HEMATOLOGICAL AND SEROLOGICAL EVALUATION OF DIETARY INCLUSION OF DIRECT FED MICROBES AS PROBIOTIC SOURCE ON LAYING BIRDS

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Abstract
A 56 days study was conducted using a total of 120 laying hens that were twenty six weeks old to evaluate the haematological and serological evaluation of dietary inclusion of Direct Fed Microbes (DFM) as probiotic source on laying birds. There were thirty layers in each treatment and ten birds per replicate. Four experimental diets was formulated; T1 (0.05% DFM), T2 (0.10% DFM), T3 (0.15% DFM) and T4 as the control with zero DFM. Feed and water were given ad libitum throughout the duration of the experiment which lasted 56 days. The experimental design used was Completely Randomized Design (CRD). At the end of the experiment, blood samples were collected from the birds and taken to the laboratory for haematological and serum biochemistry analysis. Data obtained in each measured parameter was subjected to analysis of variance. The result shows that DFM did not significantly (P>0.05) affect the Haemoglobin Concentration, Packed Cell Volume, White Blood Cell and Mean Cell Haemoglobin Concentration of the laying birds. However, the red blood cell of T4 was significantly (P<0.05) lower but similar to that of T1. The findings from this study shows that DFM included to the diets of the laying birds did not significantly (P>0.05) affect the serum chemistry of the laying birds. All the serum chemistry parameters examined were within the normal range for healthy birds. It was therefore recommended that broiler diets could be supplemented with not more than 0.15% DFM dietary inclusion for normal blood profile and better performance of laying birds.

Keywords: Haematology, serology, Direct Fed Microbes, Probiotic, Laying birds

Introduction

Scarcity of animal feedstuffs has ostensibly assumed an emergency state in developing countries including Nigeria and conceivably for other less developed countries. In fact, this singular problem is conspicuously responsible for the widening animal protein intake shortage in these countries because animal products are produced at costs out of reach of the populace (Gionchetti *et al.*, 2013). With the banning of the sub-therapeutic usage of the antibiotic in animal production, and all Antibiotic Growth Promoters (AGPs) by the European Union, other regions/countries are likely to follow suit. Non-availability of suitable substitutes presents a serious problem to the poultry industry. Despite the current use of a variety of alternative growth and production enhancers there is no single treatment or product that has been successful in replicating the relatively consistent and robust effects of AGPs (Dibner and Buttin, 2002).

These problems however can be overcome by application of probiotics. Direct Fed microbes are used widely in poultry diets in an attempt to improve nutrient utilization, the health and welfare of the birds, product quality and to reduce pollution as well as to increase the choice and content of ingredients which are acceptable for inclusion in diets (Acamovic, 2001).

The broad objective of this study is to determine the "Effect of dietary inclusion of Direct Fed Microbes as probiotic source on haematology and serum biochemistry of laying birds

Materials and Method

The study was carried out at the Poultry Unit of The Teaching and Research Farm of Michael Okpara University of Agriculture, Umudike, Abia State. The area is located on latitude 05°27' North, longitude 07°32' East, with an altitude of 123m above sea level. Umudike has an ambient temperature of 22°C – 37°C with annual rainfall of 2,177mm and relative humidity of above 50 – 90% (NRCRI, 2006). A total of 120 twenty six weeks old laying birds were used for the 56 days experiment. Completely Randomized Design (CRD) was used. The birds were divided into four treatments group of thirty birds per treatment. It was replicated three times. Each replicate contained ten birds. Four isonitrogenous and isocaloric layers diets in the form of mash were prepared and different levels of Direct Fed Microbes, T1 (0.05% DFM), T2 (0.10% DFM), T3 (0.15% DFM) and T4 (0% DFM) as the control were used in experimental diets (Table 1).

At end of 56 days, 2 laying birds from each replicate within each treatment was selected and blood samples collected for haematological

assessment such as packed cell volume (PVC), red blood cell (erythrocyte) count (RBC), mean cell volume (MCV), mean cell haemoglobin (MCH), mean cell haemoglobin concentration (MCHC), haemoglobin (HB), and white blood cell (leukocyte) count. Serum albumen, serum protein, serum globulin, serum urea, serum glucose and serum creatinine were evaluated.

Data obtained were subjected to Analysis of Variances according to Steel and Torrie (1980) in a Completely Randomized Design and differences between treatments means were separated using the Duncan's Multiple Range Test (Duncan, 1955).

Results and Discussion

The result of the findings presented in Table 2 showed that DFM did not significantly (P>0.05) affect the Haemoglobin Concentration, Packed Cell Volume, White Blood Cell and Mean Cell Haemoglobin Concentration of the laying birds.

However, the red blood cell of T4 (0% DFM) was significantly (P<0.05) lower but similar to that of T1 (0.05% DFM). It was also observed that Mean Packed Cell Volume and Mean Haemoglobin Concentration was significantly (P<0.05) higher in laying birds receiving diets containing 0.15% of DFM. This may be due to the presence of high levels of viable natural occurring microorganisms contained in DFM.

The serum chemistry of the laying birds fed microbes were not significantly (P>0.05) affected. The parameters examined were within the normal range for healthy birds as reported by Banerjee (1998). The total protein and albumin had an increasing trend and the globulin has a decreasing trend; total protein and glucose were higher numerically in the trial diets than the control diet.

Conclusion and Recommendation

The haematology and serum chemistry of laying birds fed microbes at 0.05 to 0.15% were maintained in tandem with normal range for healthy birds. Hence, did not produce any effect that could be detrimental to the normal physiological characteristics of the laying birds. It is therefore recommended that layers diet could be supplemented with not more than 0.15% DFM for normal blood profile and better performance of laying hen.

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Table 1: Ingredients Composition of Laying Hen Diets containing Different levels of DFM

Ingredients	T_1	T_2	T_3	T_4
Yellow maize	50.00	50.00	50.00	
Soybean	20.00	20.00	20.00	
Wheat offal	9.00	9.00	9.00	
PKM	9.30	8.80	8.30	
Limestone	5.00	5.00	5.00	
Fish meal	3.00	3.00	3.00	
Bone meal	3.00	3.00	3.00	
Salt (NaCl)	0.25	0.25	0.25	
Vitamin Mineral Premix*	0.25	0.25	0.25	
Lysine	0.10	0.10	0.10	
Methionine	0.10	0.10	0.10	
Direct Fed Microbial#	0.00	0.05	0.10	
TOTAL (%)	100	100	100	
Calculated Composition				
Crude Protein (%)	18.54	18.45	18.27	
ME (Kcal/kg)	2711.20	2700.33	2678.58	

Table 2: Effect of Direct Fed Microbial (DFM) on the Haematology of Laying Birds

Parameters	T1	T2	T3	T4	SEM
Hemoglobin Conc. (g/dl)	10.91	11.94	11.65	12.53	0.47
Red Blood Cell	2.48^{ab}	2.77^{a}	2.67^{a}	2.13^{b}	0.91
Packed Cell Volume (%)	23.16	23.16	23.66	22.50	0.26
White Blood Cell	19.55	16.63	18.91	16.28	1.00
Mean Cell Volume (fl)	94.91^{ab}	83.56^{b}	88.42^{b}	105.62^{a}	3.26
Mean Cell Hemoglobin (pg)	44.15^{b}	43.16^{b}	43.54^{b}	58.45^{a}	2.47
Mean Cell Hb Conc. (g/dl)	47.12	51.37	49.22	54.91	1.77

a, b: means within th e same row with different supersc ript are significantly ($P<0.05$) different.
SEM: Standard Error of Mean. T_1, T_2, T_3, and T_4 = Control, 0.05g of DFM, 0.10g of DFM and 0.15g of DFM.

Table 3: Effect of Direct Fed Microbial (DFM) on the Serum Chemistry of Laying Birds

Parameters	T1	T2	T3	T4	SEM
Total Protein (g/fl)	3.96	4.21	4.22	4.43	0.20
Albumin (g/dl)	2.14	2.10	1.98	1.78	0.69
Globulin (g/dl)	1.81	2.11	2.24	2.65	0.19
Glucose	238.66	257.33	300.00	258.66	16.37
Urea (mg/dl)	1.08	1.29	1.55	0.77	0.13
Creatinine (mg/dl)	0.43	0.24	0.27	0.40	0.04

a, b: means within the same row with different supersc ript are significantly ($P<0.05$) different.
SEM: Standard Error of Mean. T_1, T_2, T_3, and T_4 = Control, 0.05g of DFM, 0.10g of DFM and 0.15g of DFM.