotic growth promoter, Convertion rations, Earthworms flour, Infection, Trimizyn-S

Received 16 March 2023 | Revised 29 June 2023 | Accepted 30 June 2023

1 Introduction

Ayam Kampung Super chicken is preferred because the chicken is much healthier to eat as it has lower cholesterol than broiler chicken. In addition, Ayam Kampung Super chicken has a tastier and more voluminous.

Chicken feed generally uses additional ingredients and additives like enzymes, vitamins, antibiotics [1]. Additives in feed in order to support chicken growth is antibiotics growth

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promoters (AGP) because antibiotics can increase Immunogenic thus increase feed efficiency. In addition it cause broiler chicken to grow 100 grams at 6 weeks of age [2].

Antibiotics can increase the performance of villi intestines so that absorption of food in the intestines increase. From review apparently, AGP can maximize absorption of nutrients in digestion channel cause quick growth and efficiency consumption of feed. The problem is that AGP are semi- synthetic products and its use on a long time will raise effect resistance to bacteria pathogen target. Residue of antibiotics raise impact on the health of humans who consume it [3]. Therefore, it is necessary to find a safe alternative chicken growth promoter.

Lumbricus rubella is a worm with a specific nutrition content especially protein. According to [3], nutrition in worms meal is protein 64-76%, fat 7- 10%, calcium 0.55%, phosphorus 1%, and fiber crude 1.08%.

Worms is very potentially become material feed due to its high protein content. Cultivation of worm is relatively easy, efficient, and inexpensive. Worm flour could be used for poultry. Several previous studies revealed that worm flour in feed increase poultry growth and the quality as well as quantity of carcass.

This study try to investigate the influence by giving Lumbricus rubellus as replacement Antibiotic Growth Promoter (AGP) on performance of Ayam Kampung Super which infected by Salmonella Sp.

2 Materials and Methods Materials

The materials used in this study were 150 DOC, Salmonella Sp. isolates and chicken feed and worm flour. The tools used in this study were colony cages equipped with feed and water containers per cage, digital scales, 25w incandescent lamps as heaters in the cage, and logbooks.

Methods

The sample that used are 150 Day Old Chcik (DOC) of Ayam Kampung Super, which be taken randomly. The experimental design used in this study was a completely randomized design with 5 treatments and 6 replicates of 5 DOC per replication. The treatment is as follows:

P0 : Negative Control (No Infection),
P1 : Positive Control (Without Antibiotics + Infection)
P2 : Positive Control (Trimizyn-s Antibiotics + Infection), P3 : Positive Control (50 mg/Kg Feed + Infection),
P4 : Positive Control (100 mg/Kg Feed + Infection).

Observed variables

1. Consumption of Feed

Consumption rations are the amount of feed consumed by livestock used For sufficient life principal and the production of animals.

Consumption Feed = Giving feed (g) – Waste Feed (g)

Maintenance Period (Week)

2. Average Weight Gain

Body weight gain and feed conversion can be calculated using the formula according to Anang (2007) as follows:

Body weight gain = weight end (g) – initial weight (g)Feed Conversion Ratio

FCR = Feed Consumption Increase body weight

FCR = Cumulative amount of feed Chicken body weight

Data Retrieval

Retrieval of consumption data feed conducted every day by weighting remaining feed or wasted. Weighting of chicken body was done per week for 9 weeks. Retrieval of conversion data feed is done each week also until 9 weeks. Monitoring on cage temperature is also done every day by using a room thermometer.

Data analysis

Data were analyzed using *analysis of variance (ANOVA*) with the method Draft Random Complete (RAL). If there is a difference between treatments, then will further test is carried out with the Tukey test [4]. The mathematical model is as follows:

$$\mathbf{Yij = \mu + \tilde{O}i + \sum ij}$$

Description :

Yij = Results of observations obtained from unit Test from treatment to I and test to j

μ = Mean observation

Õi = effect from treatment i.e

∑ ij = Error test treatment i and repetition j

The data obtained were analyzed using SAS to determine the significance of the treatment. The data was also processed using the Least Significant Difference (LSD) test method to determine significant differences between treatments.

3 Result and Discussion

Consumption feed is amounts of feed eaten by chicken for sufficient need principal and production. Consumption feed can be counted with the method subtraction amount of the feed given with feed in left on feed container. Consumption of feed is an important thing because relate to fulfillment need of chicken.

Table 1. Average Consumption Feed Kampung Super Chicken (gr/chicken/week)

Treatment	Test						Total	Average
	1	2	3	4	5	6		
P0	333.03	306.20	329.46	328.54	324.23	311.59	1933.05	322.18[a]
P1	301.35	318.14	303.16	293.39	297.93	309.86	1823.83	303.97[c]
P2	316.53	307.84	312.23	310.83	311.14	304.88	1863.44	310.57[bc]
P3	313.97	307.76	314.65	309.69	317.73	319.00	1882.79	313.80[ab]
P4	309.05	317.55	313.91	315.04	314.89	320.08	1890.52	315.09[ab]
Total							9393.64	1565.61

Note: Different superscripts on the same feed consumption table show significant differences ($P<0.05$).

Based on Duncan's test results, that P0 is different significant ($P<0.05$) to P3 and P4. Consumption of uninfected chickens is better than treatment of infected chickens. How ever, by adding worm meal to chicken feed infected with Salmonella leads to better consumption than infected chickens treated with commercial antibiotics. Addition level of worm flour cause no different on consumption. This is because addition of worm flour cause a similar effect to additional antibiotics with low dose in feed. Following results research [5] that application of antibiotics in feed can lower consumption, and the addition of antibiotics in feed is no influential to consumption.

Worm flour has an anti-bacterial bioactive called lumbricine [6] that is capable of hindering the development of bacteria pathogens in wall intestines so that the population of bacteria pathogens is reduced. Reduction population bacteria pathogens will increase absorption of substance food. The rate of absorption of food is influential to consumption so which increases glucose blood [7]. Glucose- increased blood (hyperglycemia) will lower willingness to eat because will stimulate the center in the hypothalamus part ventro media hypothalamus (VMH). Enhancement blood glucose is also caused by the fat content of worm flour which is high (18.5%). Glycerol from fatty acids digestion changed become fructose and glucose as source blood sugar. Worms flour with the substance lumbricine could reduce the development of bacteria pathogens in the wall intestines, reduce bacteria pathogens will increase the absorption of substance food [6].

Average Weight Gain

Increase body weight (AWG) includes growth of bones, heart, brain, and all network body other (except adipose tissue) and muscles body. Increase Body weight can be measured with the method subtract.

Table 2. Average Increase Weight Super Kampung Chicken (gr/chicken/week)

Treatment	Test						Total	Average
	1	2	3	4	5	6		
P0	823	821	821.2	821.3	822.4	822.6	4931.50	821.92[a]
P1	713.16	712.56	712.92	712.44	712.16	713.04	4276.28	712.71[e]
P2	776.78	777.94	777.84	776.02	777.28	776.6	4662.46	777.08[c]
P3	774.46	773.12	775.68	769.88	771.4	776.4	4640.94	773.49[d]
P4	781.92	781.6	778.8	779.7	781.4	781.8	4685.23	780.87[b]
Total							23196.4	773.2

Note: Different superscripts on the same body weight gain table show significant differences ($P<0.05$).

Based on the data in the Table 2, treatments with worms flour as additive feed cause less increase on body weight ($P<0.05$) compare with control. Control without infection has better body weight than other treatments. However, treatment with 100 mg worm flour with infection has better body weight that treatment with antibitioc infected chicken. The average increase in body weight with the addition of worm 100 mg is of 780.87 gram/ chicken/ week compared to with 50 mg worm flour which was 773.49 grams/head/week.

Feed protein of all treatments is still in the range of protein requirements needed by Ayam Kampung Super i.e. 18–20%. The following opinion by [8] stated that internal protein restriction feed for Ayam Kampung Super is 18% at age (1 – 15 days) and 15% at age (15 – 60 days).

[6] reported addition of flour worm in the feed up to the 5% level give no influence on Ayam Kampung Super proteins feed absorbed in form amino acids. Amino acids play a role as composer network body and growth, especially at the time chicken aged one until three day because at the age the formation cells (hyperplasia) process takes place fast.

Feed Conversion Ratio (FCR)

Conversion feed is needed for evaluating efficiency feed use as well as feed quality. Conversion feed is a comparison between the amount of feed consumed with an increase in internal body weight period time certain. [9] stated that conversion feed (Feed Conversion Ratio) is a comparable amount of consumption feed with an increase in body weight achieved in a week it.

Table 3. Average Conversion Feed Ayam Kampung Super (gr/chicken/ week)

Treatment	Test						Total	Average
	1	2	3	4	5	6		
P0	3.48	3.93	3.44	3.43	3.45	3.30	21.03	3.50[a]
P1	3.71	3.37	3.64	3.53	3.61	3.26	21.11	3.52[a]
P2	4.79	3.43	3.45	3.43	4.63	3.40	23.13	3.85[a]
P3	2.74	3.45	3.59	3.43	4.36	3.83	21.40	3.57[a]
P4	3.43	4.84	3.48	3.05	3.04	4.62	22.46	3.74[a]
Total							109.1	18.2

Note: Different superscripts in the same feed conversion table show no significant difference (P>0.05).

Based on the data from the table 3 above is known that the influence of feed additive containing worm flour on conversion feed (FCR) was no different with other treatments (P>0.05). This happens because there is a difference in consumption and difference digestibility of feed, digestion of feed relates to the absorption of substance food through the wall intestine. Absorption of food influenced thick and thin mucosa intestine, increasingly absorbed food caused good growth of chicken. Absorption good food can streamline the use of rations so that lower conversion ration. Using low antibiotics in feed, can thin out mucosa intestine and improve the efficiency of feed. This describes that lumbricine content in flour worms has a capable role as an antibacterial [6]. Antibacterial low rate can be beneficial as a booster of deep growth promoters body livestock. Mechanism work of the antibiotic growth promoters (AGPs) among others is that antibiotics can help protect food from destruction bacteria, antibiotics help increase the absorption of nutrition because can make a barrier in the wall gut. Antibiotics also can lower the production of toxins from bacteria channel digestion and lowering incident infection channel digestion subclinical [10]. Antibiotics can increase the performance villi intestine and as a result efficiency of feed increases because of the height absorption of food in the gut. Following research by [10] whom applied antibiotics with different levels can lower conversion feed compared to chicken that does not give antibiotics.

4 Conclusions

Using worms flour of *Lumbricus rubella* as an additive up to a level of 100 mg/kg feed in Ayam Kampung Super feed can repair the performance of Ayam Kampung Super (consumption feed, increase body weight, and conversion feed (FCR). *Lumbricus rubella* flour content antibacterial so it potentially used as material additive for Antibiotic Growth Promoter (AGP) in the feed.

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