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Influence of Multi-Enzyme Supplementation on Broilers Fed Normal Energy and Protein Level Diet in South-East Tropical Zone of Nigeria

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Abstract
A total of 120 day-old Abor Acre mixed sex broilers were used in a completely randomized design experiment to investigate the Influence of multi-enzyme supplementation on finisher broilers fed normal energy and protein level diet in south-east tropical zone of Nigeria. Each dietary treatment was replicated four (4) times with fifteen (15) birds per replicate. Multi-enzyme was supplemented at 1g/kg of experimental diet. Results showed that multi-enzyme supplementation to normal energy and protein broiler dietary levels decreased live weight, organ weights and carcass percentage weight. This suggested that supplementation of multi-enzyme to normal energy and protein starter to finisher broiler diets will negatively affect performance and should not be practiced.

Keywords: Broilers, carcass characteristics, multi-enzyme, hematology

Introduction

The dynamics of the scarcity of the feed materials for poultry placed premium on the study of the actual required dietary nutrient in poultry feeding which must be well balanced for optimum performance and production (Diro *et al*., 2010). The non-starch polysaccharides (NSP) in ingredients such as soybean meal and other cereal grains are the main factors which reduce nutrient bioavailability (Malathi and Devegowda, 2001).The use of synthetic enzyme for enhanced utilization in monogastric feeding to meet the dietary energy and protein needs has been worked upon (Aletor *et al*., 2000). Supplementation of exogenous enzyme to cereal based diet is often followed by improved performance (Wang et al., 2005). Hajati *et al*. (2009) reported significant increase in carcass yield and decreased the relative size of the digestive organs as a result of enzyme supplementation.

Increasing energy and protein density of diets for broiler chicken has been giving inconclusive results; hence this study aimed at investigating the influence of multi-enzyme supplementation on finisher broilers fed normal energy and protein level diet in south-east tropical zone of Nigeria**.**

Materials and Methods

A total of 120 day-old Abor Acre mixed sex broilers from Nastech hatchery, Oyo state were used for this study. The birds were allocated to the experimental dietary treatment in a randomized complete design. Each treatment was replicated 4 times with 15 chicks per replicate; the dietary treatment was formulated to meet the nutrient recommendation according to feeding standard of broilers chickens. The composition of the diet is shown in Table 1. Maxi-Grain^{R} multi-enzyme, (Polchem Hygiene Laboratories Pvt. Ltd India), was supplemented at the level of 1g/kg of the experimental diets.

Brooding was done with kerosene stoves under metal hoovers, while light was provided with 100 watt electric bulbs for additional five hours at night each day. The birds were provided with water and experimental died *ad libitum*. Routine vaccination against common diseases (Newcastle, Gumboro, and Typhoid) and medications were administered to the birds during the experiment.

The experimental design for this study is a Completely Randomized Design, (CRD). At the end of 7th week (49 days), 4 birds per treatment were randomly selected, starved over-night but allowed access to drinking water, weighed and slaughtered by severing the jugular vein. They were thoroughly bled and the internal organs and intestine were removed through a slit made between the end of the keel bone and the cloacae.

The weight of small intestines, heart, liver, kidney, gizzard, spleen and lungs were taken using electronic sensitive scale and expressed as percentage of live weight. The carcass cut parts; breast, shank; thigh, drumstick, wings, neck, back and head were severed, weighed and expressed as percentage of dressed weight were taken using electronic sensitive scale and expressed as percentage of live weight.

Data collected were subjected to one way analysis of variance (ANOVA) for a Completely Randomized Design of SPSS 15 (2011). Difference among treatments means were separated using Duncan's Multiple Range Test of SPSS 15 (2011).

Table 1: Composition of the experimental diet

Feedstuff	Starter	Finisher
Maize	57.32	63.29
Soybean meal	38.98	33.61
Palm oil	0.45	3.10
Lysine	0.20	0.10
Methionine	0.10	0.10
Bone meal	2.55	2.50
Vitamin premix	0.25	0.25
Nacl	0.15	0.15
Total	100	100
CP (%)	23	21
ME (kcal/kg)	3000.98	3204.54

*Vitamins and mineral premix supplied the following per kg starter diet: Vitamin A: 1×107; Mn 80 g; vitamin K: 2,250 mg, Fe 20 g; Thiamine 1,750 mg; Cu 5 g; Riboflavin 5,000 mg; Iodine 1.2 g; Pyridoxine 2,750 mg; Se 200 mg; Niacin 2,750 mg; Co 200 mg; Pantothenic acid 7,500 mg; Zn 50 g; Folic acid 7, 500 mg. * Vitamins and premix supplied the following per kg finisher diet: Vitamin A 800 I.U.; D3 (1, 4731.C.U); Riboflavin 4.20 mg; Pantothenic acid 5.0 mg; Nicotinic acid 20.0 mg; Folic acid 0.5 mg; Choline 300 mg; Vitamin K, 2.0 mg; Vitamin B12, 0.01 mg; Vitamin E, 2.5I.U; Manganese, 56.0 mg; Iodine, 1.0 mg; Iron 20.0 mg; Copper 10.0 mg; Zinc 50.0 mg and Cobalt 1.25 mg.

Results and Discussion

Live weight and organ characteristics of finisher broilers fed normal energy and protein level diet supplemented with and without multi-enzyme isshown on Table 2. Broilers fed multi-enzyme supplemented diet had low significant ($p<0.05$) live weight, kidney and small intestine, apart from heart which was significantly ($p<0.05$) higher those broilers fed diet without multi-enzyme supplementation.Influence of multi-enzyme supplementation on Carcass characteristics of finisher broilers fed normal energy and protein level diet is shown on Table 3. Dress percentage, breast and back-cut of broilers fed normal energy and protein diet level without multi-enzyme supplementation were significantly ($p<0.05$) higher than those fed normal energy and protein diet supplemented with multi-enzyme.

Thebeneficial effect of enzyme supplementation of poultry diets based on viscous cereals are well established (Annison, 1992). Wang *et al.* (2005) reported that supplementation of exogenous enzyme to cereal based diet is often followed by improved performance. Thus, enzyme supplementation has become increasingly popular in poultry feeds. This study has shown that enzyme supplementation to normal energy and protein diet significantly ($p<0.05$) decreased live weight, kidney, heart and small intestinal percentages of finisher broilers.

Table 2: live weight and organ characteristics of finisher broilers fed normal energy and protein level diet supplemented with and without multi-enzyme

Parameters	+Enzyme	-Enzyme	SEM
Live weight (g)	1573.33^{b}	1840.00^{a}	108.73
Liver (%)	2.15	1.81	0.30
Kidney (%)	0.46^{b}	0.50^{a}	0.08
Lungs (%)	0.40	0.38	0.01
Spleen (%)	0.16	0.13	0.02
Gizzard (%)	2.37	1.95	0.21
Heart (%)	0.52^{a}	0.44^{b}	0.03
Small Intestine (%)	2.80^{b}	3.04^{a}	0.11

a, b, c Means on the same row with different superscripts differ significantly ($p< 0.05$); SEM= standard error of mean

Dressed percentage, breast and back-cut of finisher broilers fed multi-enzyme supplemented diet showed significant ($p<0.05$) reduction in percentage weight than those fed non multi-enzyme supplemented diet. These significant ($p<0.05$) decreased live weight and carcass cut-parts of finisher broilers fed multi-enzyme supplemented diet could be as a result of increased nutrient availability due to multi-enzyme activity which leads

to fast nutrient requirement attainment of the birds with reduced feed intake leading to poor performance and organs weight reduction. This is in line with the report of Cowan (1993) who reported that soybean meal contain non-digestible carbohydrates which could be available to broilers with proper enzyme supplementation. Zanella *et al*. (1999) reported that exogenouse enzyme supplementation of broilers diets based on corn and soybean improved nutrient digestibility which is in corroboration with the findings of this study but it contradicts with performance improvement. The poor performance observed on broilers fed multi-enzyme supplemented diet could be attributed to dietary nutrient level; this is in accordance with the report of Zhu *et al.* (2014) who stated that exogenous enzyme supplementation allowed for reduction in the energy formulation of diets.

Table 3: Carcass characteristics of finisher broilers fed normal energy and protein level diet supplemented with and without multi-enzyme.

Parameters	+Enzyme	-Enzyme	SEM
Dressed percentage	63.68^{b}	69.78^{a}	0.73
Wings (%)	14.45	13.28	0.48
Drum stick (%)	15.90	16.12	0.51
Thigh (%)	17.80	17.79	0.31
Breast (%)	27.40^{b}	30.86^{a}	0.59
Back cut (%)	22.45^{b}	24.96^{a}	0.80

a, b, c Means on the same row with different superscripts differ significantly (P< 0.05); SEM= standard error of mean

Conclusion

In conclusion, our result showed that supplementing normal energy and protein corn-soybean diet with multi-enzyme negatively affected internal organs weight and the over-all performance of finisher broilers in the south-east zone of Nigeria. This suggested that supplementation of multi-enzyme to normal energy and protein starter to finisher broiler diets will negatively affect performance and should not be practiced.

Reference

Annison, G. (1992). Commercial enzyme supplementation of wheat based diets raises ileal glycannase activities and improves apparent metabolizable energy, starch and pentosan digestibilities in broiler chickens. *Anim. Feed Sci. Technol.,* 38:105-121.

Cowan, W.D. (1993) Understanding the manufacturing, distribution, application and overall quality of enzymes in poultry feeds. Jour. Appl. Poult. Res. 2:293-299.

Dairo, F.A.S., Adeseinwa, A.O.K., Oluwasola, T.A. and Oluyemi, J.A. (2010). High and low dietary energy and protein levels for broiler chickens. *African journal of Agric. Res*., 5: 2030-2038.

Hajati, H., Rezaei, M. and Sayyahzadeh, H. (2009). The Effects of enzyme supplementation on performance, carcass characteristics and some blood parameters of broilers fed on corn-soybean meal-wheat diets. Inter*. Journal of Poult. Sci*., 8(12): 1199-1205.

Malathi, V. and Devegowda, G. (2001) *In vitro* evaluation of non starch polysaccharide digestion of feed ingredients. *Poult Sci.,* 80(3):302-305.

SPSS (2011) Statistical Package for Social Students, 2011 version 15for windows.

Wang, Z. R., S.Y. Qiao, W. Q. Lu, and D.F. Li (2005). Effect of enzyme supplementation on performance, nutrient digestibility, gastrointestinal morphology, and volatile fatty acid profiles in the hindgut of broilers fed wheat-based diet. Poultry Science 84; 875-881.

Zanella, L., Sakomura, N.K., Silversides, F.J., Fiqueirdo, A. and Pack, M. (1999). Effect of enzyme supplementation of broiler diet based on corn and soybean*. Journal of Poult. Sci.,* 78: 561-568.

Zhu, H. L., Hu, L.L.,. Hou, Y.Q., Zhang, J. and Ding, B.Y.I. (2014). The effects of enzyme supplementation on performance and digestive parameters of broilers fed corn-soybean diets. *Poult. Sci. Journal,* 93: 1704–1712.