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The Effect of Feeding with Different Percentages of Energy on the Growth Performance of Jowo Super Chicken

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ABSTRACT: This study aims to determine the different levels both metabolic energy and protein treatments on growth performance of Jowo Super (JOPER) chickens. A total of 192 one-day-old chicks Jowo Super chickens (unsexed) were used in twelve-week trials. Prior to statistical analysis using analysis of variances (Anova) where least significance differences subjected using Duncan Multiple Test. The different levels of treatments on growth performance was not significance differ ($p > 0.05$). In summary, the metabolizable energy was recommended at 2880 kcal/kg (starter periods) and 2,950 kcal/kg (finisher). Feed intake, body weight gain, feed conversion ratio, and mortality was best in the 1707.17; 744.25; 2.53; 699.75, respectively.

Keywords: Jowo super chickens; Feed intake; Body weight; Body weight gain; FCR; Mortality; Index performance.

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INTRODUCTION

The livestock sub-sector has a strategic role in Indonesia's economic life and human resource development. Data on chicken meat consumption based on the Central Statistics Agency (2021) shows that purebred or native chicken meat consumption was recorded at 0.538 kg/capita/month. The increase in people's welfare will be accompanied by an increase in the consumption of livestock products such as beef, chicken, milk, and other livestock products. Chickens are warm-blooded (endothermic) animals whose body temperature is regulated by appropriate limits.

Chickens can reproduce optimally if internal and external factors are within normal limits according to their needs. Efforts to increase the productivity of local chickens are not enough to improve the ration and maintenance management, but it is also necessary to improve in terms of genetic quality. Crossbreeding can be done to increase the productivity of local chickens.

Characteristics of local chickens and brooding instincts. Improving the genetic quality of local chickens is carried out with various kinds of research and various activities carried out by the community trying to meet the need for poultry meat and the development of poultry species. Local chickens have very high genetic diversity with various physical appearances such as color, size, sound, production, and reproductive ability.

Local chickens are raised under an extensive traditional system, where they are free to scavenge forage around. Almost all local chicken breeds are very low in production and reproduction. Growth is relatively slow compared to cross-breed chickens such as broilers and has low feed efficiency. Jowo super chicken is a cross between chicken and layer chicken. Free-range chicken is a group of native chickens that have been domesticated and traditionally reared by the general public. Free-range chicken has several advantages, such as having nutritional value and delicious taste and more disease resistance. Anggraini., et al (2019) stated that the superiority possessed by super native chickens is the ability to adapt well to environmental conditions.

To achieve maximum productivity, efforts to meet the nutritional needs of super-free-range chickens must be provided with good quality rations. Rahardja (2021) states that, in general, local chickens have very high genetic diversity and diverse physical appearances such as colour, size, sound, production, and reproductive ability. Super jowo chicken is a particular type of chicken with fast growth, but the quality of the meat produced is almost close to that of native chicken.

The 60-day maintenance period makes Jowo Super Chicken a superior breed with healthy chicken meat with a shorter maintenance period compared to the length of rearing of native chickens.

According to the description above, this study aims to determine the different levels both metabolic energy and protein treatments on growth performance of Jowo Super (JOPER) chickens.

MATERIALS AND METHODS

A total of 192 one-day-old chicks Jowo Super chickens (unsexed) were used in twelve-week trials. The Jowo Super used was produced by CV. Berline Farm. Each treatment was randomised completed block design for position (three treatments with ten chickens per replication pen). All chicken was housed in adjusted bamboo rooms in 1 x 1 m^2 rice-hull-littered pens.

Treatments were as follows: E1= Metabolic Energy 2700 kcal/kg for starter and 2800 kcal/kg for finisher; E2= Metabolic Energy 2880 kcal/kg for starter and 2950 kcal/kg for finisher; E3= Metabolic Energy 2990 kcal/kg for starter and 3100 kcal/kg for finisher. The formulated feed consisted rice bran, soybean meal, yellow corn, corn DDGS, fish meal,

copra meal, broiler concentrate, coconut oil, salt, premix, and DL-Methionine. All chicken was allowed ad libitum access to water through adjustable nipple drinkers.

Table.1 Feed formulation and nutrition content for starter periods

Ingredients	*Starter Periods* (%)		
	Treatment E1	Treatment E2	Treatment E3
Rice Bran	18.19	9.91	6.22
Soybean meal	18.26	16.19	16.28
Yellow maize	32.00	37.00	40
Dried Distiller Grain Soluble	5.00	10.00	10
Fish meal	10.00	10.00	10
Copra meal	5.00	5.00	5
Broiler Concentrate	10.00	10.00	10
Coconut oil	0.18	0.55	1.48
Salt	0.21	0.21	0.21
Premix	0.98	0.98	0.66
Nutrient content:			
CP (%)[1]	22.94	22.79	23.56
DM(%)[1]	88.6	86.8	88.33
WA (%)[1]	11.4	13.2	11.67
Fat (%)[1]	5.04	4.01	5.74
CP (%)[1]	6.87	8.82	7.46
Ca (%)[1]	1.71	1.77	1.38
P(%)1	0.96%	0.86	0.85
ME (kcal/kg) [1]	2,466	2,246	2,446

Table.2 Feed formulation and nutrition content finisher periods

Ingredients	*Finisher* Periods(%)		
	Treatment E1	Treatment E2	Treatment E3
Rice Bran	14,69	6,45	0,43
Soybean meal	10,31	10,46	10,57
Yellow maize	38	45	50
Dried Distiller Grain Soluble	10	10	10
Fish meal	10	10	10
Copra meal	5	5	5
Concentrate broiler	10	10	10
Coconut oil	0,44	1,56	2,89
Salt	0,1	0,1	0,11
Premix	1,46	1,44	1
Nutrient content:			
CP[2] (%)[2]	22,62	21,48	21,91
DM[2] (%)[2]	90,88	91,21	91,40
WA[2] (%)[2]	4,91	5,00	4,59
FAT[2] (%)[2]	6,03	6,43	7,04
CF[2] (%)[2]	6,55	5,11	4,81
ME (kcal/kg)[3]	2431	2651	2736

Source:

1) The results of proximate analysis of feed at the Laboratory of Animal Science and Fisheries Laboratory, Blitar.

2) The results of a comparative study of feed at the Laboratory of Nutrition and Animal Feed Science, Faculty of Animal Science, Universitas Brawijaya, Malang.
3) The results of proximate analysis of feed at the Central Laboratory of the University of Muhammadiyah Malang, Malang.

Research methods

Data analysis

Prior to statistical analysis using analysis of variances (Anova) where least significance differences subjected using Duncan Multiple Test. The different levels of treatments on growth performance was not significance differ ($p > 0.05$) (Kusriningrum, 2008). The mathematical model of this experiment is as follows:

$$Y_{ij}(k) = + i + j(_i) + k(_{ij})$$

Information:
Yij = value of observation on factor A level-i and factor B level-j
K = general mean
i = influence of factor A on i-level
j(i) = the influence of the j-th level factor B nested in the i-th level A factor
k(ij) = test error i = 1, 2 j = 1, 2, 3 k = 1, 2, 3, 4

Parameters observed

Parameters measured were feed conversion, feed intake, body weight, body weight gain, and Feed intake

Feed intake (g/bird) was obtained by calculating the difference between the remaining feed and the total amount of feed given from the starter periods of 1 day to 30 days and the finisher periods of 31 to 60 days.

$$\text{Feed intake} = \frac{\text{Feed given} - \text{Remaining feed}}{\text{Number of Chickens}}$$

(Amiruddin et al., 2020)

1. Body Weight
   Calculation of body weight was carried out by sampling five chickens and then the average was taken from the results of weighing the bodyweight which was carried out once a week. (Woro et al., 2019)
2. Body Weight Gain
   The increase in body weight (g/bird) was obtained by calculating the difference between weekly chicken body weights until the harvest period was 60 days old. (Woro et al., 2019)
3. Feed Conversion
   Feed conversion was calculated based on the amount of feed consumed (g/bird/week) with bodyweight gain (g/bird/week). The formula to calculate the conversion is

$$\text{Feed Conversion Ratio} = \frac{\text{Feed consumption}}{\text{Body weight gain}}$$

(Pakaya and Zainudin, 2019)

Table 3. The mean value and standard deviation of feed intake, body weight, body weight gain, feed conversion and index performance Joper Chicken.

Variable	Treatment		
	E1	E2	E3
Feed Intake (g/bird/week)	1978,07± 107.36[a]	1706,17± 81.73[ab]	1606,81± 79.11[a]
Body Weight(g/bird)	719.38± 27.27[a]	744,25± 86,52[a]	722,25± 77.46[ab]
FCR	2 .75± 0.17[a]	2,53± 0.24[ab]	2.56± 0.32[a]
Body Weight Gain (g/bird)	673,88± 27.91[a]	699,75± 86.06[a]	673,88± 27.91[ab]
Mortality (%)	4.69± 6.47[a]	1.56± 4.42[a]	3.13±3.13[ab]

Note: based on the results of statistical analysis of the effect of feed treatment, the results were not significantly different (P>0.05).

RESULT AND DISCUSSION

The various effects of feeding treatment with different energy percentages on feed intake, body weight, weight gain, feed conversion, and performance index of joper chickens can be seen in Table 3. The results of the analysis of variance showed that the treatment had not significantly different (P>0.05) on feed intake and feed conversion average body weight, body weight gain, mortality and performance index in joper chicken.

Feed intake

Based on the analysis of variance, the study showed no significant difference (P >0.05). Based on the results of analysis of variance, the highest feed intake was in treatment E1 of 1978.07 ± 107.36 grams/bird/day and the lowest consumption was shown in treatment E3 which was 1606.81 ± 79.11 grams/bird/day. Feed intake showed the difference between feed intake of treatment E1 and E2 was 271.9 g/bird/day, while the difference between E1 and E3 was 371.26 g/bird/day. Treatment E2 with E3 showed a 99.36 g/bird/day difference in feed intake. The highest feed intake was demonstrated by treatment E1 with a metabolic energy of 2700 kcal/kg for the starter and 2800 kcal/kg for the finisher, which led to 1978,07±107,36 g/bird. The difference in the amount of chicken consumption can be influenced by several factors such as age, weight, feed palatability, and nutritional content of the feed used during the study.

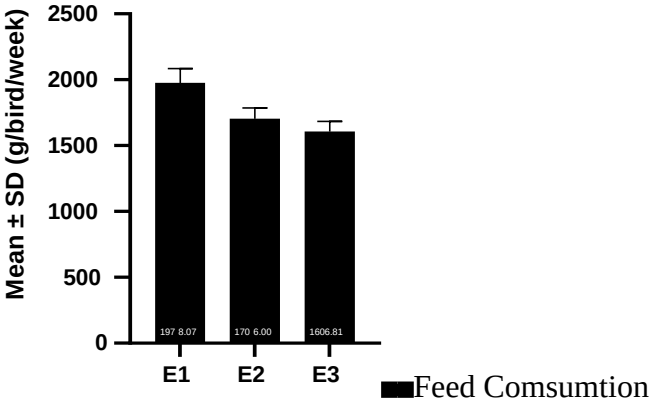

Figure 1. The mean of indicate no significant difference (P >0.05) from the effect of treatment on the feed intake of Jowo Super chicken

Factor influence feed intake was the energy and protein content in the feed; if the energy content of the feed given to livestock exceeds the energy needs of poultry, it can reduce feed intake. The form of feed provided also affects feed intake where the feed given to Joper chickens in the starter periods and the finisher periods in the form of flour during the maintenance period can affect feed intake during maintenance; the use of flour in the form of feed can increase the amount of feed that is scattered in the

litter and influence the nature of choosing. Chickens because of the condition of feed that is less refined. NRC (1984) for broilers requires 23% protein at 0-3 weeks of age, 20% protein at 36 weeks of age, 18% protein at 6-8 weeks of age with 3200 kcal/kg metabolic energy. Free range chicken in the growth period requires 17% protein and 3200 kcal/kg ration metabolic energy (Nataamidjaja, 1998). This situation illustrates that the protein and energy requirements for native chickens tend to be lower than for broilers. Broilers require 23% protein at 0-3 weeks of age and 20% protein at 6-8 weeks of age with 3200 kcal/kg metabolic energy (NRC, 1984). Factors that affect feed intake are chicken body size, daily activity, environmental temperature, quantity, and quality of rations (NRC, 1994).

Body Weight

Based on the results of the analysis of variance shown in the table. The effect of feeding with different energy percentages on the average live weight of joper chickens showed no significantly different results (P>0.05).

Treatment E1 and treatment E2 showed a difference of 24.87 grams/bird. Treatment E2 showed a higher average body weight when compared to treatment E1, with an average value of 744.25 grams/bird. In comparison, treatment E1 and E3 showed an average difference of 2.87 grams/bird E3 showed a higher average when compared to E1 with a value of 722.25 g/bird. Treatment E2 with E3 showed a difference in body weight gain with 22 grams/bird.

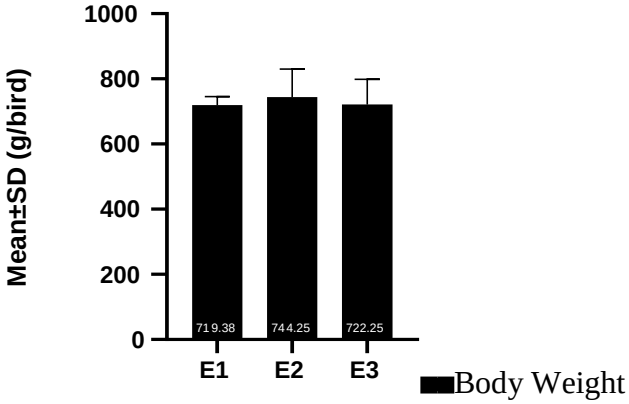

Figure 2. The mean of indicate no significant difference (P >0.05) from the effect of treatment on body weight of Jowo Super chicken.

Treatment E2 showed the highest average body weight compared to the other two t average treatments, namely E1 and E3. The highest average body weight was shown in treatment E2, which was 744.25 ± 86.52 grams/bird while the lowest average body weight was shown in treatment E1, 719.38 ± 27.27 grams/head. Average body weight is closely related to the consumption of feed consumed by Joper chickens during the maintenance period; the quantity and quality of feed nutrition significantly affect the efficiency of the feed given to produce several body weights of joper chickens. Growth is closely related to ration consumption, and change will increase along with ration consumption.

Body Weight Gain

The analysis of variance showed that feeding with different energy percentages had no significant effect (P>0.05) on the body weight gain of joper chickens. Treatment E1 with E2 showed a difference of 25.87 grams/bird, while E1 and E3 did not show a difference in body weight gain. The difference between treatment E2 and E3 showed a value of 25.87 grams/bird. Treatment E2 showed the highest value of body weight gain, which was 699.75 grams/bird, while the smallest value of body

weight gain was shown by treatments E1 and E2, with a value of 673.88 grams/bird.

Chicken growth depends on protein and amino acid content in the ration consumed by the chicken. Bodyweight gain will be influenced by the amount of feed consumed and the nutritional content contained in the feed. Increased consumption of crude protein and energy will provide a measurable increase in growth from higher body weight gain. The relationship between ration consumption and weight gain is determined by feed conversion, rations with a low energy protein balance will result in lower ration conversion (Mubarak et al., 2019).

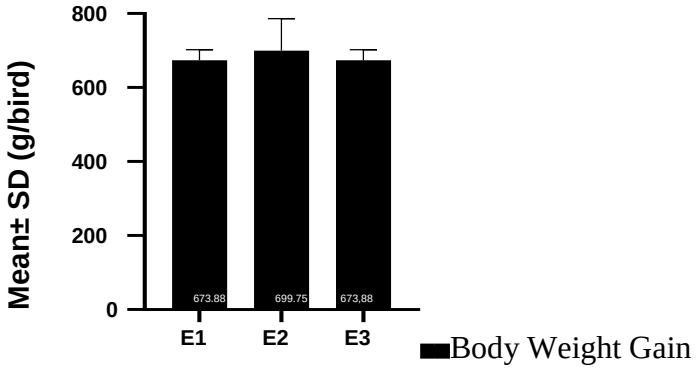

Figure 3. The mean of indicate no significant difference (P >0.05) from the effect of treatment on Body Weight Gain of Jowo Super chicken.

Feed Conversion Ratio

Based on the analysis of variance, it showed that feeding with a percentage of energy balance showed not significant different results (P>0.05) on the conversion value of joper chicken feed. Treatment E1 with E2 showed a difference in the mean of 0.22. Treatment E2 showed a lower average feed conversion value than treatment E1, with a value of 2.53. The average difference between E2 and E3 treatments showed a value of 0.03 with a lower feed conversion value of E3 compared to E1 with a value of 2.53. Treatment E2 with E3 showed a difference in the average feed conversion with a value of 0.03. Feed intake with increased body weight affects the feed conversion value of joper chickens; the lower the feed conversion value, the more efficient the use of feed to produce an increase in body weight of joper chickens during maintenance. The high-quality feed contains complete nutrition and balanced amino acids needed by poultry to support the growth of super jowo chickens. Feed intake is influenced by feed quality, where the balance of feed protein is mainly the amino acid lysine.

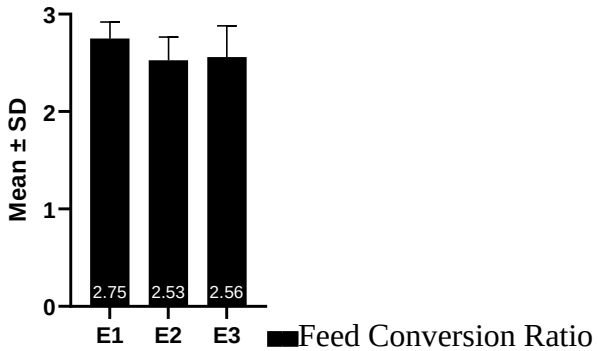

Figure 4. The mean of indicate no significant difference (P >0.05) from the effect of treatment on the feed Conversion Ratio of Jowo Super chicken.

When the feed contains more protein with a more balanced amino acid, it can increase feed intake and the efficiency of feed protein utilization (Ma'rifah et al., 2013).Feed conversion ratio can be influenced by the palatability of the feed given to livestock in addition to other factors that affect the consumption of percentages, namely the nutritional content, especially the energy and protein of the ration, the form of the ration, environmental factors, genetics, sex, and the condition of the livestock. (Anggraini et al., 2019). Factors that affect feed conversion are feed quality, age, and strain of chickens. Factors that affect feed efficiency include growth rate, the metabolic energy content of the feed, body weight, adequacy of nutrients in feed, environmental temperature, and animal health. A low feed conversion rate indicates a good efficiency level in feed use. If the feed conversion rate is more significant, feed use is not good. Factors that affect feed conversion are genetics, temperature, ventilation, sanitation, feed quality, type of ration, use of additives, water quality, disease, and maintenance management (Adil et al., 2010). conversion value starter periods chicken rations given sago dregs that have been fermented ranged from 2.4 to 2.75 (Rianza et al., 2019).

Mortality

The analysis showed that feeding treatment with different energy percentages had no significant effect (P>0.05) on the mortality of joper chickens. The variance difference in the average mortality percentage of joper chickens treated with E1 and E2 was 3.13%. The treatment of E1 and E3 showed an average difference of 1.56%. The treatment of E2 with E3 shows a difference of 1.57%. The lowest mortality was indicated by treatment E2, with an average of 1.56%.

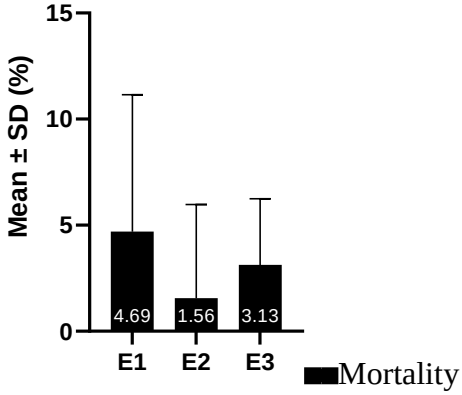

Figure 4. The mean of indicate no significant difference (P >0.05) from the effect of treatment on Mortality of Jowo Super chicken.

Mortality can be influenced by several factors, such as factors that can affect mortality, including body weight, nation, type of chicken, climate, cleanliness, environment, sanitation, equipment, cages, and environmental temperature. Death usually occurs in the initial period (starter); it rarely occurs except for respiratory attacks in the finisher period.

The mortality rate fluctuates in one recording period; management error or constant; if the number increases are likely to occur slightly and remain cons, death could be caused by bacteria or other diseases. (Amiruddin et al., 2020). The level of protein administration of the limit determined in the feed will cause a less efficient value of the feed.

CONCLUSIONS

Based on the results and discussions that have been described, the E2 treatment with a metabolic energy balance of 2880 kcal/kg for the starter and 2950 kcal/kg for the finisher showed good results based on feed intake, body weight, body weight gain, feed conversion, mortality showed sufficient numbers.

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