RESPONSE OF COCKEREL CHICKENS TO OYSTER MUSHROOM (*PLEUROTUS OSTREATUS*) ADMINISTERED IN FEED

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ABSTRACT

This study investigated the response of 120 cockerel chickens to varying dietary inclusion levels of oyster mushroom. The birds were randomly assigned to four treatments (0, 500, 750 and 1000 ppm) of varying levels of oyster mushroom in feed with each treatment consisting of 30 birds which was sub-divided into three replicates of 10 birds each for an experimental period of 8 weeks. Data obtained were subjected to Analysis of Variance in a Completely Randomized Designed. Results showed that oyster mushroom inclusion in cockerel chickens' diet significantly ($P<0.05$) influence feed intake of the birds. Comparable feed intake means (71.05, 71.11 and 69.64 g) were recorded at 500, 750 and 1000 ppm inclusion levels, respectively which were significantly ($P<0.05$) higher than 56.29 g recorded at 0 ppm. Also, all haematological and serum biochemistry parameters measured were significantly affected ($P<0.05$) by dietary inclusion of oyster mushroom. It was concluded that oyster mushroom inclusion up to 1000 ppm could be a substitute for antibiotics in cockerel chickens' production for optimum immune response without adversely affecting the growth performance of the birds.

Keywords: Cockerel chicken, growth performance, oyster mushroom, blood parameter

INTRODUCTION

Cockerels are male chickens kept and reared for meat production up to six months of age for good quality tender meat as a good source of protein in human diet. However, the profit levels in this poultry enterprise have been constrained by a number of factors critical among which is feed quality, high cost of production and disease management (Hassan *et al*., 2011). The high feed cost has largely been attributed to competitions between man and animals for limited grains. Input cost and profitability of cockerel production require a critical review of feed component and the drugs administered to the birds. This lend credence to the use of antibiotics as growth promoters and immune builders in its production but banned in recent years due to concerns about their residues in animal tissues and subsequent emergence of resistant strains of microorganisms (Roe and Pillai, 2003; Saleha *et al*., 2009). This prompted the search for safe alternatives in combating poultry diseases including natural products and phytobiotics such as oyster mushroom. Oyster mushroom (*Pleurotus ostreatus*) has been shown to have antioxidant and immunomodulatory effects (Giannenas *et al*., 2010). However, limited reports exist on the effects of oyster mushroom on growth performance of cockerel chickens. The use of oyster mushroom as a substitute for synthetic antibiotics in poultry production has received much attention in recent years because they are natural and cheap alternatives to antibiotics. Hence, the study investigated the response of cockerel chickens to oyster mushroom administered in feed.

MATERIALS AND METHODS

Experimental site and management of birds

The experiment was carried out at the Poultry unit, Directorate of University Farms (DUFARMS), Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. It is a region of 70 m above the sea level of latitude 7° 5' to 7° 8'N and longitude 3°11'E (FUNAAB Meteorological Station). A total of 120 cockerel birds were used in the study. After the chicks were brooded for two weeks using charcoal pot as a source of heat, they were randomly assigned to four treatments of varying levels of oyster mushroom administration in feed. Each treatment consisted of 30 birds; which were further divided into three replicates of 10 birds each. Water and feed were supplied *ad libitum*.

The birds were fed formulated diets that contained 18.29% CP and 2880 kCal/kg ME. The dietary treatments are as follows: Treatment 1: 0 ppm of oyster mushroom in a bag of feed; Treatment 2: 500 ppm (500 mg/kg feed) = 12.5 g of oyster mushroom in a 25 kg bag of feed; Treatment 3:750 ppm (750 mg/kg feed) = 18.75 g of oyster mushroom in a 25 kg bag of feed and Treatment 4: 1000 ppm (1000 mg/kg feed) = 25.00 g of oyster mushroom in a 25 kg bag of feed. Cockerel chickens on treatment 1 were administered antibiotics and other medications as at when due while those on treatments 2 to 4 were not administered any antibiotics and medications in the course of the experiment.

Preparation of Oyster Mushroom Extract

Two (2) kg each of oyster mushroom was boiled with 4 litres of water for 15 minutes at 60 °C. After boiling, it was poured into a sleeve and screw pressed for the concentrate to be extracted, the concentrate was left to cool at room temperature then stored in a clean dark container to prevent fermentation and deterioration of the filtrate (Oyster mushroom extract). A whole oyster mushroom was also oven dried at 60 °C to constant weight and milled into powdered.

Data Collection and Statistical Analysis

Data were collected weekly on the performance characteristics including weight gain, feed intake, feed conversion ratio and mortality. At the end of the 8th week, 2 ml of blood was collected from birds in each replicate via the wing vein into two sets of sterilised bottles; one containing ethylene diamine tetra acetic acid (EDTA) as the anti–coagulant for determination of haematological parameters and the other bottle without EDTA was for serum biochemical determination. Data were subjected to Analysis of Variance using a Completely Randomized Design. Significantly ($P<0.05$) different means among variables were separated using Duncan's Multiple Range Test contained in Statistical Analyst System (SAS, 2010) package.

RESULTS AND DISCUSSION

Table 1 shows the effect of varying levels of oyster mushroom inclusion in feed on the growth performance of cockerel chickens. Significant ($P<0.05$) difference was observed among treatments for feed intake. Birds on oyster mushroom had significantly higher feed intake compared to those on the control. The increase in feed intake through supplementation of the experimental diet with oyster mushroom could be explained by the monosodium glutamate existence and bitter-sweet aroma of benzaldehyde in oyster mushroom which enhances palatability of feeds (Bellisle, 1998). Also, the result is in consonance with the findings of Shila *et al.* (2014) who also reported significant difference in the feed intake of poultry birds when their diets were supplemented with oyster mushroom. The results of haematological and serum biochemical parameter of cockerel chickens fed oyster mushroom in diet are presented in Table 2. The haematological parameters measured were significantly ($P<0.05$) affected by the inclusion of oyster mushroom. The values were higher in birds fed oyster mushroom compared to the control. The values obtained for all the haematological indices were similar to the ranges reported by Duwa *et al.* (2013) when cockerels were fed diet containing probiotics. This shows that oyster mushroom had no adverse effect on health status. This finding disagreed with the reports of Owosibo *et al.* (2013) who reported no significant difference in the haematology and serum biochemical indices of poultry birds when their diets were supplemented with both antibiotics and probiotics. It was then concluded that up to 1000 ppm of oyster mushroom (*Pleurotus ostreatus*) inclusion in feed is an appropriate level in cockerel chickens' production for improved growth performance and improved immune.

REFERENCES

Bellisle, F. 1998. Effects of monosodium glutamate on human food palatability. *Annals of the New York Academy of Sciences* 30: 855

Duwa, H., Saleh, B. and Adegbola, T. 2013. Haematological and serum biochemical characteristics of cockerels fed graded levels of boiled sorrel seed meal. *Online Journal of Animal and Feed Research*, 3 (2): 111-115.

Giannenas, I., Tontis, D., Tsalie, E., Chronis, E.F., Doukas, D and Kyriazakis, I. 2010. Influence of dietary mushroom *Agaricus bisporus* on intestinal morphology and microflora composition in broiler chickens. *Research Veterinary Science*, 89: 78-84.

Hassan, A.A., Nwanta J.A., Mohammed, A., Njoga, E.O. and Maiangwa, M. G. 2011:

Economic analysis of broiler production on On-farm formulated and commercial feeds: A case study of Igabi local government area of Kaduna state, Nigeria. *Veterinary Journal* 32(2): 2011; 154 - 156.

Owosibo, A. O., Odetola, O. M., Odunsi, O. O., Adejinmi, O. O. and Lawrence-Azua, O. O. 2013. Growth, haematology and serum biochemistry of broilers fed probiotics based diets. *African Journal of Agricultural Research,* 8(41): 5076-5081.

Roe, M. T. and Pillai, S. D. 2003. Monitoring and identifying antibiotic resistance mechanisms in bacteria. *Poultry Science,* 82: 622–626.

Saleha, A. A., Miyang, T. T., Ganapathy, K. K., Zulkifli, I., Raha, R. and Arifah, K. 2009. Possible effect of antibiotic-supplemented feed and environment on the occurrence of multiple antibiotic resistant E. coli in chickens. *International Journal of Poultry Science*, 8: 28-31.

SAS (Statistical Analysis System). 2010. Version 9.3, SAS, Institute Inc. Carry NC., USA.

Shila, H.F., Majid, T. and Sayed, A.T. 2014. Effect of oyster mushroom wastes on performance, immune responses and intestinal morphology of broiler chickens. *International Journal on Recycle Organic Waste Agriculture,* 3:141–146.

Table 1 Effects of varying levels of Oyster Mushroom (*Pleurotus ostreatus*) administered in feed on the growth performance of cockerel chickens

Parameter	Level of Oyster Mushroom inclusion				
	0 ppm	500 ppm	750 ppm	1000 ppm	SEM
Initial weight (g/bird)	106.41	96.67	106.67	100.00	3.48
Final weight (g/bird)	798.50	938.70	903.50	953.40	47.50
Feed intake (g/bird/day)	56.29b	71.05a	71.11a	69.64a	0.82
Weight gain (g/bird/day)	12.36	15.04	14.23	15.24	0.83
Feed conversion ratio	4.56	4.75	5.00	4.63	0.21
Mortality (%)	2.56	3.33	0.00	0.00	2.10

[a,b]: Means that do not share similar superscript are significantly different (P<0.05)
SEM: Standard Error of Means

Table 2 Effects of varying levels of Oyster Mushroom (*Pleurotus ostreatus*) administered in feed on the immune status of cockerel chickens

Parameter	Level of Oyster Mushroom inclusion				
	0 ppm	500 ppm	750 ppm	1000 ppm	SEM
Haematological parameter					
Packed cell volume (%)	34.00^{a}	30.50^{b}	29.50^{b}	29.50^{b}	0.43
Haemoglobin (g/dL)	10.55^{a}	9.85^{b}	9.70^{b}	9.90^{b}	0.08
Red blood cell ($\times 10^{15}/\mu l$)	1.90^{ab}	2.10^{a}	2.25^{a}	1.45^{b}	0.08
White blood cell ($\times 10^{12}/\mu l$)	11.45^{b}	12.70^{a}	13.30^{a}	10.75^{b}	0.14
Heterophils (%)	26.00^{b}	34.50^{a}	34.00^{a}	33.00^{a}	0.56
Lymphocytes (%)	72.00^{a}	61.00^{c}	65.00^{b}	65.00^{b}	0.00
Eosinophil (%)	0.00^{b}	1.50^{a}	0.00^{b}	0.00^{b}	0.25
Basophils (%)	0.50^{b}	2.00^{a}	0.00^{b}	1.00^{ab}	0.25
Monocytes (%)	1.50	1.00	1.00	1.00	0.25
Serum biochemical parameter					
Total Protein (g/dL)	31.50^{bc}	33.00^{b}	29.00^{c}	37.50^{a}	0.60
Albumin (g/dL)	15.00^{ab}	18.50^{a}	13.50^{b}	15.50^{ab}	0.70
Globulin (g/dL)	16.50^{b}	14.50^{b}	15.50^{b}	22.00^{a}	0.70

[a,b,c]: Means that do not share similar superscript are significantly different (P<0.05)
SEM: Standard Error of Mean