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Diet formulation using distillers dried grains solubles with different levels on performance of laying chicken growers

Formulasi pakan menggunakan distillers dried grains solubles dengan level berbeda terhadap performa pullet ayam petelur

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ABSTRACT

This study aims to determine the performance of laying hens in the grower phase that are given formulated feed treatment using distiller dried grain solubles (DDGS) at different levels. The research materials are 72 New Lohman Brown strain of DOC , with basal feed. The experimental design used a completely randomized design with 4 treatments and 3 replications, each treatment group consisting of 6 chickens. Feed treatments consisted of (T1) 0% DDGS formula feed, (T2) 10% DDGS formula feed, (T3) 20% DDGS formula feed and (T4) 30% DDGS formula feed. The research variables were feed consumption, body weight gain, and feed conversion ratio of laying hens. Data analysis using analysis of variance (ANOVA) to determine the level of significance at the standard of 0.05. then continued with Duncan's multiple range test (DMRT). The results of the study showed that DDGS did not affect the performance of laying hens in the grower phase. Study is that the distillers dried grains solubles up to a level of 30% in the basal feed formulation improved feed intake, body weight gain, and feed conversion ratio of laying hens in the grower phase.

Kata kunci:
Distillers dried grains solubles (DDGS)
Pakan
Ayam petelur
Performa
Pullet

ABSTRAK

Penelitian ini bertujuan untuk mengetahui performa ayam petelur fase grower yang diberi perlakuan pakan formulasi menggunakan distiller dried grain solubles DDGS pada level yang berbeda. Materi penelitian DOC strain New Lohman Brown sebanyak 72 ekor, pakan basal. Rancangan percobaan penelitian menggunakan rancangan acak lengkap dengan 4 perlakuan dan 3 ulangan, setiap kelompok perlakuan terdiri dari 6 ekor ayam. Perlakuan pakan terdiri dari (P1) pakan formula 0% DDGS, (P2) pakan formula 10% DDGS, (P3) pakan formula 20% DDGS dan (P4) pakan formula 30% DDGS. Variabel penelitian berupa konsumsi pakan, pertambahan bobot badan dan konversi pakan ayam petelur. Analisis data menggunakan Analisis varian (ANOVA) dengan tingkat signifikasi 0,05. dilanjutkan analisis Duncan's multiple range test (DMRT). Hasil penelitian menunjukan penggunaan DDGS tidak mempengaruhi performa ayam petelur fase grower. Kesimpulan penelitian adalah pemberian distillers dried grains solubles sampai dengan level 30% pada formula pakan basal mampu memperbaiki konsumsi pakan, pertambahan bobot badan dan konversi pakan ayam petelur fase grower.

INTRODUCTION

Laying hens are a type of poultry raised for egg production with maintenance management according to the laying phase. The laying hen phase begins with the starter, grower, and layer (egg production phase). Internal factors that affect the productivity of laying hens are the strain and body weight conditions of the strain. The body weight factor is included in the external factors maintenance management the factors that affect body weight is feed. Good quality feed including palatable and can produce result in optimal grower weight.

The optimal body weight of laying hens in the grower phase results in maximum egg production. Diets containing good ingredients with good protein and energy can produce optimal body weight with a low feed conversion ratio. One of the good feed ingredients is distillers dried grains solubles (DDGS). The DDGS is a fermentation and distillation waste from the process of producing bio-ethanol from wheat and corn starch (Widyaratne & Zijlstra, 2008). The DDGS has been used in the poultry feed industry since 2007 with a protein content of 27.15% (Salim, Kruk, & Lee, 2010), and metabolizable energy of 2,905 Kcal (Lumpkins, Batal, & Dale, 2004) and organoleptic. The recommendation for the use of DDGS in feed should not exceed 15% of the total feed formulation. This is because the high fiber content can be digested by laying hens (Lumpkins et al., 2004). However, the results of research by Sudarisman, Yunianta, & Agustin, (2022) showed that diets containing up to 30% DDGS were able to improve the feed conversion ratio of laying hens in the laying phase. Research is being updated with DDGS formulations of up to 30% at different stages of laying hen, namely at the grower stage.

At this time there is not much information related to the use of DDGS in feed for laying hens in the grower phase, so the aim of this study to investigate the effect of DDGS in feed on the performance of laying in the grower phase is. Optimal DDGS formulation in feed can improved feed intake, average daily gain, and feed conversion ratio in layer chickens, so testing of DDGS formulations in feed is needed to observe the performance of laying hens in the grower phase. From the considerations, it is hoped that the results of this study will be able to obtain the right DDGS formulation in feed to increase the productivity and performance of laying hens.

MATERIALS AND METHODS

Location and Time of Research

The location of feeding trials at the Brahmaputra Animal Husbandry Academy cage Laboratory for 16 weeks consists of 14 weeks for DOC to the grower and 2 weeks for analysis and writing up of research results.

Research Materials

The research materials are stage cages of the open house model, cage equipment including food and water containers, a hygrometer to adjust the temperature and humidity in the cage, partitions, heat lamps, 2 digital scales with

Table 1. Composition of feed formulation and diets containing DDGS at levels

Materials diets	Treatments			
	DDGS 0%	DDGS 10%	DDGS 20%	DDGS 30%
DDGS (%)	0.00	10.00	20.00	30.00
Corn (%)	60.00	60.00	43.24	37.49
Rice bran (%)	11.59	2.75	20.00	20.00
Grit (%)	5.28	9.08	4.64	4.99
Soybean meal (%)	19.91	10.25	8.53	4.99
Meat bone meal (%)	0.00	5.91	1.02	0.00
Fish meal (%)	1.00	1.00	1.00	1.00
Dicalcium phosphate (%)	1.52	0.31	0.86	0.82
Premix (%)	0.50	0.50	0.50	0.50
NaCl (%)	0.20	0.20	0.20	0.20
Total	100.00	100.00	100.00	100.00

Nutrient content				
Moisture (%)	12.50	12.10	11.70	11.50
Energy (Kcal)	2,800.00	2,800.00	2,800.00	2,800.00
Protein (%)	16.00	16.00	16.00	16.00
Fat (%)	4.83	4.88	7.40	7.99
Fiber (%)	3.38	3.02	5.07	5.55
Lysine (%)	0.84	0.76	0.74	0.70
Methionine (%)	0.35	0.38	0.37	0.37
Sisteine (%)	0.67	0.64	0.67	0.67
Threonine (%)	0.61	0.58	0.56	0.53
Tryptophan (%)	0.18	0.15	0.15	0.14
Calcium (%)	2.55	4.33	2.26	2.26
Phosphorus (%)	0.79	0.77	0.88	0.85

Source: Laboratory analysis results (2024)

a capacity of 10 kg and 30 kg, 72 New Lohman Brown Day Old Chicks with a body weight range of 45-55 g/chicken, cage floor husks, paper for floor layers, data recording and basal feed according to the treatment as shown in the following Table 1.

Research Methods

The research methods are to test the nutritional quality of the feed and chicken maintenance and observe the performance data of laying hen growers.

Experimental Design

The experimental design is a completely randomized design with 4 treatments and 3 replications, each treatment group consisting of 6 chickens. Diet treatments consist of:

(T1) = 0% DDGS formulation feed
(T2) = 10% DDGS formulation feed
(T3) = 20% DDGS formulation feed
(T4) = 30% DDGS formulation feed

Research Variables

The research variables include:

Feed intake is the total amount of feed that can be consumed by poultry.

Feed Intake=(Total Feed (g)-Remaining Feed (g))

Average daily gain is the amount of weight gain in poultry during a certain period.

Average Daily Gain=(Final Weight (g)-Initial Weight (g))

Feed conversion ratio is the amount of feed used to convert body weight.

$$\text{Feed Convertion Ratio} = \left(\frac{\text{Feed Intake (g)}}{\text{Average Daily Gain (g)}}\right)$$

Research Procedure

The research procedure starts with diet formulation according to experimental design, continues with cage preparation, dividing the cage area and assigning treatment codes randomly according to the research design, each partition is equipped with a feed container, water container, and heat lamps. Day-old chicks with a range of 45–55 g are randomly assigned to each partition and treatment is carried out from week 0 to week 14. The amount of feed is according to the requirement of the age and the observation data are recorded in the record including body weight and remaining feed to be weighed. The procedure is performed by calculating data according to the research variables. body weight data to determine the average daily gain, remaining feed data to determine feed consumption, average daily gain, and determine the feed conversion ratio.

Data Analysis

Data were analyzed using analysis of variance (ANOVA) from SPSS application version 26.0 (IBM Corp.; Armonk, United States) to determine the level of significance level at 0.05. Further data differences were analyzed using the Duncan's multiple range test (DMRT).

RESULTS AND DISCUSSION

Feed Intake

The results showed that feeding given DDGS at levels of 0%, 10%, 20%, and 30% had no effect (P>0.05) on the feed intake of laying hens in the grower phase. The results of feeding with or without DDGS did not affect the feed intake of layer hens in the grower phase,. because the levels of metabolized energy in the feed formulation do did not differ from each other (Table 1), so the feed intake of the layer of the grower phase does not differ. This condition is supported by the statement of Fadillah (2022) that the energy content in the diet affects the level of feed intake of laying hens.

Another factor is that laying hens in the grower phase have not produced eggs and have established weights with each other so that the results obtained are not different between treatments. This condition is supported by the the report of Fadillah (2022) that affect the consumption of laying hen feed include growth rate, body weight, palatability and egg production levels. These results are further supported by the results of previous research by (Sudarisman et al., 2022) which showed that the formulation of DDGS in the feed up to 30% was able to increase feed intake of laying hens in the layer phase due to increased chicken performance for egg production with high palatability and nutrient levels.

Average Daily Weight Gain

The results showed that feeding DDGS with levels of 0%, 10%, 20%, and 30% had no effect (P>0.05) on the average daily gain in the grower phase. The results showed that feeding with DDGS and DDGS formulations did not differ in gain because the level of feed inatake was also not different. This condition is supported by the report of Mosobalaje & Adedoyin (2021) that feed intake is a factor in forming body weight formation and a component of the average daily weight gain.

Another factor is the protein content of the feed, which is not different between treatments (Table 1). Dietary protein has a major influence on the formation of muscle tissue through the absorption of amino acids derived from dietary protein. This condition is supported by the statement of Aziz, Dewi, & Wirapartha (2020) that protein consists of amino acids that are used to build body tissue, replace damaged tissue, meet production needs and the excess is converted to energy.

Feed Conversion Ratio

The results showed that diets supplemented with DDGS at levels of 0%, 10%, 20%, and 30% had no effect (P>0.05) on the feed conversion of hens in the grower phase. The results showed that the best formulation diets without DDGS or with DDGS did not differ in the feed conversion ratio of the growers. This is because the feed intake and average daily gain are the same between treatments, so the feed conversion ratio values are also not different from each other. These results are supported by the statement from Dwi, Soetiarso, Prasetyatama, & Hapsari 2022) that feed conversion is the total feed intake used to form each kilogram of body weight.

Another factor is that the uniformity of the nutrient content of the treatment diets such as protein and fat may prevent hens from absorbing feed nutrients for growth. These findings are supported by the of Wamai, Munga, Osuga, Munguti, Subramanian, Kidoido, & Tanga (2024) that the energy and protein content of the diets affect the feed conversion ratio of laying hens in the growing phase.

Table 2. Performance of laying hens in the grower phase fed with DDGS at levels of 0%, 10%, 20% and 30%

	DDGS 0%	DDGS 10%	DDGS 20%	DDGS 30%	SE
Feed Intake (g)	57.1^{ns}	61.24^{ns}	60.47^{ns}	57.03^{ns}	$\pm 0.97^{ns}$
Average Daily Gain (g)	10.62^{ns}	11.07^{ns}	11.78^{ns}	12.02^{ns}	$\pm 0.96^{ns}$
Feed Conversion Rations	5.38^{ns}	5.54^{ns}	5.13^{ns}	5.32^{ns}	$\pm 0.93^{ns}$

ns = No signicant (P>0.05)

CONCLUSION

Distillers dried grains solubles (DDGS) formulation up to 30% in feed can maintain feed intake, average daily gain, and feed conversion ratio of laying hens in the grower phase.

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