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(RESEARCH ARTICLE)

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Performance of superior native chickens Balitbangtan (KUB) given rations containing Nutrigold feed supplement

Kadek Agus Dwipayana [1], Ni Made Witariadi [2,*] and Desak Putu Mas Ari Candrawati [2]

[1] *Animal Husbandry Study Program, Faculty of Animal Husbandry, Udayana University, Badung, Bali, Indonesia.*
[2] *Faculty of Animal Husbandry, Udayana University, Badung, Bali, Indonesia.*

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Abstract

KUB chickens have the potential to meet the nutritional needs of the community as meat providers but are still constrained by low growth rates as meat producers in terms of quality and quantity. This study aims to determine the effect of providing Nutrigold Feed Supplement in commercial rations on the performance of KUB chickens. The study used a completely randomized design (CRD) with four treatments and five replications. The treatment of Nutrigold Feed Supplement in commercial rations was: P0 = 0% Nutrigold feed supplement, P1 = 1% Nutrigold feed supplement; P2 = 2% Nutrigold feed supplement; and P3 = 3% Nutrigold feed supplement. The variables observed were: initial body weight, ration consumption, drinking water consumption, final body weight, weight gain, and FCR. The results of the study showed that the provision of 1% Nutrigold feed supplement in commercial rations was not able to improve the performance of KUB chickens, but the provision of 3% Nutrigold feed supplement in commercial rations could increase the final body weight (1047.66 g/head), weight gain (982.13 g/head), and could reduce the FCR of KUB chickens by 2.51. It can be concluded that the provision of 3% Nutrigold feed supplement in commercial rations can increase the final body weight, weight gain, and reduce the FCR of KUB chickens.

Keywords: KUB chickens; FCR; Consumption; Nutrigold feed supplement; Performance

1. Introduction

Free-range chicken meat has the advantage of better nutritional content, low cholesterol content, making it the right choice to meet the nutritional needs of the community. The obstacle in cultivating free-range chickens is slow growth compared to broiler chickens. Cultivation of superior native chickens Balitbangtan (KUB) is a solution to meet the community's animal protein needs. KUB chickens are free-range chickens that have undergone selection, from six generations of free-range chickens in the West Java region and are an innovation of new local chicken varieties resulting from the invention of the Agricultural Research and Development Agency [16]. The advantages of KUB chickens are low ration consumption, low mortality, high egg hatching power, and faster growth [14]. KUB chickens are a business opportunity, order to provide eggs and meat to the community, but in cultivation they often encounter obstacles, especially in providing quality feed. Efforts to improve the performance of KUB chickens, by providing natural supplements in the form of *Nutrigold feed supplement*.

Nutrigold feed supplement is an alternative poultry feed, composed of maggot flour, spirulina and turmeric. Maggots are larvae *Black soldier fly* (*Hermetia illucens*) containing protein (40-50%) and essential amino acids, as a substitute for fish meal and soybean meal [20]. Protein sources from insects are more economical, environmentally friendly [6], do not compete with humans, so they can be used as feed ingredients for poultry and fish [11]. Maggots contain lauric acid, act as antimicrobials and chitin can increase the immune response and health of livestock [5]. *Black soldier fly* larval extract has inhibitory activity against *Escherichia coli*, *Salmonella sp*, and *Pseudomonas aureginosa* bacteria [1]. Spirulina

* Corresponding author: Ni Made Witariadi

is a filamentous cyanobacteria, can produce high-value bioactive compounds, so it can be used as an additional feeding to KUB chickens. Spirulina nutrient content such as protein, minerals, vitamin B12, carotenoids, and essential fatty acids [7]. Turmeric contains curcumin to increase the performance of the chicken's digestive organs, by stimulating the gallbladder wall to secrete pancreatic bile fluid. This fluid contains enzymes amylase, lipase and protease, to increase the digestibility of carbohydrates, fats, and proteins. The essential oil content in turmeric can also accelerate the emptying of the stomach contents [10].

The results of the study [19], replacing commercial rations with 5-15% maggot flour had no effect on ration consumption, and chicken ration conversion. Giving turmeric through rations can increase body weight gain, optimize feed conversion, and reduce fat in native chickens [17]. The use of spirulina in feed, during the livestock maintenance period can have a positive effect on livestock productivity [9].

2. Material and methods

2.1. Cages and Equipment

The cages used are colony cages, made of wood and bamboo as many as 20 units. The size of the cage is length x width x height (50 x 50 x 40 cm). Each cage unit is equipped with a place for rations and drinking water. At the bottom of the cage, a base is filled to make it easier to clean chicken droppings. At the top of the cage, a 5 watt light bulb is placed for lighting at night and to keep the cage temperature warm.

2.2. KUB Chicken

The study used 60 KUB chickens (1 week old), with a homogeneous initial body weight (65.20g ±0.34).

2.3. *Nutrigold Feed Supplement*, Rations, and Drinking Water

Nutrient content of *Nutrigold feed supplement* and commercial ration CP 511 B from PT. Charoen Pokphan Indonesia (Table 1), nutrient content of treatment rations (Table 2). Drinking water used comes from the Regional Drinking Water Company (PDAM).

Table 1 Nutrient Content of CP 511B Ration and *Nutrigold feed supplement*

Nutrient Content	Nutrigold [1)]	CP 511 B
Energy (GE)	6203 Kcal/kg	3961 Kcal/kg [3)]
Moisture content	3.7 %	14.0 % [2)]
Ash	4.9 %	8.0 % [2)]
Crude protein	54.3 %	20.0 % [2)]
Crude fiber	6.7 %	5.0 % [2)]
Crude fat	33.6 %	5.0 % [2)]

Description: Animal Nutrition and Feed Laboratory, Faculty of Animal Husbandry Udayana University [2]; PT. Charoen Pokphand; Animal Nutrition and Feed Laboratory, Faculty of Animal Husbandry Udayana University [3]

Table 2 Nutrient Content of Treatment Rations

Nutrient Content	Treatment[1)]				Standard SNI [8]
	P0	P1	P2	P3	
Energy (GE) Kcal/kg	3961.00	3983.42	4005.84	4028.26	-
Water content (%)	14.00	13.90	13.80	13.60	14.00
Protein (%)	20.00	20.34	20.68	21.02	19.00
Fat (%)	5.00	5.29	5.57	5.86	3.00
Fiber (%)	5.00	5.02	5.04	5.05	7.00
Ash (%)	8.00	7.97	7.94	7.91	8.00

Description: P0 = 0% Nutrigold feed suplement, P1= 1% Nutrigold feed suplement, P2=2% Nutrigold feed suplement, dan P3= 3% Nutrigold feed suplement

2.4. Experimental Design

The research design used a completely randomized design (CRD) consisting of 4 treatments, 5 replications, and each replication was filled with 3 KUB chicken. The treatment of *Nutrigold feed supplement* in commercial rations was as follows: P0 = 0% *Nutrigold feed supplement*; P1 = 1% *Nutrigold feed supplement*; P2 = 2% *Nutrigold feed supplement*; and P3 = 3% *Nutrigold feed supplement*.

2.5. Randomization of KUB Chickens

Randomization of KUB chickens, by weighing 100 chickens to obtain a homogeneous body weight (65.20g ±0.34). KUB chickens were randomly placed into cage units and have been coded according to treatment. Each cage unit was filled with 3 KUB chickens, so that were 60 KUB chickens used for the study.

2.6. Provision of Rations and Drinking Water

Rations and drinking water are provided *adlibitum*. Rations are provided according to treatment, the ration container is filled up to ¾, to prevent the rations from falling when the chickens are eating. The frequency of providing rations and drinking water in a day is 2 times, namely in the morning (08.00 WITA) and in the afternoon (16.00 WITA).

2.7. Maintenance

KUB chicks before entering the cage, a sanitation process is carried out on the cage and cage equipment. KUB chicks that have been in the cage are given a sugar water solution to increase energy, reduce stress, and maintain the body temperature of the KUB chicks. After 4 hours, the sugar water is replaced with water from the PDAM source. In the ration place, rations are entered according to the treatment.

2.8. Disease Prevention

Biosecurity by spraying formaldehyde throughout the cage. Formaldehyde spraying was carried out 1 week before the KUB chicks were put into the cage, and spraying was carried out once every 2 weeks during the study. Cleanliness of the cage, air circulation, and humidity of the research cage area were maintained.

2.9. Observed Variables

The variables observed in this study are:

- Initial body weight (g): obtained by weighing the chicken before receiving treatment.
- Final body weight (g): obtained from weighing chickens that have received treatment at the end of the study.
- Body weight gain (g): obtained by subtracting the final body weight during the study from the initial body weight of the study.
- Drinking water consumption (ml): obtained by calculating the amount of drinking water consumed minus the amount of drinking water remaining from the study.
- Feed consumption (g): obtained by calculating the amount of ration given minus the amount of remaining ration from thr study.
- *Feed Conversion Ratio* (FCR): the comparison between the amount of ration consumed and the increase in body weight during the study.

2.10. Data Analysis

The research data were analyzed using analysis of variance. If there is a significant difference between treatments ($P<0.05$), then proceed with Duncan's multiple range test [13].

3. Results and discussion

The results of the study on the provision of *Nutrigold feed supplement* given in commercial rations on the performance of KUB chickens can be seen in (Table 3).

Table 3 Effect of *Nutrigold feed supplement* in commercial rations on the performance of KUB chickens aged 1-8 weeks

Variable	Treatment [1)]				SEM[3)]
	P0	P1	P2	P3	
Initial body weight (g/head)	65.21[a2)]	65.37[a]	65.32[a]	65.53[a]	0.12
Feed consumption(g/head)	2464.60[a]	2469.79[a]	2465.00[a]	2466.59[a]	3.35
Drinking water comsumption (ml/head)	4436.28[a]	4445.64[a]	4437.00[a]	4439.88[a]	6.02
Final body weight (g/head)	876.13[b]	902.66[b]	1033.00[a]	1047.66[a]	17.17
Weight gain (g/head)	810.91[b]	837.29[b]	967.68[a]	982.13[a]	17.15
Feed convertion rasio (FCR)	3.04[a]	2.95[a]	2.55[b]	2.51[b]	0.05

Description: P0 = 0% Nutrigold feed suplement, P1= 1% Nutrigold feed suplement, P2=2% Nutrigold feed suplement, dan P3= 3% Nutrigold feed supplement; Values with different letters in the same row indicate significant differences (P<0.05); SEM: "Standard error of the treatment means"

KUB chickens given *Nutrigold feed supplement* in commercial rations did not affect ration consumption and drinking water consumption in all treatments. This is because this study used commercial ration CP 511B with nutrient content such as energy, crude protein, fat, crude fiber, and water content that were not much different, so that ration consumption and drinking water consumption were not different. This opinion is supported by [4] that rations with the same protein content did not have a significant effect on the level of ration consumption and drinking water consumption. In this study, drinking water consumption was 2 times higher than ration consumption.

Giving *Nutrigold feed supplement,* can increase the final weight and weight gain of KUB chickens. This is *Nutrigold feed supplement* contains essential amino acids, phytochemical compounds, minerals, vitamins, lauric acid, curcumin, and essential oils. The role of lauric acid in *Nutrigold feed supplement* is as a body defense system, antibacterial, and has properties that inhibit various types of pathogenic microorganisms. Maggot extract has inhibitory activity against pathogenic bacteria such as *Escherichia coli, Salmonella sp.,* and *Pseudomonas aureginosa* which are included in the Gram-negative bacteria group [1]. Turmeric and spirulina in *Nutrigold feed supplement* act as antioxidants to increase the absorption of ration nutrients in KUB chickens. Spirulina with high protein and vitamin content can be used as an antioxidant [21]. Curcumin and essential oils in *Nutrigold feed supplement* play a role in: (1) increasing the absorption of nutrients in the ration; (2) increase the working capacity of the digestive organs by stimulating the gallbladder wall to secrete pancreatic bile fluid containing amylase, lipase, and protease enzymes to help digest carbohydrates, fats, and proteins; and (3) accelerate the emptying of the stomach contents [10]. The results of this study showed that the administration of 3% *Nutrigold feed supplement* in commercial rations showed the most optimum results in weight gain of KUB chickens raised for 8 weeks of 982.13 g/head, and a final body weight of 1047.66 g/head. The results of this study are higher than the study conducted by [18] the final body weight KUB chickens (7 week old) given 5-15% maggot flour ranged from 582.80-788.30 g.

The *feed conversion ratio* (FCR) of KUB chickens given *Nutrigold feed supplement* in the ration ranged from 2.51-3.04. The FCR of KUB chickens with the provision of *Nutrigold feed supplement* in commercial rations can reduce the FCR value. This is because *Nutrigold feed supplement* contains antimicrobial peptides (AMP) phytochemical compounds (curcumin, essential oils, Phycocyanin, and β carotene) which have strong antioxidant and anti-inflammatory activities, so that they can affect the absorption of nutrients contained in the ration to be more efficient. This is supported by the statement of [15], that the provision of maggots can increase the efficiency of native chicken feed. The provision of 0.5% turmeric flour significantly reduced the FCR value [12]. Furthermore [21], explained that due to the high protein and vitamin content in spirulina, it can be used as an antioxidant and activate antioxidant enzymes in cells, inhibit lipid peroxidation and DNA damage, bind free radicals, and increase superoxide dismutase and catalase activity. In this study, the lowest FCR value was found in the 3% *Nutrigold feed supplement* treatment of 2.51. This FCR value shows that the efficiency of ration used to increase 1 kg of weight gain, KUB chickens require 2.51 kg of ration.

4. Conclusion

From the results of the study, it can be concluded that the provision of 1% *Nutrigold feed supplement* in commercial rations has not been able to improve the performance of KUB chickens, but the provision of 3% is able to increase the final body weight, weight gain, and reduce the FCR of KUB chickens.

Suggestions

It can be suggested to livestock farmers used 3% *Nutrigold feed supplement* in commercial rations to increase final body weight, weight gain, and reduce FCR of KUB chickens.

Compliance with ethical standards

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Disclosure of conflict of interest

All authors declare that there is no conflict of interest in this study.

Statement of ethical approval

The Animal Ethics Committee has approved 60 KUB chickens (one week old) used in this study from the Faculty of Veterinary Medicine, Udayana University, Badung, Bali, Indonesia.

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