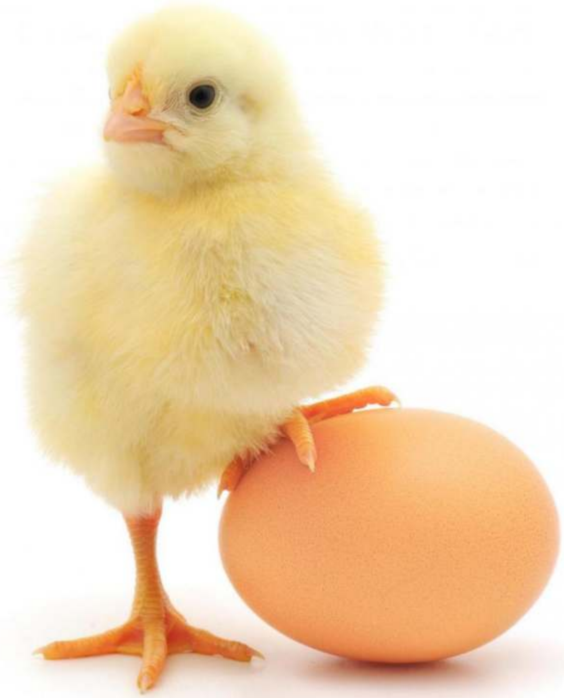
ISSN 1682-8356
ansinet.org/ijps



INTERNATIONAL JOURNAL OF
POULTRY SCIENCE

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

International Journal of Poultry Science 8 (4): 397-400, 2009
ISSN 1682-8356

Effect of Graded Level of Alphamune G on Performance, Blood Chemistry and Histology of Cockerel Chicks

S.A. Bolu, V. Ojo, O. Oluyemi, O.I. Babawale and O.A. Awodele
Department of Animal Production, University of Ilorin, Ilorin, Nigeria

Abstract: A study was conducted to determine the response of day-old cockerel chicks to graded levels of Alphamune G (0.00, 0.04, 0.05 and 0.06%). The experiment which was conducted for 8 weeks employed a completely randomized design. Feed intake and nutrient retention were not significantly influenced (p>0.05) by dietary inclusion levels of Alphamune G. However, weight gain and feed to gain ratio were significantly improved (p<0.05) for cockerel chicks fed 0.06% inclusion level when compared with the control. The values were 7.78 and 4.58 g/bird/week, respectively. Haematology and serum indices did not show any significant effect as a result of the graded levels of dietary Alphamune G. Histological characteristics revealed slight morphological changes in specific organs of birds fed Alphamune G supplemented diet vis-a viz the control diet. Inclusion of Alphamune G at 0.06% in the diets of cockerel chicks gave the best performance.

Key words: Alphamune G, cockerels, diet

INTRODUCTION

The use of antibiotics as a growth promoter has been reported for decades (Jensen, 1998). Antibiotics improve digestibility, nutrient uptake and inhibit proliferation of pathogenic bacteria by establishing themselves in the gut of poultry animals (NOAH, 2006). Currently, the use of antibiotics has come under critical reviews because of the development of resistant bacteria strains can be transferred from the animals to humans (Bent and Jesen, 2004). Consequently, new concepts have been developed aimed at promoting animal health and growth performance, feed efficiency and product quality as well (Sims *et al.*, 2004).

Alphamune G is a promising alternative to Antibiotics Growth Promoter (AGP) (Alpharma Animal Health, 2004). Alphamune G is an extract of *Saccharomyces cerevisae* that has been spray dried to a tan powder and granulated. It is a feed supplement that improves performance and immuno-competence system of animals. It enables the animal withstand occurring pressure with its own physiological competence (Huff, 2007). Alphamune is a combination of 1-3, 1-6 β - glucans and mannan oligosaccharides. β-glucan has been found to posses' immunomodulatory function and mannans, a prebiotic effect when fed to biological systems. (Bent and Jesen, 2004). It has been reported that Alphamune G supplementation in pig diet improved their performance compared to salinomycin (an AGP). Optimal performance, of alphamune as been recorded at 500 g/tonnes of feed (Alpharma Animal Health, 2004). However, Bolu *et al.* (2009) reported that 0.04% dietary inclusion of Alphamune G gave better performance in broiler chicks.

There is dearth of record on the possible effect of a lower or higher level of alphamune when fed to birds in the Sub-Saharan environment. Production idiosyncrasies in the Sub-Saharan Africa may increase or lower the dietary inclusion levels that would guarantee optimum performance of Cockerel chicks. This study was conducted to examine the effect of graded levels of Alphamune G on performance, carcass characteristics, blood constituents and histology of cockerels.

MATERIALS AND METHODS

Two hundred days old Anak cockerels were used in this study. The chicks were weighed and randomly allotted to four treatment groups. Each group was replicated in ten pens of five birds each. Birds were housed in an electrically heated metabolic battery cage. The dietary treatments consisted of four graded levels of Alphamune G (0.00, 0.04, 0.05 and 0.06%) incorporated into a basal diet (Table 1) formulated to meet the nutrient requirement of cockerel chicks (NRC, 1994). Routine management and vaccination programme necessary for cockerel production were followed. Feed and water were given *ad libitum* for the 56 days feeding trial.

Feed intake and body weight gain were recorded weekly and used to compute the feed to gain ratio. Nutrient retention was determined after three weeks of the trial using the total collection method. Proximate analysis of the diet and faecal samples were determined according to the methods of AOAC (1990).

At the end of the experiment, ten birds were selected/ treatment fasted overnight and slaughtered by severing the jugular vein for carcass evaluation. The relative weights of different cut parts and organs were taken and expressed as g/100 g body weight of the birds. Following carcass analysis, the organs required for histological studies were dissected and preserved in 10% formalin solution. The tissues were trimmed, fixed

Table 1: Composition of the basal diet (g/kg)

Ingredients	Quality
Maize	570.0
Soybean meal	161.5
Groundnut cake	200.0
Fish meal	25.0
Bone meal	25.0
Oyster shell	11.0
DL-methionine	1.0
L-lysine	1.0
Salt	3.0
Minerals/vitamin premix*	2.5
Total	1000.0

Analyzed nutrient content: Crude protein (%), 23.86; Crude fat (%), 4.5; Crude fibre (%) 3.6; Total ash (%), 13. Minerals (as calculated) ca (%), 0.9; K (%), 0.2; Na (%) 0.15, cl (mg), 800; cu (Mg), 4; Se (mg), 0.1; Zn (mg), 40, *Contain (/Kg):- Retinol, $4x10^6$ i.u; Cholecalciferol, $1.2x10^6$ i,u; Tocopherol, 3200 i.u. Menadione, 800 mg; Riboflavin, 2200 mg; Thiamin, 3200 mg; Niacin, 400 mg; Pyridoxine, 480 mg; Calcium pantothenate, 2800 mg; Folate 240 mg; Choline choride, $2x10^5$ mg; Biotin, 12 mg; Se. 40 mg; Mn, 32000 Cu, 3200 mg; Zn, $2x10^5$ mg; Co, 180 mg; I, 800 mg; Mg, 400 mg

in Bouin fixative for 24 h, embedded in wax, sectioned at 5-6 μ with microton and stained with haematoxylin and eosin. Blood samples were collected and used for haematological and serological indices according to Maxwell *et al.* (1990). This procedure include the use of Wintrobes microhaemotocrit, improved Neubauer haemocytometer and cyanomethaemoglobins method, respectively.

Response criteria from the experimental trial were subjected to Analysis of Variance (ANOVA) for Completely Randomized Design (Steel and Torrie, 1980). Differences between treatment means were separated using Duncan Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Weekly feed intake was not significantly influenced (p>0.05) by dietary Alphamune G, however, weight gain and feed to gain ratio varied (p<0.05) in response to dietary levels of Alphamune G (Table 2). Cockerel chicks fed 0.06% inclusion of Alphamune G had the highest weekly feed intake (35.60 g/bird/week) and weight gain (7.78 g/bird/week). Cockerel chicks fed 0.04% dietary Alphamune G inclusion had the least weight gain (5.74 g/bird/week) and the poorest feed/gain ratio. Cumulative weight gain is a function of nutrition; alphamune and other yeast cell complex have been shown to improve feed conversion efficiency and increased body weight in chickens (Bolu *et al.*, 2009; Zhang *et al.*, 2005). Broilers chicks fed 0.04% dietary inclusion of Alphamune G gave the best performance (Bolu, *et al.*, 2009). Cockerels are slow growers vis-a-viz a broiler. The effect of an immunomodulator may be more pronounced in a fast growing strain of poultry than the slow growers. However, higher levels of Alphamune G may enhance performance of slow growing strains.

Nutrient retentions were not influenced by dietary Alphamune G (p>0.05). Protein retention was however, highest for cockerel chicks fed 0.06% Alphamune G inclusion (65.59%) and lowest in control diet (0.00% Alphamune G). Fat retention was highest (61.90%) for cockerel chicks fed 0.04% inclusion level of Alphamune G and lowest in 0.05% Alphamune G inclusion (57.08%). This observation is at variance with the result of nutrient retention in broiler chicks (Bolu *et al.*, 2009). Nutrients retained were not different for cockerel chick, however, the highest inclusion level of Alphamune G may further benefit cockerel chicks since, their growth rates are not expected to be rapid as for broilers.

Carcass characteristics of cockerel chicks fed Alphamune G (Table 3) were not influenced significantly (p>0.05) for some parameters such as dressing percentage, shank, wing, proventriculus and spleen. However, values observed for most of the commercial cuts e.g. drum stick, thigh, keel and back and neck, liver were significant different. Cockerel chicks fed 0.06% alphamune had the highest dressing percentage while birds fed 0.04% Alphamune G recorded the lowest dressing percentage (74.50 and 70.05%), respectively. This observation is in consonance with the report of Brake *et al.* (1993) that the yield of body component changes with increase body weight.

Haematological indices (Table 4) were not affected significantly by dietary levels of Alphamune G except for White Blood Cell (WBC). The WBC value recorded for the birds on control diet was $10.47x10^9$/L. Haemoglobin and Packed Cell Volume (PCV) values were similar for the treatments but lower than normal values of 9-13 and 30-40%, respectively reported by MVM (1986). Lymphocyte values were higher than values of 30-70% reported by Babatunde and Olusanya (1992). Higher values of lymphocyte were observed in birds fed alphamune inclusion than in control with the least value (84%). This may be attributed to the immunomodulatory function of alphamune indicating high immunity in birds (Adeyemo and Longe, 2007). It is noteworthy that cockerel chicks fed 0.06% Alphamune G inclusion had the highest value of lymphocytes (89%). This observation agrees with Bolu *et al.* (2009) that reported immunomodulatory lymphocytic infiltrations in various histological sections of tissues in broiler chicks fed Alphamune G. Haematological indices have been reported as diagnostic tools for various illnesses in domestic animals (Kecceci *et al.*, 1998).

Serum biochemical constituents (Table 5) showed that total protein, albumin, cholesterol, creatinine and Alanine Amino Transferase (ALT) did not vary significantly (p>0.05) in response to dietary Alphamune G in cockerel chicks. Alkaline phosphate was non-significantly higher in alphamune fed birds than in control. Elevated serum alkaline phosphates are usually

Table 2: Effect of graded levels of alphamune on performance of cockerels chicks

Diets alphamune G (%)	Feed intake (g/bird/week)	Weight gain (g/bird/week)	Feed/gain ratio	Protein retention (%)	Fat retention (%)
0.00	35.47	7.14^{a}	4.97^{a}	62.44	61.33
0.04	33.58	5.74^{b}	5.85^{b}	64.42	61.90
0.05	33.24	5.84^{b}	5.66^{b}	65.49	57.08
0.06	35.60	7.78^{a}	4.58^{a}	65.59	61.65

a,b, Values in a column with the same superscript are similar ($p>0.05$)

Table 3: Effect of dietary levels of alphamune on relative weights of organ and commercial cuts of cockerel chicks (g/100g body weight)

Diets alpha-mune (%)	Dressing %age	Head	Shank	Drum stick	Thigh	Wing	Keel	Neck	Liver	Back	Proventriculus	Spleen
0.00	71.20	3.14^{ab}	5.1	9.42^{ab}	10.78^{bc}	8.72	16.96^{a}	4.16^{b}	3.02^{a}	17.29^{a}	0.49	0.2
0.04	70.05	2.80^{b}	5.02	8.16^{b}	9.89^{c}	7.00	15.78^{b}	3.71^{bc}	2.33^{b}	15.39^{b}	0.43	0.2
0.05	70.83	3.18^{ab}	5.28	9.66^{ab}	10.00^{bc}	8.26	16.79^{a}	3.87^{c}	2.72^{a}	16.40^{a}	0.46	0.1
0.06	74.50	3.44^{a}	5.63	10.95^{a}	11.50^{a}	8.17	17.34^{a}	4.57^{a}	2.85^{a}	16.85^{a}	0.47	0.2

a,b, Values in a column with the same superscript are similar ($p>0.05$)

Table 4: Effect of dietary levels of alphamune g on haematology of cockerel chicks

Diets Alphamune (%)	Packed cell volume (%)	White blood cell ($\times 10^{9}$/L)	Red blood cell ($\times 10^{12}$/L)	Haemoglobin (g/dL)	Neutro-phils (%)	Lymphocytes (%)	Eosinophils (%)	Monocytes (%)	Baso-phils (%)
0.0	23	10.47^{a}	4.3	5.4	14	84	1.3	-	-
0.4	26	9.4^{b}	4.8	5.5	12	87	1.0	-	-
0.5	23	6.7^{ab}	4.7	4.8	12	87	1.3	-	-
0.6	24	9.4^{b}	4.9	4.7	11	89	-	-	-

a,b, Values in a column with the same superscript are similar ($p>0.05$)

Table 5: Effect of dietary levels of alphamune g on specific biochemical indices of cockerel chicks

Diets alphamune (%)	Uric acid (Mmol/L)	Cholesterol (M mol / L)	Albumin (g/L)	Protein (g/L)	Creatinine (μmol/L)	Alkaline phosphatase (μ/L)	Aspartate amino transferase (μ/L)	Alanine amino transferase (μ/L)
0.00	0.45	1.9	14.7	31.0	63.3	83.3	22.0	8.0
0.04	0.35	1.7	18.0	45.3	88.7	104.0	22.7	12.0
0.05	0.49	2.1	19.0	38.3	76.7	108.7	30.0	9.0
0.06	0.44	1.9	17.3	45.3	86.0	105.3	26.0	10.0

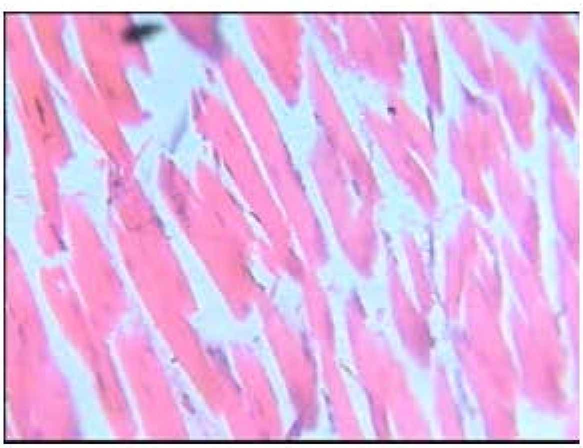


Fig. 1: Breast muscle of Broilers fed the control diet. (x 400)

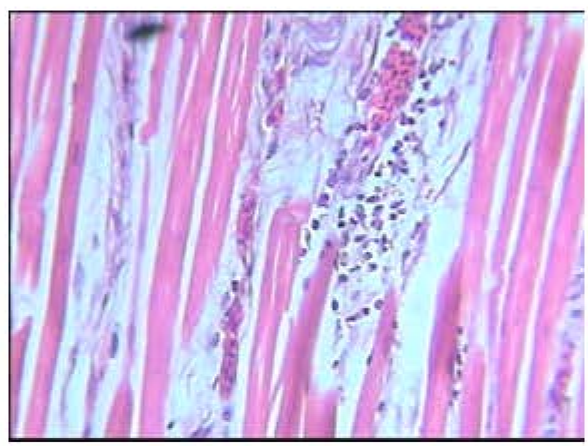


Fig. 2: Breast muscle of broilers fed Alphamune G showing specific lymphocytic infiltrations (x 400)

due to increased concentration of the hepatic or bone isoenzymes and they indicate pathology of these organs (Bolu *et al.*, 2006).

Histological examination of the organs of cockerels revealed no abnormal morphological changes especially for birds fed 0.00 and 0.04% Alphamune G inclusion. However, with increase in the level of Alphamune G above 0.04%, slight morphological distortions (Fig. 1-3) with scanty areas of hemorrhage were observed. This observation tends to show the immunmodulatory effect of Alphamune G (Huff, 2007). Cockerel chicks fed dietary Alphamune G inclusion at

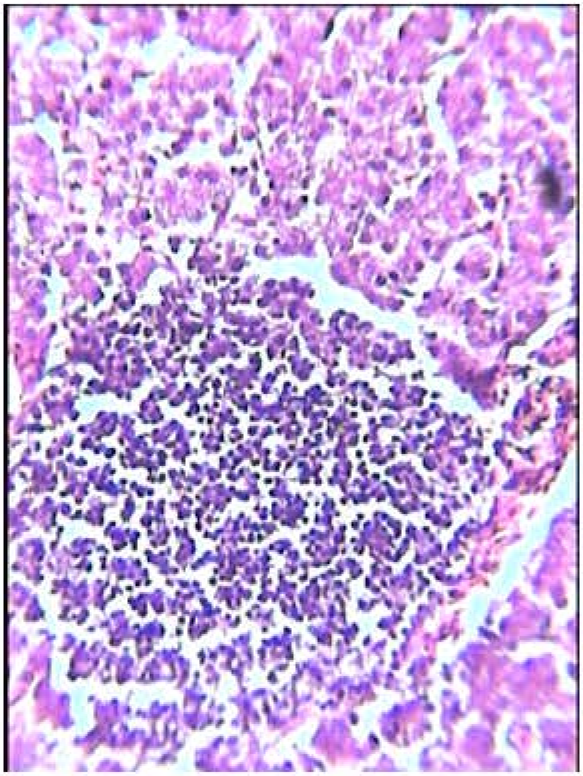


Fig. 3: Liver cells of Broilers fed Alphamune G showing lymphocytic infiltrations (x400)

0.06% had better performance. Alphamune G may be a necessary additive in the diets of cockerels. Further studies to ascertain the specific immunomodulatory effect of Alphamune G on pathogens challenged birds may be necessary.

REFERENCES

Adeyemo, G.O. and O.G. Longe, 2007. Effect of graded levels of cotton seed cake on performance, haematology and carcass characteristics of broiler fed from day old to 8 weeks of age. Afr. J. Biotechnol., 6: 1064-1071.

AOAC, 1990. Association of official analytical chemist official method of Analysis. 15^h Edn. Washington, DC.

Alpharma Animal Health, 2004. alphamune G. for poultry http://www.thepoultrysite.com/articles/722/alphamune-g-data-sheet (retrieved 04/04/09).

Babatunde and Olusanya, 1992. Rubber seed oil vs. Palm oil in broiler chickens diet. Effect on performance, nutrient digestibility, haematology and carcass characteristics. Feed Sci. Tech., 35: 133-146

Bent Borg and Jesen, 2004. Cereal micro flora as affected by dietary fibre of cereals and enzyme supplementation 69 zjad Naukowy OTZ Stri., pp: 60.

Bolu, S.A., V. Ojo, B.A. Oyeleke, A.O. Ajiboye, A. Baa Sambo and O. Oluyemi, 2009. Effects of Alphamune G on the performance, blood chemistry and Histology of Broilers. Int. J. Poult. Sci., 8: 32-34.

Bolu, S.A. Aklilu, Hailemichael and O.O. Balogun, 2006. Effects of improved locally produced natural vitamin premix on the histology and specific enzyme activities of broilers. Ind. J. Poult. Sci., 6: 223-228.

Brake, J., G.B. Havesten, T. Scheducers, P.R. Ferdet and D.V. River, 1993. Relationship of Sex, Age, Body Weight to carcass yield and offal production. Poult. Sci., 72: 1137-1148.

Duncan, D.B., 1955. Multiple range and multiple F. Test Biom., 11: 1-42.

Huff, G.R., 2007. Yeast improves resistance to environmental challeng4es. World Poult., 23: 12-14. www.Worldpoultry.net (retrieved 04/04/08).

Jensen, B.B., 1998. The impact of feed additives on the microbial ecology of the gut in young pigs. J. Anim. and Feed Sci., 7: 45-64, Suppl. 1.

Kecceci, T., H. Oguz, V. Kurtoglu and O. Demet, 1998. Effect of polyvinylpyrrolidon, synthetic zeolite and bentonite on serum biochemical and haematoogical characteristics of broiler chickens during aflatoxicosis. Br. Poult. Sci., 39: 152-158.

MVM, 1986. Merck Vet Manual 6th Edn. Merck and Co. Wc Rehway NJ USA, pp: 1-9.

Maxwell, M.H., W. Robertson, S. Spence and Mc Corquodale, 1990. Comparison of haematological values in restricted and *ad libitum*-fed domestic fowls: Red blood cell characteristics. Br. Poult, Sci., 31: 407-413.

National Research Council, 1994. Nutrient Requirements of Poultry. 9th ed. National Academy Press, Washington, DC.

NOAH, 2006. National Office of Animal Health (NOAH). Antibiotics for animals http://www.noah.co.uk/issues/antibiotics.htm (retrieved 04/04/08).

Steel, R.G.B. and S.A. Torrie, 1980. Principles and Procedures of Statistics. A Biometrical Approach 2nd Edn. McGraw Hill Book Co. New York.

Sims, M.S., K.A. Dawson, D.E. Neroman, P. Spring and D.M. Hoogell, 2004. Effects of dietary mannan oligosaccharide, bacitracin methlene disalicylate, or both on the live performance and intestinal microbiology of turkeys. Poult. Sci., 83: 1148-1154.

Zhang, A.W., B.D. Lee, S.K. Lee, K.W.K.B. Song and C.H. Cee, 2005. Effects of yeast cell component on growth performance, meat quality and via mucosa development of broiler chicks. Poult. Sci., 84: 1015-1621.