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Response of turkey poults to graded levels of Alphamune

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Abstract

A study was conducted to assess the effects of feeding graded levels of Alphamune (a growth promoter and immunomodulator) on the performance, nutrient utilization, haematology, serum biochemistry, enzyme profile, histology and carcass evaluation using turkey poults. The birds were fed graded levels of Alphamune of 0.00%, 0.04%, 0.05% and 0.06%. Feed and water were provided *ad libitum* throughout the eight (8) week experimental period. There was no significant difference (P>0.05) in weight gain, feed to gain ratio, utilization of crude protein, fat and crude fiber, however, feed intake was significantly influenced (P<0.05) by dietary Alphamune. Haematological parameters and serum biochemical indices were similar (P>0.05) except for haemoglobin concentration and, creatinine and potassium, respectively. Relative weights of the primal cuts were not significantly affected (P>0.05) except for wings and back. Histological study revealed increased degeneration of tissues with increased level of Alphamune, however, at inclusion levels of Alphamune above 0.05%, there was extensive infiltration of lymphocytes in the liver. Generally, inclusion of Alphamune in turkey poults diet improved their relative performance. A recommended dietary inclusion level of 0.05% is optimum for the health benefit of Turkeys.

Introduction

Growth promoters are estrogenic materials used to bring about a hormonal balance within the animal that favours fat deposition, carcass improvement and generating tender and tastier products (Atteh, 2004). An important growth promoter, the antibiotics, which has been in use since 1950 has been shown to compensate for the high levels of stress, improve digestibility, nutrient uptake and inhibit proliferation of pathogenic organisms by establishing themselves in the gut of the animal (NOAH, 2006). The overuse of non-therapeutic antibiotics in poultry, beef, cattle and swine production poses a threat to human health as half of these antibiotics belong to classes of drugs used in human medicine. The risk of antibiotic resistance is a current discourse and this has led to increased frequency of treatment failures and severity of infection (Bates et al., 1993; Bent and Jensen, 2004; WHO, 2007). The need for alternative sources to antibiotics to promote growth in animals cannot be over-emphasized (Thwaites and Frost, 1999; Bywater, 2005; Dibner and Richards, 2005).

Alphamune, a unique combination of alpha-glucans and mannans, is a reliable and innovative metabolic complement replacing antimicrobial growth promoters in modern production of growing animals like pigs and poultry, recommended application is 500g per tonne of feed (Alpharma, 2011). It 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. Alpha-glucans are known to have immuno-modulating effects and mannans are known to have prebiotic effects (Bent and Jensen, 2004). Immunomodulators are known to specifically stimulate the immunity response and prebiotics mannans are substrate for and helpful to develop a well balanced intestinal flora and inhibit gram-negative bacteriae.g., *Salmonella* species.

Improved performance has been reported with Alphamune G supplementation in pigs, broiler chicks and cockerels (Alpharma Animal Health, 2004; Bolu et al., 2009 a&b). Solis et al. (2007) reported accelerated gastrointestinal maturation in turkey poults. The objective of this work was to determine the response of turkey poults to graded levels of Alphamune G.

Materials and Methods

Sixty five weeks old turkey poults of mixed sexes were used for the study. The birds were weighed and randomly allotted to four treatments with three replicates. The dietary treatments consisted of graded levels of Alphamune G at 0.00%, 0.04%, 0.05% and 0.06% incorporated into a basal diet (Table 1). The birds were housed in deep litter pens and feed and water were provided *ad libitum* throughout the experimental

period. Standard management practices and vaccinations were administered (Bolu et al., 2009).

Feed intake, weight gain and feed/gain ratio were measured on weekly basis. At the third week of the experimentation, nutrient retention trial was carried out using the total collection method for 72 hours (Bolu et al., 2009). Proximate compositions of feed and feacal samples were carried out according to the procedure of AOAC (1990). At the end of the experimental period, four birds per treatment were randomly selected, fasted for 12 hours and slaughtered for carcass evaluation. Organs (breast muscle and liver) for histology were taken and preserved in 10% formalin solution. At the end of the experiment four birds were selected, fasted overnight and slaughtered by severing the jugular vein. Blood samples were collected with EDTA containing sample bottles for haematological studies. Blood samples used for serum analysis were collected without an anti-coagulant. Haematological and serological indices were determined according to Maxwell et al. (1990). Data obtained from the experimental trial were analyzed using the completely randomized design (Steel and Torrie, 1980). Significant differences were subjected to Duncan Multiple Range Test (Duncan, 1955).

Table 1: Composition of Basal Diet

Ingredient	%
Maize	46.70
Wheat offal	6.00
Soyabean meal	29.30
Groundnut cake	10.00
Fishmeal	3.50
Palm Oil	2.50
Bone meal	1.00
Oyster shell	0.10
Methionine	0.10
Lysine	0.25
Salt	0.30
Vitamin/Mineral Premix	0.25
Total	100.00
Calculated Analysis	
Crude Protein (%)	26
Metabolizable Energy (kcal/kg)	2900

*Premix supplied per kg of diets; Vitamin A: $8x10^6$ IU, Vitamin D_3: 1500IU, Vitamin E: 10IU, Vitamin K_3: 1.5mg, Vitamin B_1: 1.6mg, Vitamin B_2: 4mg, Vitamin B_6: 1.5mg, Vitamin B_{12}:0.0mg, Niacin: 20mg, Pantothenic acid: 5mg, Folic acid: 0.05mg, Biotin 0.75mg, Choline Chloride: $1.75X10^4$ mg, Cobalt: 0.2mg, Copper: 0.2mg, Iodine: 1mg, Iron: 20mg, Manganese: 40mg, Selenium: 0.2mg, Zinc: 80mg, Antioxidant: 1.25mg.

Results and Discussion

There was significant difference ($P<0.05$) in the performance of Turkey poults fed diets containing Alphamune G and the control diet (Table 2). Turkey poults fed 0.06% dietary level of Alphamune G had highest feed intake and weight gain (113.5 gm/bird/day and 49.9 gm/bird/day respectively. This was also similar to the bird fed 0.05% dietary level of Alphamune (105.70 gm/bird/day and 48.6 gm /bird/day). However, Turkey poults fed 0.05% inclusion level of Alphamune had the best feed to gain ratio These results further corroborate the reports of Zhang et al. (2005), Huff et al. (2006) and Bolu et al. (2009) that inclusion of dietary Alphamune significantly improved the body weight gain of chicks. The result of the nutrient retention trial showed that dietary inclusion of Alphamune G had no significant effect ($P>0.05$) on fat, fiber and ash retention (Table 2).

There were no significant differences ($P<0.05$) among birds fed the different treatments for haematology (Table 3), except for the haemoglobin concentration, WBC and lymphocyte values. Birds fed 0.06% dietary Alphamune had significantly ($P<0.05$) higher relative value (9.43 g/dl). This value, is a positive indication of significant haemopoiesis and consequently, improved oxygen carrying capacity of the blood. Haematology values have been reported to be diagnostic tools for various illnesses in domestic animals (Kecceci et al., 1998). With increasing concentration of dietary Alphamune, values for PCV decreased which was within the range for turkey poults (MVM, 1986). Birds fed dietary Alphamune G had higher WBC values *viz-a-viz* the control diet. This observation was also similar for the values for lymphocytes recorded. Lymphocytes have been reported to range between 30–70% of total WBC (Babatunde and Olusanya, 1992; Bolu et al., 2009). Birds fed dietary Alphamune tended to have higher WBC values than the control birds, this may be as a result of the immunomodulatory function of Alphamune indicating high immunity in birds (Adeyemo and Longe, 2007).

Serum biochemical indices observed for the turkey poults (Table 4) showed that total protein, albumin, uric acid, alkaline phosphatase, acid phosphate, aspartate aminotransferase (AST), alanine Amino Transferase (ALT), cholesterol, glucose, globulin, bicarbonate and sodium were not significantly ($P>0.05$) affected by dietary Alphamune G. However, serum creatinine and potassium were significantly ($P<0.05$) affected by dietary Alphamune, birds fed 0.04% and 0.05% Alphamune had similar values with the control birds but these values were different ($P>0.05$) from the value obtained for birds fed 0.06% dietary.

Table 2: Effect of graded levels of Alphamune G on feed intake, weight gain, feed:gain ratio and nutrient retentions on turkey poults

Alphamune (%)	Feed intake (g/bird/day)	Weight gain (g/bird/day)	Feed: Gain Ratio	Fat retention (%)	Fibre retention (%)	Ash retention (%)
0.00	89.60[a]	19.8	4.5	9.50	28.40	20.00
0.04	102.60[b]	31.8	3.2	7.70	22.50	24.50
0.05	105.70[bc]	48.6	2.2	7.10	18.10	24.41
0.06	113.52[c]	49.9	2.3	5.40	15.20	23.21

[a-c] Values in the same column with different superscripts are significantly different (P<0.05)

Table 3: Effect of Graded Levels of Alphamune G on Haematology of Turkey Poults

Alphamune (%)	PCV (%)	RBC ($x 10^{12}$)	WBC ($x 10^{9}$)	Hb (g/dl)	Lymphocytes (%)	Neutrophils (%)	Monocytes (%)	Basophils (%)	Eosinophils (%)
0.00	30.67	2.03	9.70[b]	7.62[b]	63.33[b]	34.33	0.67	0.33	1.33
0.04	28.33	1.90	11.37[a]	7.17[b]	65.33[ab]	33.33	-	0.33	1.00
0.05	26.33	1.78	11.07[a]	6.63[b]	68.67[a]	31.33	-	-	-
0.06	25.67	1.87	11.70[a]	9.43[a]	65.00[ab]	34.00	-	-	0.67

[a,b] Values in the same column with different superscripts are significantly different (P<0.05)

Table 4: Effect of graded levels of Alphamune G on serum biochemical indices and enzyme profile of turkey poults

Biochemical Indices	0.00%	0.04%	0.05%	0.06%
Protein (Mmol/l)	29.20	31.43	28.00	25.87
Albumin (Mmol/l)	12.93	12.07	9.77	10.63
Creatine (Mmol/l)	33.43[a]	31.90[a]	30.47[a]	57.77[b]
Uric acid (Mmol/l)	0.23	0.25	0.21	0.26
Alkaline phosphatase (IU/l)	40.07	39.47	45.67	40.87
Acid phosphatase (IU/l)	4.63	4.77	3.97	4.70
Aspartate aminotransferase (IU/l)	109.40	106.97	108.17	106.08
Alanine aminotransferase (IU/l)	18.53	16.90	14.73	15.87
Cholesterol (Mmol/l)	21.60	33.77	34.37	31.60
Glucose (Mmol/l)	3.03	2.67	2.93	3.07
Globulin (Mmol/l)	16.27	19.37	18.23	15.23
Potassium (Mmol/l)	3.10[b]	1.77[a]	2.83[b]	2.77[b]
Bicarbonate (Mmol/l)	27.57	20.43	24.70	21.73
Sodium (Mmol/l)	124.93	119.20	113.00	99.45

[a,b] Values in the same row with different superscripts are significantly different (P<0.05)

Table 5: Effect of graded levels of Alphamune G on carcass evaluation of turkey Poults (g/100g body weight)

Alphamune (%)	Dressing percentage	Back	Wings	Breast	Gizzard	Thigh	Drumstick	Shank
0.00	91.20	206.2[ab]	99.0[a]	187.8	78.0	131.5	120.7	34.0
0.04	90.05	135.9[a]	124.0[ab]	195.6	75.0	151.0	129.6	39.6
0.05	92.40	226.0[ab]	177.6[b]	307.2	74.8	178.8	168.0	46.5
0.06	94.50	279.9[b]	182.8[b]	355.4	69.7	188.3	182.5	47.3

[a,b]Values in the same column with different superscripts are significantly different (P<0.05)

Alphamune (57.77 Mmol/l). Creatinine is a waste product of muscle metabolism and a good measure of kidney function (Siamak, 2011).

The results of the carcass evaluation are shown in Table 5. There were no significant differences (P>0.05) observed for the dressing percentage, breast, gizzard, thigh, drumstick and shank. However, the head, neck, back and wings were significantly different (P<0.05). Birds fed Alphamune had the higher values of dressing percentage and primal cuts than the control birds. This observation agrees with the reports of Brake et al. (1993), Young et al. (2001) and Bolu et al. (2009) that the yield of body components changes with increase in body weight.

Histological examination of the liver and breast muscle were observed. The observation (Fig. 1-4)

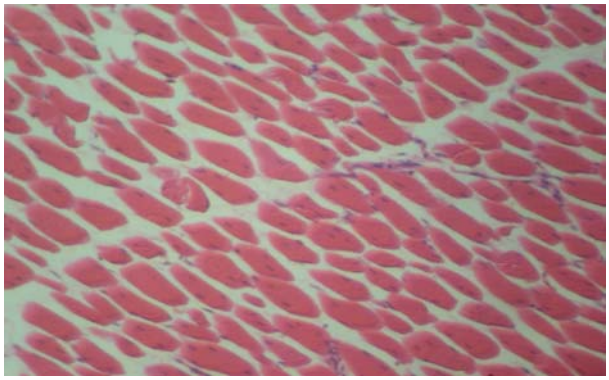

Fig. 1: Normal breast muscle of control broiler fed 0.0% Alphamune (X400).

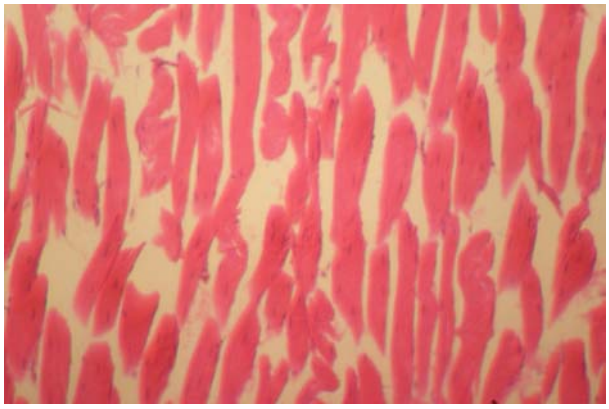

Fig. 2: Normal breast muscle of broiler fed 0.05% Alphamune (X400).

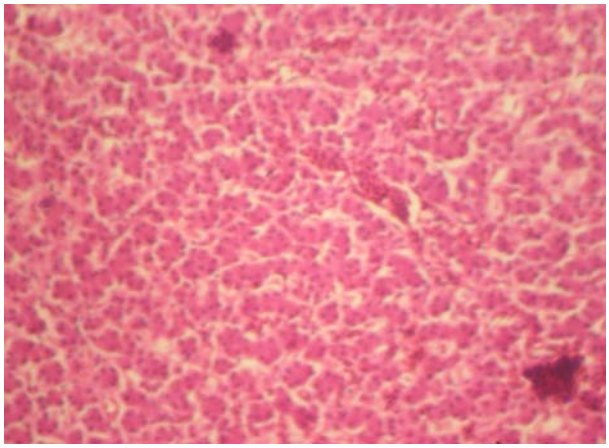

Fig. 3: Normal liver of control broiler fed 0.0% Alphamune (X400).

revealed that the liver and breast muscle of the control birds showed no abnormality. Turkey poults fed dietary Alphamune, had lymphocytic infiltration of the liver while the breast muscle showed no abnormality. This

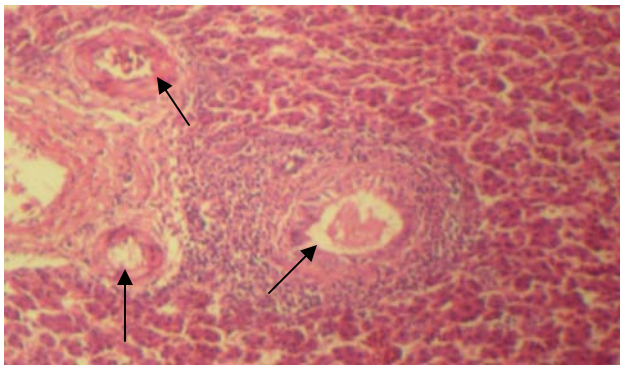

Fig. 4: Breast muscle of broiler fed 0.05% Alphamune showing lymphocytic infiltration close to the ducts (X400).

confirms the result of the haematology, that dietary Alphamune boosts the immunity of birds (Huff, 2007; Bolu, et al., 2009).

Conclusion and Recommendations

The results of this study suggest that dietary Alphamune improved performance and yield of turkey poults when used at the recommended dosage of 0.05%.

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