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Performance of Production Characteristics of Grower Phase KUB Chickens Fed with Feed Containing Fermented Cow Feces

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ABSTRACT

The purpose of this study was to investigate the effect of fermented cow feces [FCF] in ration on the growth characteristics of KUB native chicken during the grower phase. This study used 100 DOC KUB chickens. The feed given during the grower phase was commercial feed for native chicken 592 mixed with FCF. Feed and drinking water are provided ad libitum. The experimental design used was a Completely Randomized Design with 4 treatments and 5 replications each. Each replication consisted of 5 chicks. The treatments tested were: R0 = basal ration + 0% FCF as a control; R1 = 90% basal ration + 10% FCF; R2 = 80% basal ration + 20% FCF; R3 = 70% basal ration + 30% FCF. Variables measured were body weight, weight gain, feed consumption, and feed conversion. The result showed that the use of FCF in rations affects the performance of production traits of KUB chickens in the grower phase, i.e., tends to decrease the performance of production traits such as body weight and weight gain, increase feed consumption, and enlarge the feed conversion rate. The use of FCF up to a level of 10% can produce fairly good performance.

Keywords: production characteristics; grower phase; KUB chickens; fermented cow feces.

INTRODUCTION

Native chickens are a poultry genetic resource that still needs to be optimized, Aedah *et al.* [2016] stated that consumers have a high preference for free-range chicken considering that free-range chicken products have their own special taste, in addition to their high nutritional content. Apart from that, free-range chickens also have other advantages such as the ability to well adapt to environmental conditions [Mubarak *et al*., 2018]. One of the native chickens that can be developed is the KUB chicken.

KUB chicken is a cross between native chickens from Indonesia which is the result of the selection of female lines for six generations produced by the Agricultural Research and Development Agency, Ciawi Bogor [Udjianto, 2016]. Furthermore, it is stated that KUB chicken has advantages, namely containing 60% MX++ gene, a gene that marks resistance to bird flu which makes it more resistant to Avian Influenza [AI] attacks, relatively high egg production, namely daily egg production reaching 45-50% and at peak production which only occurs once during the production period reaching 65%.

One factor that needs to be taken seriously in this grower phase is feed. The feed given must be in quantity and quality that suits the chicken's needs. Urfa *et al*. [2017] stated that the composition of feed must be balanced between energy and protein levels because it has a close relationship with the growth rate and production costs of raising the chicken.

However, the cost of feed is quite high, so a way is needed to minimize the cost of feed through utilizing materials that are underutilized or by-products, after being utilized by humans, available in large quantities, easy to obtain, and have a low price.

The alternative feed that can be used is cow feces. Cow feces is one of the wastes that have very potential as an alternative feed ingredient because it has the nutritional content needed by poultry. However, its use is very limited due to low protein and high crude fiber. To increase its nutritional content, fermentation can be carried out because fermentation will increase its protein content and decrease its crude fiber content. Guntoro *et al.* [2015] stated that the use of fermented cow feces up to 15% in native chicken rations did not result in a concrete decrease in egg production and did not increase the Feed Conversion Ratio [FCR]. Telupere [2020] found that the addition of fermented cow feces in commercial rations of up to 30% did not have a negative impact on the growth and production of Sabu and Semau native chickens.

Sweken [2015] research on native chickens using a combination treatment of processed cow feces in rations with the provision of probiotics [Bio-L] for laying hens found that using cow feces up to a level of 20% could increase egg production by up to 3-4%. As a result, the price of the ration became 12-15% cheaper than using commercial rations. And reduce crude fiber [Kompyang, 2000].

Besien *et al*. [2022] stated that the addition of fermented cow feces flour in KUB chicken rations up to a level of 30% was able to produce a final body weight that was no different from the ration without the addition of fermented cow feces flour.

Based on the description above, a study has been conducted to determine the extent of the influence of providing cow feces in rations on the performance of production traits of KUB chickens in the grower phase and to determine the best level of providing fermented cow feces on the performance of production traits of KUB chickens in the grower phase.

MATERIALS AND METHODS

This study used 100 DOC KUB chickens. The feed given to KUB chickens was commercial feed for native chicken 592 during the stater period at the age of 0-4 weeks, at the age of 4-12 weeks the feed given was commercial feed 592 mixed with fermented cow feces as much as 0%, 10%, 20%, and 30%. Feed and drinking water are provided *ad libitum*.

TABLE 1: Feed ingredient and nutrient composition of trial rations.

Feed ingredient	ME(Kcal/kg)	Crude protein (%)	Crude fat (%)	Crude fiber (%)
Fresh cow feces	1549	7.23	2.80	33.82
Fermented cow feces	1863	10,93	1,48	16,86
Native chicken feed 592	3221	17,0	3,0	8,0

TABLE 2: Formula and nutritional content of trial rations.

Nutritional content	Treatments			
	R0	R1	R2	R3
Native chicken feed 592 [%]	100	90	80	70
Fermented cow feces [%]	0	10	20	30
Dry matter [%]	89.94	89.81	88.18	89.32
Ash [%]	8.82	9.55	10.61	10.74
Crude protein [%]	18.02	17.77	17.65	15.23
Crude fat [%]	4.14	4.05	2.84	2.44
Crude fiber [%]	2.06	3.61	6.20	7.53
ME [kcal/kg]	3809.83	3792.25	3587.13	3518.17

Source: Feed Chemistry Laboratory, Faculty of Animal Husbandry, Marine, and Fishery, University of Nusa Cendana.

This research was experimental research and the experimental design used was a Completely Randomized Design with 4 treatments and each treatment was repeated 5 times. Each replication consisted of 5 chicks. The treatments tested were: R0 = basal ration + 0% fermented cow feces [FCF] as a control; R1 = 90% basal ration + 10% FCF; R2 = 80% basal ration + 20% FCF; R3 = 15% basal ration + 30% FCF.

Procedure for making fermented cow feces:

- Provide fresh cow feces and Probiotics [Pro-L]
- Cow feces are aerated for 1 day to reduce the water content
- Put 10 kg of cow feces in a closed drum
- Mix the feces with 200 ml of probiotics and incubate for 7 days
- Remove cow feces and dry in the sun until completely dry then mash.
- Fermented cow feces are mixed with native chicken feed 592 and then made into pellets.

Observations on the performance of production traits of KUB chickens in the grower phase include body weight, weight gain, feed consumption, and feed conversion from 4-12 weeks of age. The data obtained were analyzed using analysis of variance [ANOVA]. If the results of the analysis of variance showed a significant effect, further analysis will be carried out using Duncan's Multiple Range Test. All data analysis was performed using the SPSS 21 software package.

RESULTS AND DISCUSSIONS

Effect of treatment on chicken body weight

The measurement of the chicken's body weight in this research was carried out after the starter period, i.e., from 4 to 12 weeks of age. The data on chicken's body weight in this research are presented in Table 3.

TABLE 3: Mean and standard deviation of body weight of research chickens [grams/head].

Treatments	Age [weeks]*]		
	4	8	12
R0	292.64 ± 34.77a	882.48 ± 132.35a	1394.56 ± 223.9a
R1	277.48 ± 26.90ab	795.08 ± 94.51b	1284.48 ± 158.78b
R2	266.48 ± 25.08b	626.84 ± 47.84c	1183.16 ± 102.20c
R3	259.88 ± 32.00b	626.60 ± 50.37c	1140.96 ± 97.56c
Mr.	0.00	0.00	0.00

*] Different superscripts in the same column indicate significant differences [P<0.05].

The average body weight of the research chickens at the beginning [DOC] did not show a significant difference, but after being treated, the body weight at the age of 4 weeks showed that livestock consuming rations containing fermented cow feces [FCF] appeared to be lower than those consuming rations without FCF. This finding indicates that the effect of FCF on the growth of KUB chickens is starting to appear, which means it tends to reduce the body weight of these chickens.

The results of statistical analysis showed that the treatment had a significant effect on the body weight of the research chickens during the growth period. The effect began to appear from 4 weeks to 12 weeks of age. At 4 weeks of age, there was a very significant difference [P <0.01] and this condition continued until 12 weeks of age. Treatments R2 and R3 were significantly different from treatment R0, while between the treatment pairs R0 and R1, there was no significant difference at 4 weeks of age. The effect of treatment on the body weight of the research chickens at 8 weeks of age was very significant [P<0.01], as well as for the body weight at 12 weeks of age. Treatment R0 was significantly higher than the other treatments, while treatment R1 was very significantly different from treatments R2 and R3. There was no significant difference between the treatment pairs R2 and R3.

This finding proves that KUB chickens are only able to tolerate feed containing FCF up to a level of 10%. Above this level, the resulting body weight will be lower than that of chickens consuming feed without FCF. However, the body weight produced in this study was higher than that of several previous KUB chicken researchers. Hasyim et al. [2020] found that the body weight of 4-week-old KUB chickens was 237.16 ± 51.03 grams, as well as Putri et al. [2020], Gunawan et al. [2020] and Erwan et al. [2023] found that the body weight of KUB chickens was lower than this study.

Tamonob [2022] who conducted a study using fermented cow feces also found that the body weight at 8 weeks of age ranged from 504.75 ± 52.69 grams to 526.38 ± 55.41 grams and for the body weight at 12 weeks of age, the range was between 833.69 ± 37.73 grams to 919.31 ± 72.51 grams and still lower than the results of this study. This difference is likely due to the type of chicken used and the type of feed given being different from this study. In addition, the body weight produced by KUB chickens in this study was quite high because the feed given was in the form of pellets so the amount of feed wasted was less.

Effect of treatment on body weight gain

Weight gain was calculated in the age periods of 4-8 weeks, 8-12 weeks, and 4-12 weeks. The average and standard deviation data of weight gain of the research chickens are presented in Table 4.

TABLE 4: Mean and standard deviation of weight gain of research chickens [grams/head].

Treatments	Age period [weeks]*]		
	4-8	8-12	4-12
R0	589.84 ± 117.60a	512.08 ± 136.63	1101.92 ± 216.93a
R1	517.60 ± 81.35b	489.40 ± 76.93	1007.00 ± 146.51b
R2	360.36 ± 52.95c	556.32 ± 102.06	916.68 ± 98.47bc
R3	366.72 ± 62.78c	514.36 ± 92.79	881.08 ± 98.36c
Mr.	0.00	0.16	0.00

*] Different superscripts in the same column indicate significant differences [P<0.05].

The average weight gain of the research chickens during the 4–8-week period showed that the R0 treatment was the highest, followed by R1, R2, and R3 which were the lowest, but in the 8-12 week age period, the R2 treatment was the highest, followed by R3, R0, and R1 which were the lowest.

This finding indicates that the chickens in the treatment group began to adjust to the feed given in line with the increasing age of the livestock. During the growth period [4-8 weeks], the R0 treatment remained the highest, followed by the R1, R2, and R3 treatments which were the lowest.

The results of statistical analysis showed that the treatment had a significant effect [P,0.05] on the increase in body weight of the research chickens for the age period of 4-8 weeks and the growth period of 4-12 weeks. While for the age period of 8-12 weeks, the treatment had no significant effect [P>0.05]. The results of Duncan's further test showed that in the age period of 4-8 weeks, the R0 treatment was significantly different from all treatments, and R1 was significantly different from R2 and R3, while the treatment pairs R2 and R3 were not significantly different. There was no significant difference in the age period of 8-12 weeks, but in the growth period [4-12 weeks], the R0 treatment was significantly [P<0.05] higher than the other treatments, the R1 treatment was significantly higher than R2 and R3 but not significantly different from the R2 treatment. The average weight gain during the growth period per head per day is presented in Table 5.

TABLE 5: Mean and standard deviation of body weight gain, feed consumption and conversion of research chickens [grams/head/day].

Parameter	Age periods	Treatments			
		R0	R1	R2	R3
Body weight gain	4-8	21.07±2.02a	18.49±0.39b	12.86±0.92c	13.10±1.07c
	8-12	6.29±2.33 PM	5.48±0.53 PM	19.87±1.99	18.37±1.14
	4-12	19.68±2.11a	17.98±0.42b	16.37±0.90bc	15.73±0.94c
Feed consumption	4-8	50.48±2.85a	52.43±0.45b	51.22±1.46c	48.66±1.38c
	8-12	101.75±1.49a	103.430.13b	103.33±0.08b	102.94±0.44b
	4-12	76.12±2.03b	77.93±0.25a	77.27±0.71ab	75.80±0.91b
Feed Conversion	4-8	2.41±0.27a	2.84±0.05b	4.00±0.34c	3.74±0.36c
	8-12	5.63±0.61ab	5.92±0.18a	5.24±0.49b	5.62±0.37ab
	4-12	3.90±0.39a	4.34±0.10b	4.73±0.23c	4.83±0.33c

In the age period 4-8 weeks, the R0 treatment had a higher weight gain, as well as for the entire growth period, namely 4-12 weeks, and the lowest R3 treatment. However, for the 8–12-week age period, the R2 treatment had a better weight gain than the other treatments and the R3 treatment reached 18.37 grams/head/day. The situation that can explain this finding is that in that age period [8-12 weeks], chickens that consumed rations containing FCF as much as 20% and 30% began to catch up on their growth or can be said to compensate for growth. So, it can be concluded that for KUB chickens, rations containing FCF should be given starting at 8 weeks of age.

Gunawan et al. [2020] who studied KUB chickens found that the weight gain for the 4–8-week age period was 525.30 ± 66.20 grams/head and for the 8-12 week age period, it was 545.27 ± 100.54 grams/head, slightly lower than this study, especially for the R0 [4-8 weeks] and R2 [8-12 weeks] treatments. Sami and Fitriani [2019] conducted a study on KUB chickens given phytobiotics in drinking water and found a higher weight gain than this study, which was 0.56-0.84 kg/head/week. This difference is likely due to the livestock's response to the different feeds given.

Effect of treatment on feed consumption

The data in Table 5 shows that feed consumption in the age period 4-8 weeks and during the growth period [4-12 weeks], R1 treatment was the highest, followed by R2, and R0 treatments, and the lowest was noted in R3 treatment. The high feed consumption in the R1 treatment is likely due to the chickens being grouped unsexed whereas in the R1 treatment, the number of males is greater. In addition, the level of ration palatability also greatly affects the level of ration consumption. The fermentation results increase the nutritional value of the ration so that palatability also increases, especially in R1 and R2 treatments. R3 treatment consumes the least ration, possibly due to the low level of ration palatability where the protein content is low, and the crude fiber is high.

Feed consumption in the age period of 8-12 weeks all chickens fed with FCF showed a higher feed consumption than the treatment without FCF. This is related to the energy content of the ration, namely the higher the energy content of the ration, the less ration is consumed because according to Ensminger, *et al.* [1990], stated that the energy level in the feed will determine the amount of feed consumed, in addition to the energy factor in the feed, the tendency of crude fiber in the feed can also affect the level of consumption.

The results of the analysis of variance showed that the treatment had a significant effect [P<0.05] on feed consumption for all age periods. The results of Duncan's further test showed that treatment R1 was significantly different from all treatments for the age period 4–8 weeks, and in the age period 8–12 weeks, all chickens that received rations containing FCF had significantly higher feed consumption than chickens that consumed feed without FCF. During the growth period [age period 4-12 weeks], treatment R1 had the highest consumption but was not significantly different from treatment R2. Likewise, with the treatment pairs R0 and R3. The results obtained indicate that for the age period 8-12 weeks, the provision of FCF in the ration tends to increase feed consumption. The results of the study by Hidayat et al. [2011] found feed consumption ranging from 81-85 g/head/day lower than this study for the 8-12

Week of age period, but higher for the entire growth age period of 4-12 weeks.

Effect of treatment on feed conversion

Feed conversion is the ratio of feed per body weight gain, measured by the amount of feed required to produce one unit of body weight gain. The smaller the value, the more efficient [Hardy and Kausik, 2021]. The mean and standard deviation of the feed conversion of the research chickens are shown in Table 5. The conversion data in Table 5 show that chickens consuming rations containing FCF have a conversion rate that tends to be higher than chickens consuming rations without FCF. What can explain this condition is the nutritional value of both protein and energy in rations containing FCF is lower than in rations without FCF so that to meet their needs, chickens will consume more feed which results in an increase in the feed conversion rate.

The results of statistical analysis showed that the treatment had a significant effect [P<0.05] on the feed conversion rate. The results of Duncan's further test showed that in the age periods of 4-8 weeks and 4-12 weeks, the R0 treatment recorded the best conversion rate and was significantly different from all other treatments. For livestock-consuming rations containing FCF, the R1 treatment had a significantly better conversion rate than the R2 and R3 treatments. Thus, to increase 1 kg of body weight, livestock receiving R2 and R3 treatments required more feed than those receiving R1 and R0 treatments. The lower energy and protein content in the R2 and R3 treatments were contributing factors to the poor conversion rates in the R2 and R3 treatments.

The feed conversion rate indicates the level of feed use, this indicates a good value because the smaller the conversion rate, the more efficient, and vice versa if the conversion rate is large then the use of feed is inefficient [Rasyaf, 2008]. Allama, et al., [2012] stated that a low feed conversion rate indicates that the efficiency of feed use is good because it is more efficient. Thus, for the age period of 0-4 weeks and 4-12 weeks, feed containing 10% FCF [R1] can be given to KUB chickens because it produces a conversion rate that is not too bad.

In the age period of 8-12 weeks, the R2 treatment was significantly better than the R1 treatment but was not significantly different from the R0 and R3 treatments. This finding indicates that for this age period, chickens that consume rations containing 20% FCF can produce the best conversion rates because they require little ration to increase their body weight, so to reduce ration costs, in this period KUB chickens should be given rations containing 20% FCF.

Feed conversion during the growth period of KUB chickens in this study was lower than that found by Lisnahan et al. [2017], which ranged from 3.60-3.86, and by Zurriyaty et al. [2023], which ranged from 3.1-3.5. But much better than that found by Susan et al. [2023] who studied local chickens fed additional termites found feed conversion ranging from 9.23-10.70. This difference is likely due to differences in the livestock used and the environment exposed to the chickens.

CONCLUSION

Based on the results and discussion, it can be concluded that the use of fermented cow feces in rations affects the performance of production traits of KUB chickens in the grower phase, i.e., the higher level of fermented cow feces in the ration tends to decrease the performance of production traits such as body weight, body weight gain, increase ration consumption and increase the ration conversion rate. The use of fermented cow feces up to a level of 10% can produce fairly good performance of production traits although it does not exceed the performance of chickens that consume rations without fermented cow feces.

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