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Response of Native Chickens (3-10 Weeks) Fed on Diets Substituated With Graded Levels of Sweet Potato Fermentation

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ABSTRACT

The purpose of this study was to determine the effect of giving fermented sweet potato waste in the ration on the appearance of native chickens aged 3 - 10 weeks and to find out what percentage of the level of use of fermented sweet potato waste in the ration. This study used a completely randomized design (CRD) with 5 treatments and 3 replications. The treatments consisted of: R0 = ration without additional fermented sweet potato waste as control, R1 = ration containing 3% unfermented sweet potato was, R2 = ration containing 3% fermented sweet potato waste, R3 = ration containing 6% fermented sweet potato waste, R4 = The ration contains 9% fermented sweet potato waste. Each replication (experimental unit) used 5 native chickens so that the number of chickens used was 75. The use of sweet potato waste fermentation in the ration had no significant effect (P>0.05) on initial body weight, final body weight , weight gain,and feed convertion ratio. Feeding of fermented sweet potato waste to a level of 3% (R2) gave optimal results.

Keywords: *Native chicken, Fermentation, Ration, Sweet Potato waste*.

1. Introduction

Native chicken is very popular in the community, because the meat is not mushy and has a distinctive taste [1, 2]. Productivity native chicken is low, so it was necessary to improve genetic quality by crossing. Crosses that can be done are marriages between male (local) chickens and female chickens that produce F1 chickens called native chickens. Native chickens have a faster growth rate than local chickens [3]. Quality rations are needed to accelerate the growth of native chickens [4]. Good quality rations usually use high protein sources, so the price of the ration becomes expensive. An alternative to reduce feed costs is the use of non-conventional materials from agricultural waste which are expected to be sufficient sources of protein and minerals [5].

Agricultural waste that can be used as a constituent of non-conventional rations for native chickens is sweet potato waste. Sweet potato waste includes sweet potato leaves, stems and skins. Sweet potato leaf contains high crude protein, namely 26 – 35% [6], with a calcium content of 28.44 mg/100g [7]. Sweet potato waste has limiting factors such as high crude fiber, HCN, oxalic acid, tannins, and phytates which can interfere with the digestive process in chickens. The crude fiber content in sweet potato leaves is also high, ranging from 25.10% [8]. Limiting factors such as anti-nutrients in sweet potato waste can interfere with the metabolism of native chickens. Crude fiber content in sweet potato leaves caneduced by fermentation. The nutritional content of fermented feed ingredients is easier to digest, so it is hoped that the digestibility of protein and crude fiber from native chickens will increase. The amount of protein content in the ration affects protein digestibility in livestock [9]. In addition, to the increased protein content, the crude fiber content also decreased by the fermentation process [10]. The reduced levels of crude fiber in fermented sweet potato leaves

are expected to increase the digestibility of crude fiber in the ration so that it has an impact on protein digestibility so that intake for growth is more available[11].

2. Materials and Methods

Research Location and Time

This research was conducted in a cage located on Jalan Sedap Malam, Banjar Kebon Kori Klod, Gang Jasmine, No. 15, Kesiman Village, East Denpasar District, Bali Province. This research was conducted on November 26, 2020 to January 14, 2021.

Experimental design

The design used in this study was a completely randomized design (CRD) with 5 treatments and 3 replications as follows: ration without the addition of fermented sweet potato waste as control (R0), ration containing 3% unfermented sweet potato waste (R1), ration containing 3% fermented sweet potato waste (R2), ration containing 6% fermented sweet potato waste (R3), the ration contains 9% fermented sweet potato waste (R4). Each replication (experimental unit) used 5 native chickens so that the number of chickens used was 75.

Materials and Methods

Materials

The chickens used in this study were native chickens aged 3 weeks having a homogeneous body weight and without sexing (unsexing), with a weight range of 205 g ± 5%. Native chicken is taken from PT. Source of Indonesian Poultry "Conservation & Integrated Livestock of Native Indonesian native chickens", address Banjar Dinas Malet Gusti, Penglumbaran Village, Susut sub-district, Bangli Regency, Bali Province.

The tools used in the study were scales, buckets, plastic containers, paper labels, stationery, plastic bags, broom sticks, hoses, drinking water containers, gas stoves and knives.

Table 1
Composition of Ingredients for Super Village Chicken Ration 3 – 10 weeks old

Feed Ingredients	Treatment				
	R0	R1	R2	R3	R4
Concentrate	30	30	30	30	30
Corn	35	32	32	29	26
Sweet Potato fermentation	0	3	3	6	9
Rice Bran	12	11	11	12	12
Meat Flour	10	11	11	10	10
Soybean meal	11	11	11	11	11
Coconut oil	1	1	1	1	1
Mineral	1	1	1	1	1
Total	100	100	100	100	100

Description: (*)

R0 = control ration without the addition of sweet potato waste.
R1 = ration containing 3% unfermented sweet potato waste.
R2 = ration containing 3% fermented sweet potato waste.
R3 = ration containing 6% fermented sweet potato waste.
R4 = ration containing 9% fermented sweet potato waste.

Table 2.
Nutrient Content of Research Ration Materials

Nutrients		Treatment					Standard*
		R0	R1	R2	R3	R4	
Crude protein	(%)	20.50	20.36	20.60	21.08	21.50	20
Energy Metabolism	(Kcal/kg)	2894	2878.42	2878.42	2839.2	2825.07	2500
Crude Fiber	(%)	4.74	5.20	5.10	5.61	5.94	5
Crude Fat	(%)	4.00	4.32	4.32	4.70	4.90	6
Calcium	(%)	1.16	1.22	1.30	1.55	1.37	2
Phosphor	(%)	0.54	0.55	0.54	0.55	0.56	0.8

Note: (*) Calculated based on calculations according to Siswohardjono (1982).

Methods

This study used sweet potato waste fermented by EM4. Prior to use, EM4 was activated with distilled water containing glucose and incubated for 72 hours under anaerobic conditions. Prior to fermentation, the sweet potato shells were cleaned and sterilized in an autoclave for 2 hours at 105°C and 1 atmosphere pressure, and then fermented with EM4 under anaerobic conditions for 10 days. The fermented product was dried at 55 °C for 3 days and ground to obtain fermented sweet potato waste flour.

Research variable

The variables observed were initial body weight, final body weight, weight gain, consumption and feed conversion ratio (FCR).

Statistic analysis

The data were analyzed using Analysis of Variance (ANOVA). If there was effect of treatment continued with the test of Duncan's double test (DMRT 5%)

2. Results and Discussion

Research result

The results of this study indicate that the fermentation of sweet potato waste has no effect on all observed parameters (P>0.05). The average value of initial body weight, final body weight, weight gain, consumption and feed conversion ratio (FCR) due to the addition of sweet potato waste in native chickens aged 3-10 weeks can be seen in Table 3.

The best results were obtained in the R2 treatment, both final body weight (964.20 gram), weight gain (759.27 gram), ration consumption (2454.05 gram), and feed conversion (2.93). This indicates that fermentation sweet potato waste in the ration to a level (3% fermented sweet potato waste) is able to provide a significant protein contribution to the appearance of native chicken. This is in accordance with the opinion of Nastiti, (2010) [12], this chicken consumes a ration of approximately 5% of body weight. To increase chicken production, the ration given must be perfect and sufficient in the sense that the ration given must contain all the nutrients needed by the body with good quality in an amount that is in accordance with the requirements of the human body [13]. Several factors that affect body weight gain include ration consumption, environmental temperature and chicken strain [14, 15, 16]. Body weight gain is also influenced by the ration given, a good ration must have quality and quantity, must contain protein and amino acids that are suitable for livestock needs [17, 18].

The fermented sweet potato waste in the ration on the consumption of native chicken was not significantly different (P>0.05). The highest ration consumption was obtained in the fermented R2 (3%) treatment Feed palatability is the attraction of feed or feed ingredients that can increase the

appetite of livestock. The relationship between feed and palatability is influenced by several factors, namely taste, smell, and color of feed ingredients. This is also due to an increase in the amount of nutrients in the research ration. The nutrient content of energy and protein in the ration is an important factor in determining the amount of ration consumed [20, 21, 22]. Several Factors that affect the consumption of rations are the breed of chickens, ambient temperature, production stage, and ration energy. In addition, the shape of the ration, the size of the ration, the placement of the ration, and the method of filling the ration also affect the consumption of the ration [23, 24].

The best ration conversion was obtained in the R2 treatment, which was 3.23. This may be due to the weight gain in the R2 treatment was higher than the other treatments. So that the chickens at R2 are more efficient in obtaining feed into meat. The higher the ration conversion value, indicating the more inefficient the conversion of rations into meat, on the contrary, the lower the ration conversion value, indicating the more efficient the conversion of rations into meat [23]. The results of this study showed that in the R4 treatment with a level of 9% the use of fermented sweet potato waste resulted in the ration conversion value increasing but still below from standard. Several main factors that influence feed conversion are genetics, ration quality, disease, temperature, cage sanitation, ventilation, treatment, and cage management [25]. The factor of giving rations, lighting also plays a role in influencing the conversion of rations, the rate of travel of the rations in the digestive tract, the physical form of the rations and the nutritional composition of the rations [26].

Based on this research, the provision of rations containing unfermented sweet potato waste and rations containing fermented sweet potato waste in super native chickens did not significantly affect the appearance of super native chickens aged 3-10 weeks. Sweet potato waste have low energy levels [27], resulting in ineffective microbial growth so that the fermentation process does not run optimally. Therefore, during fermentation process, it is necessary to add energy sources such as bran so that it can optimize microbial growth effectively and the fermentation process can run optimally [28, 29].

Table 3.
The average of initial body weight, final body weight, weight gain, consumption and feed conversion ratio (FCR) due to the addition of sweet potato waste in native chickens aged 3-10 weeks

Variable	Treatment					SEM[3]
	R0	R1	R2	R3	R4	
Initial Body Weight (gram)	205.14 [a]	205.80 [a]	204.93 [a]	205.23 [a]	203.88 [a]	1.35
Final Body Weight (gram)	932.91 [a]	953.93 [a]	964.20 [a]	919.83 [a]	876.63 [a]	19.31
Weight Gain (gram)	727.77 [a]	748.13 [a]	759.27 [a]	714.60 [a]	672.75 [a]	18.73
Feed Consumption (gram)	2381.61 [a]	2425.70 [a]	2452.05 [a]	2405.71 [a]	2413.23 [a]	19.93
FCR	2.39 [a]	3.24 [a]	3.23 [a]	3.37 [a]	3.61 [a]	0.03

Description:
1. Different superscripts in the same column show significant differences (P>0.05)
2. R0 = control ration without the addition of sweet potatowaste.
   R1 = ration containing 3% unfermented sweet potato.
   R2 = ration containing 3% fermented sweet potato.
   R3 = ration containing 6% fermented sweet potato.
   R4 = ration containing 9% fermented sweet potatowaste.
3. SEM (Standard Error of The Treatments).

4. Conclusion

Based of the results on this study, it can be concluded that the provision of fermented sweet potato waste in the ration had no effect on final body weight, weight gain, ration consumption and feed conversion ration of native chickens aged 3-10 weeks. Feeding of fermented sweet potato waste to a level of 3% (R2) gave optimal results.

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