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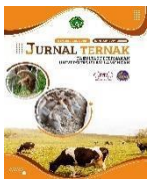

The Use of Restaurant Organic Waste Flour as a Substitute for Concentrate in Joper's Chicken Feed

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ABSTRACT

The purpose of the study was to analyze body weight gain and the efficiency of feed use in the maintenance of Joper chicken using restaurant organic waste (ROW) as a substitute for concentrated feed. The research material was 75 male Joper free-range chickens aged 1.5 month with initial weight of 0.57 – 0.80 g/head with a coefficient of diversity 9.25%. The feed ingredients were ground corn, rice bran, concentrate, commercial feed and dry milled ROW. The equipment for cages was for feeding, drinking, and weighing. The study was conducted for 30 days with experimental methods and a completely randomized design consisting of 5 treatment feeds, repeated 3 times, and each experimental unit filled with 5 heads. Substitution with concentrate in feed can improve performance and feed efficiency in Joper chickens. The results showed that the use of 60% ROW (T4) as a substitute for concentrate feed had a significant effect (P<0.05) on increasing feed conversion ratio and efficiency in Joper native chickens. On the other result, significant increase on (P<0.05) body weight gained because of feed containing 40% concentrate (T1), rather than the feeds with containing ROW materials. This means that the use of organic waste from restaurant 60% or 24% in feed as concentrate substitute optimally increased feed efficiency and body weight gain of Joper native chicken.

1. Introduction

Chicken farming is in demand by many farming communities, especially in rural areas on a small scale of 10-25 tails as a sideline that can be sold or harvested according to the needs of farmers. This chicken products, both meat and eggs, are very popular for public consumption. The eggs are believed to be a supplement to increase virility. It is suspected that there are living embryos in the fertile eggs. This type of free-range chicken is very diverse, but the relatively superior meat producers are Bangkok chicken breeds as males and the females use Kedu chickens. or Arab chickens whose egg production ability is quite high compared to females of other types of chickens. In recent years, superior free-range chicken cross products have been produced in terms of body weight gain (meat) using laying hens and superior male free-range chickens such as Bangkok chickens. The hybrid product is known as JOPER (Jowo Super) native chicken.

Concentrated feed differs from compete feed in many aspects, especially the nutritional content and the number of types of feed ingredients used. Poultry concentrate is a feed component that has a high CP content above 30%, crude fiber 4% – 5% and metabolic energy above 3200 Kcal/kg [1]. This concentrate feed can be composed of 4-5 protein source feed ingredients (CP > 30% in DM) such as

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soybean meal, fish meal, meat bond mill (MBM), blood meal and other protein source feed ingredients. The concentrate feed can be formulated using the ratio of basal poultry feed ingredients in the form of corn, bran, and tuber flour. The concentrates are comprised of certain nutritional standards depending on the type of poultry and the age of the chicken or the rearing phase. The standard CP content ranges from 20 - 23 % CF ranges from 4 – 5 % and EM content ranges from 2900 – 3100 Kcal/ Kg [2].

The success and development of poultry farming is influenced by genetic factors/breeding, feeding and management. All three are important as a unit and should not be separated like equilateral triangles that reinforce each other. Therefore, superior seeds must be fed with quality feed and maintained properly. It is said that the cost of feed occupies 60-70 % of the total cost of the livestock business. Utilization of restaurant organic waste is one way to reduce feed costs from the use of expensive concentrates as much as 30 - 40 % in feed. Research result [3] in the Batu, the tourism city, leads to the fact that the amount in 7 days of food waste is 190.3 kg for restaurants, 155 kg for hotels and 81 kg for food stalls. Restaurant food waste is mostly bones and chicken meat reaching 33.32%, hotel food waste is mostly rice reaching 29.4%, and food stall waste is mostly rice which is 44.7%. According to [4], the nutritional content of dry form of restaurant food waste contains CP 27.03%; Ether Extract 19.65%; CF 0.86% and BETN 48.33%. Hotel food waste in dry form contains of CP 24.58%; EE 20.55%; CF 1.41% and BETN 43.77%. food waste from food stalls containing 17.83 % CP; FI 14.42%; CF 2.26% and BETN 59.95% [4]. The average CP content in DM is 30%, which is comprised of protein source feed ingredient. Its value in dry form is close to the CP nutrition in poultry concentrate feed above 30%. Previous research found that restaurant waste can be used as an alternative feed for broiler chickens and fish. The result obtained is an increase in feed consumption and body weight gain [5]. The utilization of restaurant waste is still not widely used as alternative feed for Joper chicken. Addressing the gap, there is a need to conduct research on this issue as the production of restaurant waste is increasing in the environment. The research objectives are formulated as follows: 1) analyzing the effect of the use of restaurant organic waste (ROW) as a substitute for concentrate on feed consumption, body weight gain, feed efficiency and feed conversion of Joper free-range chickens, 2) determining the level of use of ROW, as a substitute for concentrate in feed that provides maximum performance response and feed efficiency in Joper chickens.

2. Method

Research Material

The study was conducted for 30 days using male Jowo Super (Joper) chickens aged 2 months as many as 75 individuals of the same age and breeder with the Diversity Coefficient (DC) initial body weight of 9.45%. In addition, commercial feed, milled corn and rice bran, concentrate and restaurant organic waste. The cages used were bamboo-based battery system divided into 15 experimental cages. Feeding, drinking places, and scaleing were facilitated to measure feed and body weight of chickens.

Research Method

This research was carried out in the Teaching Farm of the Faculty of Animal Husbandry, Unisma. The experimental method was conducted with a Completely Randomized Design (CRD) covering 5 treatment feeds, repeated 3 times and in each experimental unit filled with 5 chickens so that the total number of chickens was 75. The treatment feed was using restaurant organic waste flour as a substitute for concentrate feed and compared to commercial feed. The research feed is structured as follows:

T0 = Commercial feed without the use of milled ROW as control feed.
T1 = Use of 40% concentrate, 35% corn and 25% rice bran in feed
T2 = Use of 20% ROW as a substitute for concentrate in feed
T3 = Use of 40% ROW as a substitute for concentrate in feed
T4 = Use of 60% ROW as a substitute for concentrate in feed

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Research Implementation

The variables observed were feed consumption, body weight gain, feed conversion and feed efficiency in Joper chickens. The cages were cleaned and sanitized to avoid disturbances during the study. To obtain uniformity of research material for male Joper chickens, the selection of male Joper chickens was carried out at the same age (1.5 months) from the breeding farm and relatively the same body weight as DC (coefficient of diversity) body weight < 10% as many as 75 Joper chickens. Procurement of feed was made based on treatment, feed stocks preparation was according to the amount of feed needed per head / day of chickens during the study for each experimental unit which was estimated from 50 g x 5 birds x 30 days of data collection following the instructions [5]. Feed and drinking water were provided ad libitum in the morning and evening. Feed consumption during the study was carefully recorded. Sulfuric acid on the excreta was sprayed to bind ammonia and to avoid evaporation. Determination of the nutritional content of feed includes %DM, %CP, %CF and metabolic energy (Kcal/kg) Determination of feed consumption, BWG, feed conversion and feed efficiency. The results of the calculation of the nutritional content in the treatment feed are as listed in Table 1.

Table 1. Nutrient content in feed

Feed	Nutritional content			
	Dry Matter (%)	Crude protein (%)	Crude fiber (%)	Metabolic energy (Kcal/kg)
T0	87.65	14.68	4.10	2900
T1	86.58	17.45	4.08	3202
T2	86,20	17.29	4.13	3206
T3	85,80	17.13	4.18	3216
T4	84.45	16.97	4.22	3214

Note: The nutritional content of the feed is estimated based on the feed label, feed formulation and nutritional composition of each feed ingredient.

Data analysis

Variable data were calculated and analyzed for variance (Analysis of Variance) according to [6] instructions to determine the effect of treated feed on feed consumption, body weight gain, feed conversion, and feed efficiency in Joper native chickens. If the treatments showed a significant effect on the observed variables, then the Least Significant Difference Test (LSDT) was continued to determine the differences between treatments and at the same time to choose the most optimum treatment.

3. Results and Discussion

The results showed that the use of organic waste as a substitute for concentrate in feed had a significant effect on feed consumption, body weight gain (BWG), feed conversion and feed efficiency in Joper hybrid native chickens. The average feed intake, BWG, feed conversion and feed efficiency are presented in Table 2.

Table 2. Average feed consumption, BWG, feed conversion and feed efficiency

Treatments	Parameters			
	Feed Intake (g/head/day)	BWG (g/head)	Feed Conversion Ratio	Feed Efficiency (%)
T0	38.220c ± 0.209	8080a ± 0.426	4.743b ± 0.326	21,150a±1,205
T1	36.733c ± 0.349	8.873ab±0.034	4.140a ± 0.022	24.157ab±0.133
T2	35.123b ± 0.533	8.657b ± 0.058	4.063a ± 0.082	24,653b ±0.435
T3	34.283ab ± 0.546	8.610b ± 0.029	3.977a ± 0.049	25.113b ±0.436
T4	33,487a ± 0.683	8.490b ± 0.022	3.950a±0.078	25.367b ±0.509

Information: a, b, c Different letters following the mean value in the same column show significant differences ($p < 0.05$), T0 = control feed, T1, T2, T3 and T4 = treatment feed

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Feed Intake

Feed intake was calculated from the difference between the amount of feed and the amount of feed remaining during the study divided by 30 days and the number of chickens in each experimental unit in g/head/day. The treatment of using restaurant organic waste (ROW) in dry milled form as a substitute for concentrate can significantly reduce the consumption of Joper free-range chicken feed. This could be due to the energy content in the treated feed increasing along with the increasing use of ROW as a substitute for concentrate in the feed from 2900 Kcal/kg in commercial feed to 3202 to 3216 Kcal/kg in T1, T2 and T2 treated feed. According to [7, 8], poultry has a special characteristic that is consuming feed to obtain energy, where the amount of feed consumed depends on the amount of energy that enters. In addition, the quality of the T1, T2, T3 and T4 treatment feed was better than the control feed (T0). It could be seen from the different crude protein contents, that were 16.97% and 14.68%. The CF content was different in the T0 control feed by 4,10% while the treatment feed was 4.22% which could be tolerated by adult chickens. This is in accordance with Murdiati's statement (2002) that the energy level in the feed determines the amount of feed consumption inversely, if the energy content is high, the feed consumption is low.

The results of the LSDT (Table 2) on T4 treatment with the use of 60% ROW instead of concentrate showed the lowest amount of feed consumption compared to T2, T1 and to treatments but no different from T3. This is because T4 feed has the highest metabolic energy content and low crude fiber, so that the consumption of a smaller amount of feed is sufficient for the energy needs of chickens. Metabolic energy is needed for the growth and activity of livestock as high-energy feed causes a decrease in animal feed consumption. This is in accordance with [9] opinion that one of the factors that influence feed consumption is feed quality, the high and the low quality of the ration lies in the level of protein content in the feed, while the protein quality of feed is characterized by its essential amino acid content. The T0 treatment without ROW showed the highest amount of feed consumption compared to the T1, T2, T3 and T4 treatments. This is thought to be due to the T0 feed containing the lowest energy and relatively the same crude fiber content, which is still within the tolerable limits of poultry.

The decrease in feed consumption can be influenced by the palatability of the treated feed. The palatability of the ration is influenced by the shape, smell, taste and temperature of the given ration [10]. Furthermore, [11] stated that ration consumption was influenced by the form and physicality of the feed, and the chemical composition of the ration, the frequency of administration, and anti-nutrients in the feed. The crude fiber content of the treatment rations in Table 1 increases in line with the increase in the level of fermentation of cocoa pod flour, high crude fiber content will reduce consumption levels.

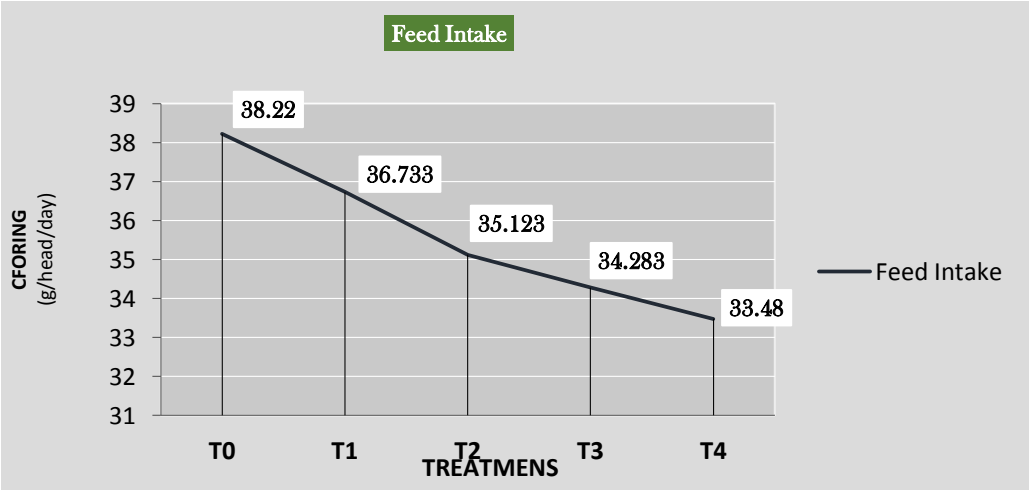

Figure 1. Feed Intake

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Body Weight Gain (BWG)

Body weight gain is the value of the increase in body weight of poultry during maintenance which can be determined from the difference in kilograms of final body weight with the initial body weight of the study expressed in a certain time daily, per week and per month. The results showed that the use of dry milled restaurant organic waste as a substitute for concentrate had a significant effect (P<0.05) on increasing the BWG of Joper free-range chicken. This was due to the nutritional content, especially crude protein in the treatment feed, which was higher than the control. The treatment feed ranged from 16.07 to 17.45 %, which was greater than the control feed (T0) by 14.10 %. This result is in accordance with [12] statement in general, the increase in body weight (BWG) of poultry is strongly influenced by the amount of feed consumption and nutritional content, especially protein content in feed. The increase in body weight gain, especially poultry, is influenced by feed consumption, especially crude protein consumption. The increase of CP content for treatment feed is simultaneous with the increase of CP consumption. This condition results in the BWG increase of Joper chicken, such as the main function of protein for cell growth and other production.

The results of the LSD test in Table 2 show that the highest BWG value in T1 feed using 40% concentrate in the feed was 8.873 g/head/day but statistically not different (*P<0.05) with feed replacement treatment concentrate with ROW as much as 20% up to 60% in feed. The average BWG of Joper chicken at the age of 3 months gram/head/day in the study ranged from 8.08 to 8.87 g/head/day. The results of this study are in line with [13], stated that the value of body weight gain of super free-range chickens given the level of addition of fermented cocoa skin flour in CF ranged from 6.80–8.67 g/head/day, while [14] resulted in BWG values in starter phase KUB chickens that received feed with added enzymes in the feed ranging from 7.16 to 7.82 g/head/day.

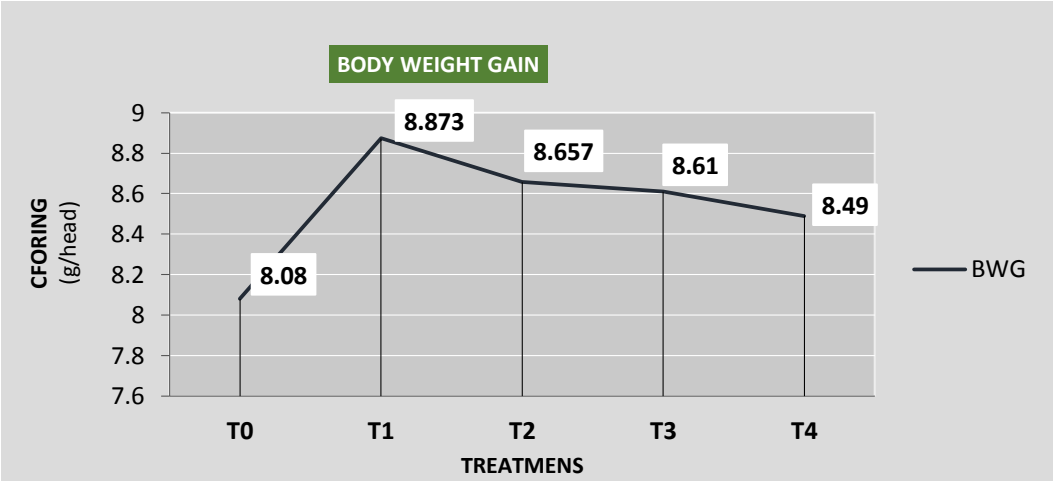

Figure 2. Body Weight Gain

Feed Conversion Ratio (FCR)

Feed conversion is a feed quality parameter that is calculated from the ratio between the amount of feed consumption and body weight gain in a certain time [15]. In addition, feed conversion is defined as a number of dry feed consumption (complete feed) to produce 1 kilogram of BWG production. The results showed that the increasing use of restaurant organic waste in dry milled form as a substitute for concentrate significantly (P<0.05) reduced the feed conversion of Joper's native chickens. This is presumably due to the increased energy content in the treated feed so that feed consumption decreases but results in increased body weight gain (BWG). So that feed conversion decreases due to the increase of feed quality. On the other words, a small amount of feed consumption resulted in the increase of BWG.

The results of the LSD Test (Table 2) showed that the mean conversion of different feeds between treatment feeds decreased with increasing use of ROW in feed ranging from 3.950 to 4.743. The lowest feed conversion value at T4 was 3.96, which was the same as for all treatment feeds at T1, T2, and T3. This means that 3.96 kilograms of dry feed must be consumed in order to create 1 kg of

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BWG. This shows that the increasing use of ROW as a substitute for concentrate, the value of feed conversion decreases. This implies that more effective feed is used,. Feed conversion, according to [16], is the quantity of feed used to produce each kilogram of body weight increase (BWG) in livestock.

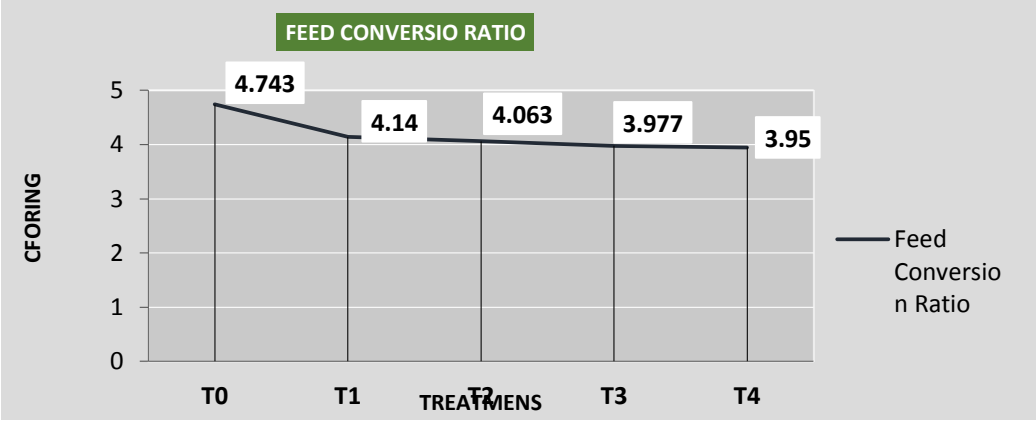

Figure 3. Feed Conversion Ratio

Feed Efficiency

The results showed that the use of ROW as a substitute for concentrate feed had a significant effect ($P<0.05$) on increasing feed efficiency in Joper native chickens. This means that the use of organic slaughterhouse waste as a substitute for concentrate can increase feed efficiency in producing body weight gain. [18] stated that several factors that affect the conversion value of livestock are genetics, feed quality, disease, temperature, cage sanitation, air ventilation, treatment, and cage management. A high feed efficiency value indicates good feed quality. Compared to the feed conversion value, in this context, smaller feed conversion value means the more efficient the feed produces production or BWG [19].

Table 2 shows the highest feed efficiency value was in the T4 treatment of 25.36%. Nevertheless the feed efficiency was quite the same with T1, T2 and T3. Totally different result was obtained from the control feed (T0). The value of feed efficiency and feed conversion are interrelated with the variables of feed consumption and body weight gain in the rearing of beef cattle, which shows what low feed conversion value actually means.

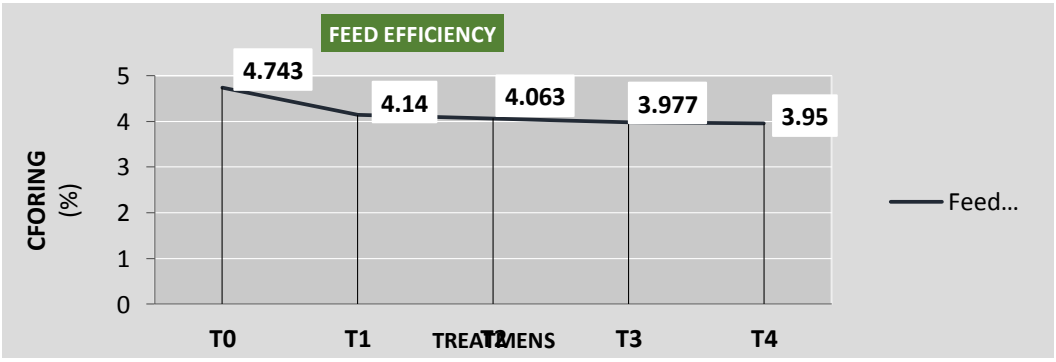

Figure 4. Feed Efficiency

4. Conclusions

The use of dry milled restaurant organic waste as a substitute for 20% to 60% concentrate feed increased body weight gain and feed efficiency in the maintenance of Joper native chickens. The use of organic waste from restaurant concentrate substitutes was 60%, or equal to the use of 24% in feed, optimally increase feed efficiency in the maintenance of Joper chicken.

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