HAEMATOLOGICAL AND SERUM BIOCHEMICAL INDICES OF BROILER STARTER BIRDS FED DIET SUPPLEMENTED WITH NIACIN AND YEAST

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ABSTRACT

The study was carried out to investigate the haematological and serum biochemical effect on starter broiler birds fed supplemented Niacin and yeast. Yeast and niacin were used as supplement in the feed, the level of yeast was constant in T_2 (32.5g), T_3 (32.5g), and T_4 (32.5g), while the level of Niacin varied in T_2 (1.5g), T_3 (3g), and T_4 (4.5g). T1 was the control (no niacin, no yeast included).The study was carried out in the Poultry Unit, Department of Animal Science Teaching and Research Farm, University of Nigeria Nsukka, and it lasted for 8 weeks. A total of one hundred and twenty (120) day old broiler birds were randomly allotted to four (4) dietary treatments with thirty (30) birds per treatment in each pen. The animals were further divided into three replicates with ten birds per replicate in a completely randomized design (CRD). The result of the study on the haematological parameters showed that the inclusion of niacin and yeast had significant effect ($P<0.05$) on the Haemoglobin concentration (Hb), Mean Corpuscular Haemoglobin(MCH), and corpuscular heamoglobin concentration(MCHC). The result of the study on the Serum profile of broiler starter phase showed that the inclusion of Niacin and yeast had significant effect ($P<0.05$) on the cholesterol, triglycerides and Low density lipoprotein (LDL). It is evident from this study that majority of the parameters measured or determined did not favor high inclusion of Niacin and yeast in broiler production. However, the research had established that inclusion of niacin and yeast in broiler production, small dosages have to be administered to avoid overdoes.

Key words: haematology, serum, diets, niacin and yeast

INTRODUCTION

In recent years, consumers' pressure and worries towards harmful effects of antibiotic use and the ban of antibiotics has prompted researchers to think about alternatives to antibiotics in poultry production (Diarra and Malouin, 2014). Probiotics are defined as "live micro-organisms, when administered in adequate amounts; confer a health benefit to the host" (WHO, 2001). Probiotic feed supplementation improves growth, feed efficiency and intestinal health (Giannenas *et al.*, 2012). Among the different probiotic organism, the Lactobacillus and Saccharomyces have most commonly been used. Saccharomyces cerevisiae (SC), one of the most widely commercialized types of yeast, rich in crude protein (40-45%) and its biological values were high and also rich in vitamin B complex, biotin, niacin, pentothenic acid and thiamin (Reed and Nagodawithana,1999) has long been fed to animals and poultry. Niacin is important in energy production and storage and tissue growth (El-Husseiny *et al*., 2008). The availability of niacin in grains and grain by-products is very low, therefore, the need to supplement it in the diet of the birds. Haematology refers to the study of the numbers and morphology of the cellular elements of the blood – the red cells (erythrocytes), white cells (leucocytes), and the platelets (thrombocytes) and the use of these results in the diagnosis and monitoring of disease (Merck Manual, 2012). However, the essence of this study was to investigate the effect of niacin and yeast on haematology and serum biochemical indices of starter broiler birds.

MATERIALS AND METHOD

Location and duration of study

The study was conducted in the poultry unit, Department of Animal Science Teaching and Research farm, University of Nigeria Nsukka. The study lasted for four (4) weeks.

Experimental materials

Niacin and yeast was used for the study. Niacin was gotten from Joechem Agrochemicals in Nsukka, Enugu state. Commercial yeast was also gotten from a reputable dealer in Ogige market in Nsukka.

Experimental animal and management

One hundred and twenty (120) broiler birds of a day old commercial broiler chicks of mixed sexes of the Anak strain were purchased from a reputable source in Nsukka, Enugu state and were used for the

study. The broiler birds were randomly allotted to four (4) dietary treatments with thirty (30) birds per treatment in each pen. The animals were further divided into three replicates with ten birds per replicate in a completely randomized design (CRD). Yeast and Niacin were included in the feed of the broiler birds. The treatments were as follows: T_1= Control (no Niacin, no Yeast included), T_2=32.5g of Yeast + 1.5g of Niacin, T_3=32.5g of Yeast + 3g of Niacin and T_4=32.5g of Yeast + 4.5g of Niacin. Feed and water were supplied ad *libitum* to the birds. Vaccinations and other management practices were strictly followed.

Feed composition table

Table 1: Percentage composition of the starter diets

INGREDIENTS (%)	**STARTER DIET**
Maize	40.00
Soybean cake	33.6
Palm kernel cake	10.40
Wheat Offal	8.00
Bone meal	4.00
Fish meal	3.00
Salt	0.25
Premix*	0.25
Lysine	0.25
Methionine	0.25
TOTAL	**100**

Haematological and serum biochemical evaluation

At the end of the experiment, three birds per treatment were randomly selected and blood samples were collected from the wing veins of each bird using sterilized syringe and emptied into sterilized bottles containing EDTA (Ethylene diaminetetracetic acid) for haematological analysis, and into the bottles without EDTA for serum biochemical analysis. Haematological parameters that were determined included haemoglobin concentration (HbC), packed cell volume (PCV), white blood cell (WBC) count, and red blood cell (RBC) count. Serum metabolites (total protein (TP), glucose albumin, globulin, creatine, cholesterol and calcium) were also determined according to the methods described by Campbell and Coles (1986).

Statistical analyses

Data collected were subjected to analysis of variance (ANOVA) for completely randomized design (CRD) using a statistics package for social sciences. (SPSS 2015) model. Significantly different means were separated using Duncan's New Multiple Range Test (SPSS, 2015).

Result and discussion

Table 2: Proximate analysis for starter feed.

	MOISTURE	PROTEIN	ASH	FIBRE	FAT/OIL
T_1	16.00	23.05	14.00	5.00	1.50
T_2	17.50	23.11	12.00	5.05	1.32
T_3	14.90	24.10	13.94	4.98	1.09
T_4	16.80	23.92	14.00	5.08	1.21

Table 3: Effect of Yeast and Niacin on Haematological parameters of broiler starter phase.

TREATMENT	T_1	T_2	T_3	T_4	SIGNIFICANCE
PCV (%)	27.50 ± 1.44	24.50 ± 0.87	26.33±1.20	26.00 ± 1.73	N.S
RBC (mm^3)	2.76 ± 0.48	2.24 ±0.31	2.62 ±0.12	2.17 ± 0.14	N.S
HB (g/100ml)	9.06 ±0.51^{ab}	10.90 ±1.24^{a}	6.14 ± 1.06^{b}	7.82 ± 1.60^{ab}	*
MCH (%)	35.20 ± 7.02^{ab}	56.90±7.84^{a}	23.88± 5.07^{b}	37.17 ±9.42^{ab}	*
MCHC (%)	32.93 ±0.51^{ab}	44.10± 3.50^{a}	23.79±5.13^{b}	29.54 ±4.64^{b}	*

N.S= not significant, *= significant

The table above indicated that there was no significant difference on packed cell volume(PCV) and red blood cells(RBC), but there were significant effect (P<0.05) of treatments on heamoglobin concentration(Hb), mean corpuscular haemoglobin(MCH), and corpuscular heamoglobin concentration(MCHC). T2 was statistically higher in Hb(10.90 ±1.24),MCH(56.90±7.84) and MCHC(44.10± 3.50) values than Hb(6.14 ± 1.06), MCH(23.88± 5.07) and MCHC(23.79±5.13) values of T3 respectively. T_2 had similar values of Hb, MCH and MCHC with T_1 and T_4. Again T_3, T_1, and T_4 were statistically similar in HB, MCH and MCHC values. The haemoglobin concentration and packed cell volume in this study fell within the normal range of (6.0 – 13.0 g/100ml) and (29 – 38%) respectively according to (Nworgu, 2007). The mean corpuscular haemoglobin and mean corpuscular heamoglobin concentration also fell within the normal range of (32.30 – 60.10pg) and (27.35-45.51%) respectively as reported by Nowaczewski and Kontecka (2012). This suggested that inclusion of niacin and yeast did not constitute of any harmful effect to the broilers. This supports the findings of (Khan and Zafar, 2005) who stated that Haematological parameters are good indicators of the physiological status of animals.

Table 4: Effect of yeast and niacin on Serum profile of broiler starter phase.

TREATMENT	CONTROL	T_2	T_3	T_4	SIGNIFICANT
HDL (mg/dl)	80.08±7.02	69.99±4.02	75.82±5.66	79.14±1.94	N.S
CHOLESTEROL (mg/dl)	68.86±2.85^{c}	68.07±1.40^{c}	111.38±7.06^{b}	126.73±8.02^{a}	*
ALBUMIN(g/dl)	1.15±0.08	1.19±0.10	1.05±0.08	1.27±0.16	N.S
TRIGLYCERIDES(mg/dl)	120.64±14.35^{a}	51.88±7.54^{b}	60.94±23.02^{b}	74.21±9.06^{a}	*
TOTAL PROTEIN(g/dl)	4.73±0.69	3.97±0.43	3.27±0.32	3.50±0.43	N.S
LDL(g/dl)	-66.07±3.47^{c}	-26.73±7.81^{b}	7.87±6.17^{a}	13.22±2.04^{a}	*
GLOBULIN	3.52±0.68	2.78±0.34	2.22±0.30	2.22±0.36	N.S

N.S= not significant, *= significant

Table 4 indicated that there were significant (P<0.05) differences in cholesterol, triglycerides and LDL. T1 and T2 were significantly (P<0.05) lower in cholesterol values than the values of T3 and T 4. T4 was statistically higher in cholesterol value. T1 (120.64±14.35) was significantly (P<0.05) higher in triglycerides value than other treatments. The LDL values of T4 (13.22±2.04) and T3 (7.87±6.17) were significantly higer than other treatments. T1 (-66.07±3.47) had the least value of LDL. This study disagreed with the finding of Kamanna and Kashyap (2000) who reported that the typical effects of niacin causes decreased low density lipoprotein and cholesterol concentrations. And it is also in contrast with the findings of Kamanna and Kashyap (2000) who affirms that niacin is best used to reduce cholesterol serum. These differences could be due to the level of inclusion, environmental factor, climate and management practices. This result agreed with the findings of Djouvinov et al (2005) who reported no significant difference in the level of total proteins in a study with ducklings using a multi-strains probiotic. The result on the value of triglycerides level was in agreement with the findings of Hu *et al*. (2012) who reported that niacin effectively reduces plasma triglyceride levels.

CONCLUSION

This research established that in inclusion of niacin and yeast in broiler production, small dosages have to be administered to avoid overdoes. Notwithstanding, a right dosage of niacin and yeast can enhance the performance of broiler production in terms of haematological, serum biochemical and carcass and organ analysis.

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