Online Journal of Animal and Feed Research

Volume 2, Issue 3: 240-243 (2012) *ISSN 2228-7701*

SUBSTITUTION OF LYSINE WITH MUSHROOM (*Pleurotus cystidiosus*) IN BROILER CHICK'S DIET

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ABSTRACT: *Effect of inclusion of mushroom (Pleurotus cystidiosus) to substitute lysine in the diet of broiler chicks was investigated. The study lasted for a period of twelve weeks. Twenty four broiler chicks were subjected to two different dietary treatments (Diet I contained 0.22% of mushroom while Diet II contained 0.22% of synthetic Lysine and was used as control). The different treatments had four replicates of three birds each housed in a metabolic cage. Two parameters, mean weight gain and mean feed intake were recorded. Student t- test showed that there was no significant difference (P>0.05) in the mean weight gain for the chicks on the two treatments (DI-3550g and DII-3375g) and mean feed intake for the chicks on the two treatments (DI-502.5g and DII-420g). Consequently, the observed results showed that mushroom can be used to substitute lysine in the diet of broiler chicks.*

ORIGINAL ARTICLE

Key words: *Mushroom, Lysine, Broiler Chicks, Amino-Acid*

INTRODUCTION

In recent times, cost of chicken has increased due to high price of feed ingredients, the cost of fish meal and soybeans, the two main protein ingredients in poultry feeds has gone up substantially as well as the cost of synthetic amino acid used to make up the protein requirements of monogastrics (Sunil, 2007). The high price of feed ingredients has affected the size and supply of chicken in the market (Kurmanath, 2006). Transportation problems, delivery cost and already high price of feed has put chicken out of the reach of consumers and most of the needed ingredients for chicken are not locally available and have to be imported (Shaiful, 1992). This has necessitated the search for cheap feed ingredients by animal scientists and nutritionists and the research torchlight is now being directed to use of wastes such as sawdust, corncobs and crop straws in poultry feeding. Though monogastrics cannot utilize the cellulose-bound wastes but fungi grown on such wastes become useful feed ingredient for non-ruminant (Fibi, 2007). Wastes like sawdust have caused serious environmental problems like fire explosion in mills and air pollution which results from burning sawdust. Fasidi and Kadiri (1993) reported that utilizing sawdust as compost for growing agricultural products like mushroom can help in ameliorating environmental hazards caused by sawdust.

Mushroom has been found to have some nutritional values that can enhance the growth and performance of broiler chickens and human beings in general. Mushroom contains almost all the essential and non-essential amino acid with lysine as the most essential amino acid (Oei, 2005). Lysine as an amino acid in the diet of chickens and human beings will enhance growth and development. It is also known to contain vitamins (B_1, B_2, and C), carbohydrates, minerals and low fat (Oei, 2005). There were reports on beneficial effects of mushroom, which are used as feed supplements and medicines in chickens (Ogbe et al., 2008; Ogbe et al., 2009). Some medicinal properties have been found in mushroom like antiviral, anti-tumor, immune enhancing and anti-inflammatory, rejuvenating and cholesterol reducing properties (Fasidi, 2006).

In the light of the above extracts on mushroom, the aim of this study is to investigate the nutritive value of mushroom (*Pleurotus cystidiosus)* and to assess the contribution of this mushroom on the performance of broiler chicks if it is used to substitute lysine in their diet.

MATERIALS AND METHODS

Experimental Animals

The animals used for the experiment were twenty-four broiler chicks of two weeks old irrespective of gender. The animals were vaccinated against Newcastle disease and gumboro-disease. They were later treated with Oxytoyin broad spectrum antibiotics and Amprolium to prevent Coccidiosis. The chicks were maintained for two weeks to acclimatize in the new environment before commencement of the experiment.

To cite this paper: Ezeonyejiaku CD, Ebenebe CI, Okeke JJ, Obiakor MO, Ezenwelu CO. 2012. Substitution of lysine with mushroom (*Pleurotus cystidiosus*) in broiler chick's diet. *Online J. Anim. Feed Res.*, 2(3): 240-243.
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Experimental Diet

Twenty-four kilogram of fresh mushroom was used for the study. The mushroom was sun-dried and later milled using hamabill milling machine.

Formulation of Experimental Diet

Two diets, I and II were prepared for the study. In the first diet, 0.02kg of mushroom was used to substitute lysine, while diet II which served as the control contained 0.02kg of lysine without any mushroom. The composition of the diets is as shown in tables I and II.

Table 1 - Diet 1 (Mushroom)

Feed Name	Quantity (Kg)
Mushroom	0.02
Soyabean	2
Maize	5.65
Fish meal	0.4
Dried brewers grain	0.5
Palm oil	0.2
Bone meal	0.25
Oyster shell	0.05
Vitamin/mineral premix	0.05
DL-Methionine	0.03
Salt	0.05

Table 2 - Diet 2 (Control)

Feed Name	Quantity (Kg)
Lysine	0.02
Soyabean	2
Maize	5.65
Fish meal	0.4
Dried brewers grain	0.5
Palm oil	0.2
Bone meal	0.25
Oyster shell	0.05
Vitamin/mineral premix	0.05
DL-Methionine	0.03
Salt	0.05

Data Collection

The feed intakes of the chickens were recorded daily using the formula below;

*Daily feed intake= feed fed – weight of left over

The chicks were also weighed weekly and the record of the weight increase recorded throughout the 12 weeks period of the investigation.

Statistical Analysis

The data collected were subjected to statistical analysis using student's *t*-test to compare means.

RESULTS

The result of proximate composition of the mushroom meal (*Pleurotus cystidiosus)* is shown in table 3 while that of the two experimental diets is as shown in tables 4 and 5 respectively.

Weight changes on the broiler chicks fed on diet I increased from initial weight 2000g to final weight of 4450g, while those fed on diet II increased from initial weight of 2150g to final weight of 4300g at the end of twelve (12) weeks period of the study.

Statistical analysis using student *t*-test showed that there was no significance difference (P>0.05) for the overall feed intake and mean weight gain of the broiler chicks fed on the two different diets.

Result of feed intake and weight changes of chicks in the two dietary groups are presented in tables 6 and 7.

Table 3 - The proximate analysis of the mushroom meal (*Pleurotus cystidiosus*)

Nutrient	% Composition in the Mushroom Meal (*Pleurotus cystidiosus*)
Crude protein	25.0
Carbohydrate	58.0
Moisture	91.5
Ash	9.3
Fat	1.6
Fibre	11.5
Energy (Kcal dry maternal)	265

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Table 4 - The Proximate analysis of the experimental diet I with mushroom (*Pleurotus cystidiosus*)	
Nutrient	**% Composition in the Experimental Diet I**
Crude protein	20.78
Fat	3.82
Dry matter	89.46
Crude fibre	2.03
Ash	4.98
Moisture	10.54
Nitrogen free extract	57.85

Table 5 - The Proximate analysis of the experimental diet II with Lysine	
Nutrient	**% Composition in the Experimental Diet II**
Moisture	9.76
Dry matter	90.24
Crude protein	22.05
Crude fibre	1.8
Fat	2.52
Ash	5.59
Nitrogen free extract	58.33

Table 6 - Weekly records of feed intake for two dietary groups (g)

Dietary	W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12	Total	Total Mean
Diet I	390	640	420	560	390	420	560	640	425	385	640	560	6030	502.5
Diet II	400	370	460	450	370	460	400	450	460	370	400	450	5040	420

W=week

Table 7 - Weekly changes in weight gain of the broiler chicks feed on two different Diets

Dietary	Initial Wt	W 1 Wt	W 2 Wt	W 3 Wt	W 4 Wt	W 5 Wt	W 6 Wt	W 7 Wt	W 8 Wt	W 9 Wt	W 10 Wt	W 11 Wt	W 12 Wt	Total	Total Mean
Diet I	2000	2350	3100	3,100	3200	3,300	3300	3600	3600	4100	4200	4300	4450	42600	3550
Diet II	2,150	2400	2800	3050	3,300	3,300	3,350	3400	3450	3450	3750	3950	4300	40,500	3,375

W=week, Wt= weight

DISCUSSION

The study showed that there was no significant difference in the feed intake of broiler chickens fed on the two diets and their weight gains. This may be attributed to the high lysine content of mushroom as reported by Oei (2005) that mushroom contained all the essential and non-essential amino acids with lysine as the most abundant essential one. But the numerical variation between the two values in the weight of the two experimental subjects could also be attested to the similar high nutritional contents of the mushroom. Alternatively, there might be difference in the feed conversion process of the two diets among the broilers and possibly their gender, age and duration of feeding. The disparity in age, gender, duration, and method of feeding is documented in a report by Tolkamp (2005).

The current study is consistent with the report of Fasidi (2006) that mushroom protein and amino acid can compete with similar nutritional elements from any other source. This is further supported by the work of Guo et al. (2004) that showed increase BW (Body weight) gain in broilers with the use of mushroom and herb polysaccharides. Consequently, going by the report of Oei (2005), mushroom is a healthy diet since it contains good amount of protein and amino acid, supporting the present investigative report and scientific claims. The medicinal effects and values have been earlier documented by Ogbe et al. (2008) and Ogbe et al. (2009).

CONCLUSION

Mushroom meal (*Pleurotus cystidiosus*) has been proved to be of high nutritional value in terms of its effect on the growth and performance of broiler chicks. The contents of amino acid in mushroom especially lysine can comfortably match any synthetic amino acid (lysine) as carried out in this study that can help in the growth and performance of broiler chicks. In this era of high price of feed ingredients which has denied majority of Nigerians animal protein from chicken, cultivating of mushroom and using it to substitute lysine in feed formulation for broiler chicks will go a long way in enhancing availability and food security of chickens with affordable market price.

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