Short Communication

Evaluation of The Impact of Variations in Protein Levels in Rations on The Performance of Kamang Ducks

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Abstract | This study aimed to determine protein requirements in preparing appropriate feed for Kamang ducks during the starter period. This study used 200 male Kamang ducks, aged one week, with an average body weight of 60.62 ± 9.47 g per bird. A completely randomized design was employed with four dietary protein levels: R1 (19% crude protein), R2 (20% crude protein), R3 (21% crude protein), and R4 (22% crude protein). Each treatment had five replicates, with 10 birds per replicate. Parameters observed include total feed intake, final body weight, body weight gain, and feed conversion ratio (FCR). The results showed that different protein levels in the feed did not have a significant effect ($P > 0.05$) on total feed intake, final body weight, body weight gain, and FCR in Kamang ducks. In conclusion, a protein level of around 20% is a practical option for achieving efficient feed utilization without compromising growth.

Keywords | Body weight gain, Dietary protein, Feed intake, Feed conversion ratio, Local duck

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INTRODUCTION

Kamang duck is a local species from Nagari Kamang, Bukittinggi, West Sumatra. It has an important role in improving community nutrition and household income. Its maintenance does not require heavy requirements because it has adapted to the local environment (Triani *et al*., 2024). As a source of animal protein, Kamang ducks offer several advantages, including meat with a distinctive flavour. Kamang duck meat also demonstrates higher quality, with reduced cholesterol and fat content (Triani *et al*., 2025). However, the low productivity of Kamang ducks is due to the traditional rearing system, insufficient feeding, and feeding methods that do not follow the principles of nutrition science and do not consider the nutritional needs at various production levels. Evaluation of the impact of variations in protein levels in rations on the performance of Kamang ducks.

The preparation of duck rations in Indonesia follows recommendations from the National Research Council (1994), Leeson and Summers (2005), and Sinurat (2000). According to the National Research Council (1994), the metabolic energy requirement for White Pekin ducks

aged 0–2 weeks is 2900 Kcal/kg with 22% crude protein, while for ducks aged 2–7 weeks, the metabolic energy requirement is 3000 Kcal/kg and 16% crude protein. The metabolic energy requirement is 2900 Kcal/kg during the breeding period, and crude protein is 15%. Leeson and Summers (2005) stated that the nutritional needs of ducks can be divided into several phases, namely: starter phase, with metabolizable energy requirements of 2950 Kcal/kg and 22% crude protein grower/finisher phase, with metabolizable energy requirements of 3100 Kcal/kg and 18% crude protein breeder phase, with metabolizable energy requirements of 2850 Kcal/kg and 16% crude protein Furthermore, Sinurat (2000) reported the nutritional needs of laying ducks for various ages, namely starter type, with 3100 Kcal/kg energy and 17-20% crude protein, grower type, with 2700 Kcal/kg energy and 15-18% crude protein, and layer type, with 2700 Kcal/kg energy and 17-19% crude protein. Currently, no standard sets the energy and protein requirements for local ducks of West Sumatra, especially Kamang ducks raised in the tropics. Therefore, present research was conducted to determine the protein requirements for preparing appropriate rations for Kamang ducks.

MATERIALS AND METHODS

Ethical clearence

This research was approved from the Ethics Commission of the Faculty of Medicine, Universitas Andalas, Indonesia, with number 432/UN.16.2/KEP-FK/2024.

Animal, design, and diet

This study used 200 male Kamang ducks, aged one week, with an average body weight of 60.62 ± 9.47 g per bird. A completely randomized design was employed with four dietary protein levels: R1 (19% crude protein), R2 (20% crude protein), R3 (21% crude protein), and R4 (22% crude protein). Each treatment had five replicates, with 10 birds per replicate. The level of crude protein used in this study was determined based on research published by Sinurat (2000). The experimental cages measured 1.5 x 1.5 m and were equipped with both feed and water containers. The diet formulation consisted of corn, rice bran, soybean meal, fish meal, and a vitamin-mineral premix, providing 3000 Kcal/kg of metabolizable energy. Feed and water were provided *ad libitum* throughout the experiment. Table 1 presents the ingredients and composition of the experimental diets.

Variables observed

Measured variables include feed intake, body weight gain, and feed conversion ratio (FCR). All variables were recorded weekly for each experimental replication. Both feed and body weight were assessed using a digital weighing scale.

Table 1: Feed ingredient and nutrient content.

Ingredients	R1	R2	R3	R4
Corn	68.50	66.50	64.50	62.75
Rice bran	4.00	3.50	3.00	1.50
Fish meal	7.50	7.50	7.50	7.50
Soybean meal	19.50	22.00	24.50	27.75
Top Mix[1]	0.50	0.50	0.50	0.50
Total	100	100	100	100
ME (Kcal/Kg)	3027.25	3015.50	3003.75	3000.38
CP (%)	19.08	20.04	21.01	22.22
CF (%)	2.94	2.91	2.87	2.75
EE (%)	3.26	3.17	3.08	2.96
Ca (%)	0.46	0.47	0.47	0.48
Avail-P (%)	0.45	0.45	0.45	0.45
Meth (%)	0.43	0.44	0.45	0.47
Lys (%)	1.18	1.26	1.33	1.42
Tryp (%)	0.26	0.27	0.29	0.31

Note: R1 (19 % CP), R2 (20 % CP), R3 (21 % CP), dan R4 (22 % CP). [1]top mix provided (in mg/kg) = Vitamin A 12.000 IU; Vitamin D3 2.000.000 IU; Vitamin E 8.000 IU; Vitamin K_3 2.000 mg; Vitamin B_1 2000; Vitamin B_2 5.000 mg; Vitamin B_6 500 mg; Vitamin $B1_2$ 1.200 µg; Vitamin C 25.000 mg; Ca-D-Pathotenate 6.000 mg; Niacin 40.000; Cholin Chloride 10.000 mg; Lysine 30.000 mg; Methionine 30.000 mg; Manganese 120.000 mg; Iron 20.000 mg; Zinc 100.000 mg; Iodine 200 mg; Cobalt 200 mg; Copper 4.000 mg; Santoquin 10.000 mg; Growth promoter 1.300.000. CP = Crude Protein. CF = Crude Fiber. EE = Ether Extract. Ca = Calcium. Meth = Methionine. Lys = Lysine. Tryp = Tryptophan.

Data analysis

Data were analyzed by analysis of variance (ANOVA) using the Statistical Package for the Social Sciences (IBM SPSS Version 22). If there are significantly different ($P<0.05$) results, it is continued with Duncan's Multiple Range Test (DMRT). The values are expressed in standard deviation.

RESULT AND DISCUSSION

Feed intake

The effect of protein levels on total feed intake of Kamang ducks in each treatment during the study is shown in Table 2. The average total feed intake of Kamang ducks during the study ranged from 1170.51 g/bird to 1240 g/bird. The analysis of variance showed that different protein levels in the feed did not have a significant effect ($P > 0.05$) on total feed intake in Kamang ducks.

Relatively uniform feed intake across treatments reflects the energy homeostasis mechanism in poultry, in which feed intake is primarily regulated by energy requirements

rather than other nutrients (Leeson and Summers, 2005). Poultry can adjust feed intake to meet their metabolic energy requirements; therefore, moderate variations in protein content do not always result in significant differences in feed intake. This is consistent with Syafwan *et al.* (2022), who report that Arabian hens can adjust their energy and protein requirements by selecting feed with varying nutritional content. Although feeding methods affect feed intake and nutrient concentration, they do not significantly affect protein intake, energy intake, or egg production. meet their metabolisable energy requirements rather than protein levels.

Table 2: Effect of different crude protein levels in the diet on total feed intake of Kamang ducks.

Variables	Total feed intake (g/bird)
R1	1240.21±22.47
R2	1194.80±117.01
R3	1170.51±63.43
R4	1177.66±66.35

Note: R1 (19% crude protein), R2 (20% crude protein), R3 (21% crude protein), and R4 (22% crude protein).

Final body weight and body weight gain

The effect of protein levels on final body weight and body weight of Kamang ducks in each treatment during the study is shown in Table 3. The average final body weight of Kamang ducks during the study ranged from 357.92 g/duck to 380.69 g/duck, while the average body weight of Kamang ducks during the study ranged from 295.97 g/duck to 317.85 g/duck. The analysis of variance showed that different protein levels in the feed had no significant effect ($P > 0.05$) on the final and body weights of Kamang ducks. This value indicates growth performance in line with the growth standards for the starter phase of local duck breeds. Adequate protein intake supports the synthesis of muscle tissue and organs, while sufficient energy is needed to support metabolic processes during the growth phase (Ezeokeke and Iyayi, 2010).

Table 3: Effect of different crude protein levels in the diet on final body weight and body weight of Kamang ducks.
Note: R1 (19% crude protein), R2 (20% crude protein), R3 (21% crude protein), and R4 (22% crude protein).

Variables	Final body weight (g/bird)	Body weight (g/bird)
R1	357.92±25.89	295.97±25.89
R2	380.69±26.51	317.85±26.51
R3	373.26±32.95	310.75±32.95
R4	371.70±40.99	309.33±40.99

Feed conversion ratio (FCR)

The effect of protein levels on FCR in Kamang ducks during the study is shown in Table 4. The average total FCR of Kamang ducks during the study ranged from 3.78 to 4.21. The analysis of variance showed that different protein levels in the feed had no significant effect ($P > 0.05$) on FCR in Kamang ducks. Although not statistically significant, the 20% protein treatment had the lowest FCR, indicating better feed efficiency than the other protein levels. FCR is an important parameter for evaluating poultry production efficiency, with lower values indicating more efficient feed utilization for body growth (Rusli *et al.*, 2015; Muhammad *et al.*, 2025; Rusli *et al.*, 2023). A balanced energy-to-protein ratio will increase feed utilization efficiency by optimizing the body's protein synthesis without excess nitrogen accumulation, which is then excreted.

Table 4: Effect of different crude protein levels in the diet on feed conversion ratio of Kamang ducks.

Variables	Feed conversion ratio
R1	4.21±0.33
R2	3.78±0.47
R3	3.80±0.41
R4	3.87±0.69

Note: R1 (19% crude protein), R2 (20% crude protein), R3 (21% crude protein), and R4 (22% crude protein).

CONCLUSION

Different protein levels in feed did not significantly affect growth performance or FCR in Kamang ducks. A protein level of around 20% is sufficient to support optimal growth performance and efficient feed utilization under the conditions of this study without compromising growth. This study provides specific baseline data on protein requirements for Kamang ducks, a local genetic resource for which limited nutritional information is currently available. However, the interpretation of these findings should consider certain limitations, including the relatively narrow range of protein levels tested and the focus on a single growth phase.

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NOVELTY STATEMENT

This study provides the first scientific evidence regarding the response of Kamang ducks to different levels of protein in feed during the starter phase.

AUTHOR'S CONTRIBUTION

RKR: writing original draft, writing-reviewing and editing. HDW: writing original draft, data curation, writing-reviewing and editing. OK: writing original draft. AY: supervision, writing-reviewing and editing. H: supervision, writing-reviewing and editing. WDA: Validation, writing-reviewing and editing. YM: conceptualized, methodology, writing-reviewing and editing.

Generative AI and AI assisted technology statement

The authors declare that no generative AI and AI assisted technology was used in the creation of this manuscript.

Conflict of interest

The authors have declared no conflict of interest.

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