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(RESEARCH ARTICLE)

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Effect of Nutri gold feed supplement in ration on carcass characteristics of Balitbangtan native chickens

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Abstract

Balitbangtan native chickens have the potential as a meat source however, their slow growth affects weight and carcass characteristics. This study aimed to determine the effect of administering Nutrigold Feed Supplement in commercial rations on the carcass characteristics of balitbangtan native chickens. The study was conducted for eight weeks using a completely randomized design (CRD) with four treatments and five replications, with each treatment unit consisting of five chickens. The treatments were as follows: T0 = 0% Nutrigold Feed Supplement (control), T1 = 1%, T2 = 2%, and T3 = 3% Nutrigold Feed Supplement in commercial feed. The results showed that the administration of 2–3% Nutrigold Feed Supplement significantly ($P<0.05$) increased slaughter weight compared to T0 and T1 treatments. The supplementation of 1–3% Nutrigold Feed Supplement in T1, T2, and T3 treatments significantly ($P<0.05$) increased carcass weight and reduced the percentage of subcutaneous fat, including skin, compared to T0. The administration of 3% Nutrigold Feed Supplement in T3 significantly ($P<0.05$) increased carcass percentage and meat percentage compared to T0, while the bone percentage did not differ significantly ($P>0.05$) among the four treatments. The study concluded that the inclusion of 2–3% Nutrigold Feed Supplement in commercial feed could increase slaughter weight, while 1–3% Nutrigold Feed Supplement improved carcass weight and reduced subcutaneous fat, including skin. The addition of 3% Nutrigold Feed Supplement in commercial feed increased the carcass and meat percentage compared to the control treatment in 8-week-old balitbangtan native chickens.

Keywords: Balitbangtan Native Chickens; Carcass; Meat; Nutrigold Feed Supplement; Feed

1. Introduction

Balitbangtan native chickens is an improved native chicken breed developed through selective breeding. It has several advantages, including better feed efficiency, higher disease resistance, lower mortality rates, and greater egg and meat production than regular native chickens.

According to [1], balitbangtan native chickens can reach an average body weight of approximately 830.55 g at 10 weeks of age, with a carcass protein content of around 17.50%. Balitbangtan native chickens have significant potential in the poultry industry, both as a meat and egg source. One crucial aspect to consider in their development is their carcass characteristics. However, several challenges remain in the breeding and production of balitbangtan native chickens, particularly regarding the availability of high-quality breeding stock, farm management practices, and feed supply and quality. Researchers [2, 3] have stated that feed is one of the key factors influencing livestock growth, accounting for nearly 60-70% of total production costs in poultry farming. Additionally, [4] emphasized the importance of alternative feed sources to reduce production costs while supplementing the nutritional deficiencies of conventional feeds.

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Nutrigold Feed Supplement is an alternative poultry feed containing a blend of maggot (Black Soldier Fly larvae *Hermetia illucens*), spirulina, and turmeric. This combination offers various benefits in improving feed quality. According to [5], maggots contain essential amino acids and are rich in protein, making them a viable substitute for fish meal and soybean meal in poultry feed. Researchers [6], highlighted that insect-based protein is more cost-effective, environmentally friendly, and highly efficient in feed conversion, making it suitable for mass production. In addition to maggots, Nutrigold Feed Supplement also contains spirulina, which is easily digestible as it is a high-protein source [7]. Studies [8, 9] have shown that spirulina contains pigments such as zeaxanthin, carotene, chlorophyll, and xanthophyll, which enhance meat and egg yolk coloration. Furthermore, [10] reported that turmeric contains curcuminoids that function as antioxidants, promote digestive health, and aid in tissue repair. Meanwhile, [11] stated that turmeric contains curcumin, which provides various health benefits. The high nutritional content of Nutrigold Feed Supplement is expected to improve the carcass characteristics of balitbangtan native chickens.

The aim of this study was to determine the effect of administering Nutrigold Feed Supplement in commercial rations at levels of 1%, 2%, and 3% on the carcass characteristics of balitbangtan native chickens, to obtain a more efficient and high-quality feed formulation.

2. Materials and Methods

2.1. Material

The research site was in Luwus Village, Baturiti District, Tabanan Regency, Bali, for eight weeks using a battery colony cage system equipped with feed and water containers. A total of 100 ten-day-old balitbangtan native chickens with homogeneous body weight were used in this study.

Nutrigold Feed Supplement was provided in crumble form, while the feed used was a commercial starter feed from PT. Charoen Pokphand Indonesia, Tbk, with the product code CP 511 B. The feed given in all four treatments was isoenergetic and isoproteic. Feed and drinking water were provided ad libitum throughout the study.

2.2. Methods

The method used was a completely randomized design (CRD). A total of 100 chickens were used in the study, consisting of four treatments multiplied by five replications, each replicating five balitbangtan native chickens. The treatments were as follows:

- T0: Commercial feed without Nutrigold Feed Supplement (control)
- T1: Commercial feed supplemented with 1% Nutrigold Feed Supplement
- T2: Commercial feed supplemented with 2% Nutrigold Feed Supplement
- T3: Commercial feed supplemented with 3% Nutrigold Feed Supplement

Balitbangtan native chickens were slaughtered at 8 weeks of age, and they were not fed for 12 hours before slaughter. The chickens selected for slaughter were those with body weights closest to the average in each treatment unit.

The observed variables in this study included:

- Slaughter weight
- Carcass weight
- Carcass percentage
- Bone percentage
- Meat percentage.
- Subcutaneous fat percentage (including skin)

2.3. Data Analysis

The analysis method used in this study was SPSS (Statistical Package for the Social Sciences) version 27. In addition, Duncan's multiple range test [12] was also used if there was a significant difference between treatments or ($P<0.05$).

3. Results and Discussion

The slaughter weight of balitbangtan native chickens in the T1 treatment was 2.21% higher than T0, but the difference was not statistically significant (P>0.05). This indicates that Nutrigold supplementation at a 1% dosage did not provide a significant additional protein supply to influence slaughter weight compared to T0. In contrast, the slaughter weights in the T2 and T3 treatments were significantly higher by 9.67% and 12.23%, respectively, compared to T0 (Table 1). This increase was due to the higher protein and nutrient content in Nutrigold Feed Supplement, derived from ingredients such as maggot, spirulina, and turmeric. Maggot contains high protein (40-50%) and essential amino acids, which play a crucial role in muscle growth and tissue repair, significantly enhancing slaughter weight. According to [7], spirulina contains 60-70% protein and bioactive compounds that improve metabolism and feed efficiency. Additionally, turmeric functions as an antioxidant and digestive aid, helping chickens absorb nutrients more effectively while enhancing immunity. Researchers [13, 14] reported that incorporating 8% fresh maggot in feed significantly increases carcass weight and slaughter weight.

The average carcass weight of balitbangtan native chickens in the T0 treatment was 524.80 g per bird at 8 weeks of age (Table 1). Meanwhile, carcass weights in the T1, T2, and T3 treatments were significantly higher (P<0.05) by 8.80%, 11.85%, and 18.90%, respectively, compared to T0. This increase in carcass weight is attributed to curcumin in turmeric, which enhances digestive enzyme secretion, improving nutrient absorption and muscle protein synthesis, ultimately contributing to carcass weight gain. Additionally, turmeric in Nutrigold Feed Supplement is known to boost appetite in balitbangtan native chickens, leading to optimal feed consumption and positive effects on carcass growth. Researchers [15, 16] stated that curcumin and essential oils in turmeric can enhance appetite, which improves feed efficiency and carcass weight in chickens. Another study [17] stated that the use of maggots as a protein source in poultry feed can enhance protein deposition in muscle tissue, which directly impacts the increase in carcass weight.

The carcass percentage of balitbangtan native chickens in treatment T3 was significantly (P<0.05) higher by 6.89% compared to T0. The carcass percentage of balitbangtan native chickens significantly (P<0.05) increased with the addition of Nutrigold Feed Supplement levels in the ration. This effect is due to the higher protein intake in the T3 treatment, which promotes optimal muscle formation, thereby increasing carcass weight and the proportion of meat within the carcass. Higher protein content in feed leads to greater feed conversion efficiency into muscle mass rather than fat, ultimately contributing to increased carcass percentage [18]. Researchers [15] stated that curcumin and essential oils in turmeric stimulate appetite and digestive enzyme secretion, supporting carcass weight and percentage growth by optimizing feed utilization. Additionally, found that high-protein feed combined with bioactive compounds such as curcumin improves appetite, digestion, and nutrient absorption, positively impacting poultry growth and carcass percentage.

Table 1 Effects of nutrigold feed supplement in the diet on carcass characteristics of balitbangtan native chickens at 8 weeks of age

Variable	**Treatment[1)]**				**SEM[3)]**
	T0	T1	T2	T3	
Slaughter weight (g/bird)	858.00^{b}[2)]	877.00^{b}	941.00^{a}	963.00^{a}	18.86
Carcass weight (g/bird)	524.80^{c}	571.00^{b}	587.00^{b}	624.00^{a}	10.59
Carcass percentage	61.00^{b}	62.60^{ab}	65.00^{ab}	65.20^{a}	1.30
Bone percentage	29.00^{a}	29.40^{a}	29.20^{a}	29.80^{a}	0.80
Meat percentage	57.20^{b}	59.40^{ab}	60.20^{a}	60.80^{a}	0.82
Subcutaneous fat percentage (including skin)	13.80^{a}	11.20^{b}	10.60^{b}	9.40^{b}	0.67

Notes: 1) T0 = 0% Nutrigold Feed Supplement; T1 = 1% Nutrigold Feed Supplement; T2 = 2% Nutrigold Feed Supplement; T3 = 3% Nutrigold Feed Supplement.; 2) Different letters in the same row indicate significant differences (P<0.05); 3) SEM: Standard error of the treatment means.

Bone percentage showed no significant differences (P>0.05) across all treatments. This is because bone growth occurs earlier than muscle and fat development. Most bone development happens during the early growth phase before chickens reach eight weeks of age, meaning Nutrigold Feed Supplement had no significant effect on bone percentage in the carcass. Researchers [20] reported that bone growth in poultry occurs more rapidly than muscle and fat development, which tend to expand in later growth stages. Furthermore, [21] stated that genetic factors influence bone

structure and proportion more than dietary factors, explaining why the feed composition in this study did not significantly alter the bone percentage in balitbangtan native chickens.

Table 1 shows that treatments T2 and T3 had a significantly higher ($P<0.05$) percentage of meat in balitbangtan native chickens compared to T0. This increase is influenced by the maggot and spirulina content in Nutrigold Feed Supplement, both of which provide high-quality protein with essential amino acids that are easily absorbed. Higher protein intake supports optimal muscle formation, thereby increasing the proportion of meat within the carcass. Researchers [22] noted that amino acids are key components in muscle tissue formation. Additionally, studies [23, 24], found that spirulina enhances antioxidant capacity in broilers by reducing malondialdehyde levels while increasing glutathione peroxidase (GPx) enzyme activity and superoxide dismutase (SOD) [13], which contributes to improved growth quality and poultry health. Researchers [23, 25] demonstrated that supplementing broiler diets with 2-3% spirulina enhances feed conversion efficiency and significantly boosts muscle growth and meat mass. Another study [14] reported that incorporating maggots into poultry feed increases protein deposition and reduces body fat accumulation, promoting muscle development over fat tissue growth.

The percentage of subcutaneous fat, including skin, in treatment T1 = 18.84%, T2 = 23.18%, and T3 = 31.88% was significantly ($P<0.05$) lower than T0 (Table 1). The decrease was influenced by the high protein content in Nutrigold Feed Supplement, primarily from maggots and spirulina, which enhanced muscle protein synthesis and reduced fat storage. Excess protein in the diet can be utilized as an energy source, leading to lower fat accumulation in the form of subcutaneous fat. Additionally, curcumin in turmeric, present in Nutrigold Feed Supplement, has lipotropic properties that accelerate fat metabolism and reduce subcutaneous fat deposition. Curcumin also enhances lipase enzyme activity, which breaks down fat into free fatty acids and energy, resulting in less fat storage in subcutaneous tissue and skin. Researchers [26, 27] found that curcumin regulates gene expression related to lipid metabolism, reducing fat synthesis and accumulation in the body. Another study [28] reported that bioactive compounds in turmeric improve digestion and nutrient absorption, promoting muscle growth while reducing fat tissue accumulation.

4. Conclusion

The administration of 2-3% Nutrigold Feed Supplement in commercial rations increased slaughter weight, while the administration of 1-3% Nutrigold Feed Supplement in commercial rations increased carcass weight and reduced subcutaneous fat, including skin. The administration of 3% Nutrigold Feed Supplement in commercial rations increased carcass and meat percentage compared to the control treatment in 8-week-old balitbangtan native chickens.

Compliance with Ethical Standards

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Disclosure of Conflict of Interest

There is no conflict of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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