ENERGY AND PROTEIN REQUIREMENT BASED ON THE EFFICIENCY OF PROTEIN UTILIZATION OF SENTUL CHICKENS AND MANIFESTED IN THE PRODUCTION PERFORMANCE

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Abstract

Sentul is a specific local chicken from Ciamis region in West Java with grey feathers as its distinctive feature, with a variation of grey and brown yellows feathers and orderly arranged feathers in its breast like dragon scales. Sentul was recognized as dual purpose local chicken breed and very potential, because rapid growth and high eggs productivity. They have adapted to environments and remain productive even if their diets are low of quality, resistant on diseases, and the pattern of maintenance does need a special skill. In order to increase the productivity of Sentul chickens, the improvement of breeding pattern and nutrient on diets should be done sufficiently for production. The improvement of diets is done by ratio composition that meets the nutrient rules for production and efficiency. To compose an efficient diet, firstly the requirement standard of metabolizable energy and protein as suitable to the breeding purpose must be known. The experiment was divided into two phases, the first phase to determine the efficiency of dietary protein utilization value (EUP) by means of excreta collection and to define the standard requirement of energy and protein during the production periods by using Scott et al method (1982). This experiment, used 60 day old chicks of Sentul chickens and was carried out in three months. The second phase, was aimed to evaluate the level of energy and protein diets during layer periods. The standard requirement of energy and protein diets 150 kcal/kg of metabolizable energy and 2 % of protein under and over the standard requirement was evaluated. A completely randomized design with five replications was used in this experiment. The parameters used are feed, energy and protein consumption, egg production, egg weight and feed conversion. The experiment used 75 pullet of Sentul chicken and was carried out for five months. The results of the first phase showed EUP is 57.24 ± 6.84%. Energy and protein requirement for laying phase 2979.275 Kcal/kg and 15.44% of protein. Based on second, it can be concluded that three performance of Sentul chicken laying phase increase when diets improved as energy standard requirement and protein as the basic of efficiency dietary protein utilization.

Key words: Efficiency utilization protein (EUP), layer phase, Sentul chicken, production performance

INTRODUCTION

Sentul local chicken is a specific one which come from Ciamis region in West Java with grey feathers as its distinctive feature, with a variation of grey and brown yellows feathers and orderly arranged feathers in its breast like dragon scales. This kind of chicken is very potential because rapid growth and high productivity of eggs [13; 4]. The Sentul chicken is the good laying pullet, even though some of them raised as the laying pullet and broilers [2]. The fact in a field, the feed compose and the ration are still conventional and simple. The ration only consist of mixture from layer ration with rice and bran plus corn in a variety proportion, so that can result on egg production.

To increase the productivity of Sentul chicken in improvement of rearing pattern, so the nutrient diets should be done sufficiently for production [8; 3]. The improvement of diets is done by ratio composition that meets the nutrient rules for production and efficiency. To compose an efficient diet, firstly

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has to make the metabolizable energy and the protein for rearing purpose must be known. Energy is the control of feed consumption, meaning the ration energy will determine in feed intake. If the energy ration high then the consumption of ration is low, on the contrary if the energy ration is low so the consumption of ration is high. That is why the energy level of the ration will determine the level of nutrients composition such as protein substances. Therefore between energy and protein ration should be balance [8; 3]. The result showed that the feed intake is affected by ambient temperature. This is due to thermostatically mechanism that can control income and expenditure of energy into and out of the body, in order to maintain a stable body temperature. Therefore energy is used in different climates, and its efficiency will be different [9; 11; 1]. Chickens are kept in the tropics generally consume less feed than chickens kept in sub-tropical regions. However, low feed consumption was not significant due to the high content of energy ration. This is related to the volume of ration which first stimulates crop distension, so that feed consumption stopped despite energy intakes of protein and protein is still lack. These conditions result in the failure of the energy needs for growth and protein production, so energy must be raised followed by increased of protein levels, and that their needs can be met [9; 8; 1, 3].

The balance of protein - energy is influenced by the environment, and the amount of chicken needs [12; 8]. Ration with a high energy level must be followed by a high protein, minerals and vitamins in order that be balance. This is important, given the volume of feed consumed is relatively low, according to the achievement of energy requirement [6; 5]. To balance the use of chicken feed / energy varies ranged from 0.152 to 0.192, as seen from some of the research in Indonesia. Ration metabolizable energy levels for local laying hens ranged from 2,400 – 2,900 Kcal with protein in the ration of 13-17 percent [7; 13]. The balance of metabolizable energy and protein within ration determine the growth and production rates. Thus, the same benefit economically will be gained

MATERIAL AND METHOD

This experimental was arranged in to two experiment:

First Experiment

1. To determine the value of efficiency in utilization of dietary protein from Sentul chicken by means of excreta collection, by using [8] formula recommended as follows:

$$EUP = \frac{PIP - (PEP - PEK)}{EUP} \times 100\%$$

EUP = Efficiency utilization of dietary protein (%)
PIP = Protein Intake from treatment ration (g)
PIK = Protein intake from corrected ration (g)
PEP = The amount of excreta protein derive from basal ration (g)
PEK = The amount of excreta protein derive from corrected ration (g)

2. To determine the protein requirement per by day using The [8], formula recommended as follows :

The layer phase :

$$\frac{[(a! \times (bb)^{0,75} \times 6,25) + (PBB) \times PK) + (PBB \times b \times PB) + (PT + Bt]}{EUP}$$

Explanation :
a! = Endogenous Nitrogen excreta of the layer Sentul (mg/kg body weight)
BB = Body weight (kg)
PBB = Daily gain of body weight (g)
PK = Protein content of feathers (%)
EUP = Efficiency utilization of dietary protein (%)
b = Percentage of feather from body weight
Pb = Protein content of feathers (%)
PT = Percentage of protein in one egg (g)
Bt = Weight of an egg (g)

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3. To determine the metabolizable energy requirement for Sentul local chicken by using the [8]:

Layer phase :
Energy for their maintenance + activity energy + tissue production energy + and egg production energy.

a. Energy for maintenance : 83 x $W^{0.75}$: 0.82 Kcal
b. Energy for activity : on cage system 37% of the energy for maintenance, on litter system 50% of the energy for maintenance
c. Energy to produce tissue : (PBB) x 1.5 Kcal
d. Energy to lay eggs : The energy content of a large egg (60 g) is 86 Kcal in 100% production

4. To determine protein end energy in ration
Protein Requirement :

$$\frac{\text{Requirenment of the protein (g)}}{\text{Feed intake perday}} \text{x} 100\%$$

Energy Requirement :

$$\frac{\text{Requirenment of the energy (g)}}{\text{Feed intake perday}} \text{x} 100\%$$

Second Experiment (Feeding Trial)

This experiment was done as the basis of the results from experiment I. The diets were composed on the basis of energy-protein levels, under and over the standard requirement (energy differences 150 kcal/kg and 2 percentage protein). A Completely Randomized Design (CRD) was used in this experiment with 3 treatments, and each treatment is repeated five times. Then the data was analyzed by Random Simple Test [10]. The research used 75 pullet of Sentul chicken and the variable analysis were feed consumption, protein consumption, energy consumption, egg weight, egg production and feed conversion.

RESULTS AND DISCUSSIONS

The Result of Research First Experiment

The determination results of the efficiency protein utilization, determination of the energy and protein requirements on egg production phases of Sentul chicken are shown at Table 1.

The result by using the method of [8], the need for energy of Sentul chicken layer phase is 220.506 kcal / bird/day, with feed intake 80 g / day energy content of diets should be 2756.325 kcal / kg. According to [8; 3], energy needs can change depend on temperature of the environment change, energy requirement will increase or decrease 10% in winter and summer. For protein per day in a period of layers is 12.435 g / bird / day, with feed intake 80 g / head / day, it needs protein in chicken rations for Sentul layer phase is 15.44 percent. Sentul chicken is the light weight breeds, so required less energy for maintenance. According to [3], the light weight breeds also require less protein per day for maintenance and so chicken need a somewhat lower overall daily protein intake than do on white leghorns.

Table 1 Efficiency Protein Utilization Value, Energy and Protein Requirements for Sentul Chicken on Eggs Production Phases

Description	Eggs Production Phase
Efficiency Protein Utilization (EUP) %	57.24 ± 6.84
Energy Requirement/day on cage System (Kcal)	220.51
Energy Ration (Kcal/Kg)	2756.33
Protein requirement/day (g)	12.43
Protein Ration (%)	15.44

The Results of Second Experiment (Feeding Trial)

The results of the energy-protein levels influence on layer Sentul chicken performance are shown at Table 2.

The results of present study showed that a balanced energy-protein has significantly influence on the feed consumption, protein, energy, egg production, egg weight and feed conversion (Table 2). Increasing energy and protein on diets containing are significantly decreases the feed consumption, but are significantly increases protein and energy consumption.

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Table 2 The influence of Energy-Protein Levels on Performance of Layer Sentul Chicken

Variable	Ration		
	R1 (2600:13)	R2 (2750:15)	R3 (2900:17)
Feed Consumption (g/day)	85.99 (a)	81.36(b)	80.46 (b)
Protein Consumption (g/day)	11.58 (a)	12.18(b)	13.71 (b)
Energy Consumption (Kcal/day)	222.81(a)	223.38(a)	235.56 (b)
Egg Weight (g)	39.36 (a)	42.40 (b)	41.47 (b)
Egg Production Hen Day (%)	34.57 (a)	41.61 (b)	39.64 (b)
Feed Conversion	6.20 (a)	5.17 (b)	5.44 (b)

Note: Different superscripts indicate statistically significant difference (P<.05)

In R3 treatment with high protein and energy content, the energy needs for the chicken will be quickly achieved, but because the crop distension has not reached full condition, then the chickens will continue to consume the ration, so energy consumed is higher compared to treatments R2. This is because in laying hens tend to consume more energy when given rations containing high energy. The results agree with the [8] that the laying hens were able to consume energy as much as 10-15% energy requirement. Egg weight and egg production are significantly increases on diet containing high energy and protein. For the treatment of R2 and R3 there are no differences in weight egg, due laying hens able to tolerate ration with protein-energy balance wider, the excess of protein and energy consumption are not used to increase the egg weight but to increase egg production.

Increasing energy and protein on diets containing significantly decrease the feed conversion. This proves that in order to determine a good feed conversion is not only based on the high or low in protein and energy, but the balance between energy and protein ration. The best performance and highest efficiency of diet is achieved by the standard requirement of metabolizable energy and protein (2750 Kcal/kg :15 % CP). According to [3] a high quality protein will promote more weight gain per unit of protein consumed than with a low quality protein.

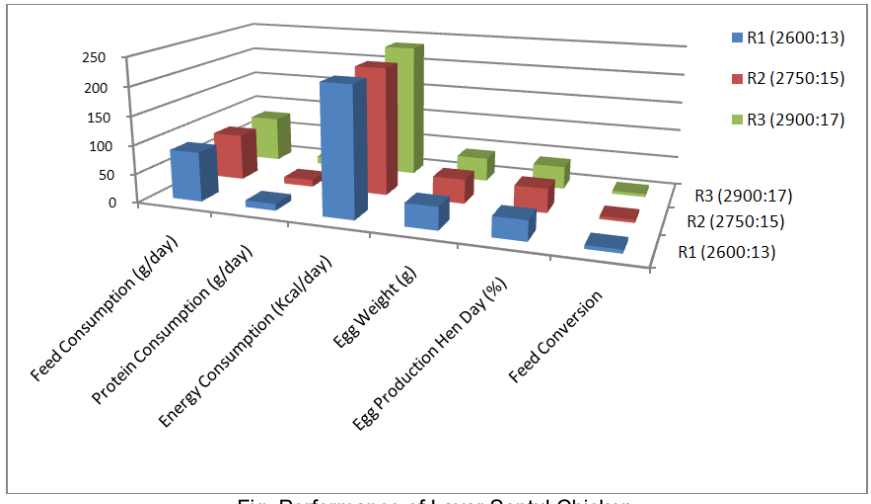

Fig. Performance of Layer Sentul Chicken

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CONCLUSIONS

1. A balanced treatment of energy/protein has significantly influences on the feed consumption, protein, and energy consumption, egg weight, egg production and feed conversion of Sentul layer chicken.

2. Ration R2 (2750 Kcal/kg: 15 % CP) is better in increasing egg weight, egg production and feed conversion of the Sentul layer chicken.

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