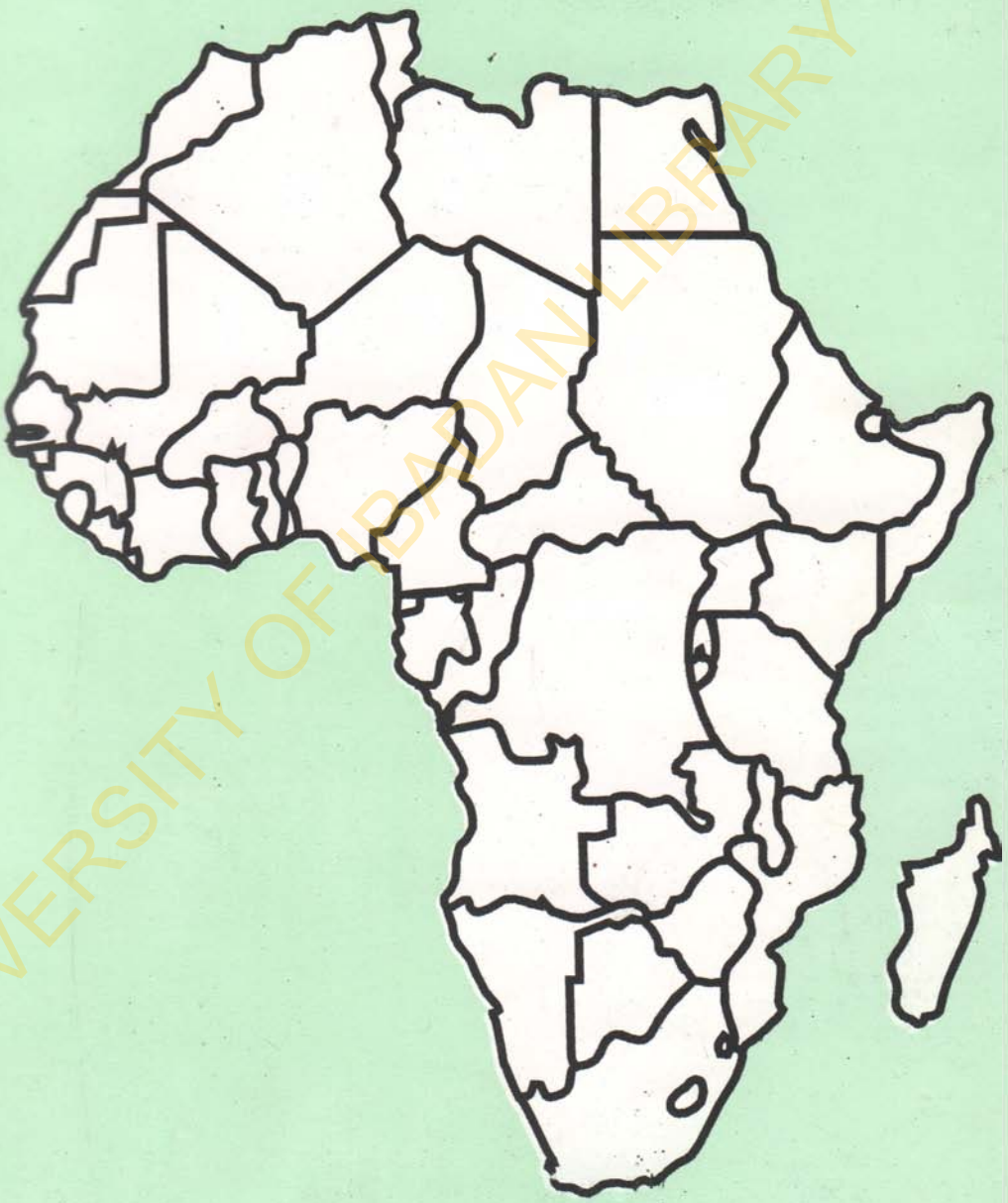
AFRICAN JOURNAL OF LIVESTOCK EXTENSION

Volume 11: January 2013



For online access:
http//ajol.info/index.php/ajlex/index

AFRICAN JOURNAL OF LIVESTOCK EXTENSION

Principal Contact
Dr. G.R.K. Sharma
Editor-in-Chief
Dept. of Vet & A. H. Extension
College of Vet. Science
A.N.G.R. Agricultural University
Tirupati – 517502
Andhra Pradesh
India
Email: sharmagrk@yahoo.com

Managing Editor
Dr. L. A. Akinbile
Department of Agric. Ext. and Rural Development
University of Ibadan
Nigeria
lakinbile@yahoo.com

African Journal of Livestock Extension. **ISSN: 1596-4019**

CORRESPONDENCE
Dr. A.E. Adekoya
Department of Agric. Ext. and Rural Development
University of Ibadan
Nigeria
Email: vichenfel@yahoo.com

AFRICAN JOURNAL OF LIVESTOCK EXTENSION **Vol. 11, January 2013**

CONTENTS OF THIS VOLUME *PAGES*

GROWTH AND CARCASS CHARACTERISTICS OF FINISHING BROILERS ON ACIDIFIED BLOOD MEAL BASED DIET

O. A. Abu, O. A. Ogunwole, B. S. Adedeji, A., V. K. Adeboboye and O. O. Tewe
Agricultural Biochemistry Unit, Department of Animal Science, University of Ibadan, Nigeria
Corresponding author's E-mail address: ohiahmed@yahoo.com

ABSTRACT

The objective of this study was to evaluate the effects of inclusion of acidifer in a blood meal based diet on broiler performance and carcass characteristics. One hundred and eighty un-sexed 4-week old broiler chicks raised on a common starter diet were randomly distributed into four experimental diets of 3 replicates and fifteen birds per replicate consisting of a control diet devoid of blood meal and acidifier (T1). Birds on treatment 2 (T2), in addition to common ingredients, had blood meal and acidifier; birds on treatment 3 (T3) had blood meal without acidifer and birds on treatment 4 (T4) had acidifier without blood meal. The birds were fed respective diets and watered *ad libitum* for four weeks. Daily feed intake was not significantly ($p > 0.05$) affected by dietary treatment. However, birds on treatment 3 had the poorest average daily body weight gain and feed conversion ratio. The addition of acidifier to diet containing blood meal however alleviated depressed daily body weight. The final body weights were 1.78, 1.74, 1.53 and 1.71 kg for birds on diets 1, 2, 3 and 4, respectively. Carcass yield expressed in percent live body weight were not significantly ($p < 0.05$) affected. The inclusion of blood meal in the diet without the addition of acidifier caused a mortality of 22% in the chickens and that addition of acidifier at 0.3% improved the growth performance and livability of chickens.

Key words: Acidifer, blood meal, broiler, growth performance, carcass characteristics

INTRODUCTION

The increasing costs of major feed ingredients have forced poultry farmers to seek for alternative ways in order to reduce costs of finished feeds (Uzegbu *et al.*, 2007). One of the ways of reducing cost of production of finished poultry feeds is the use of cheaper locally available sources of proteins. Blood meal, a protein of animal origin has been used in place of costly fish and soybean meals. Fishmeal is rich in lysine, arginine, methionine, cysteine and leucine but deficient in isoleucine. (NRC, 1994; Donko *et al.*, 1999). Onwudike (1981) reported that the lysine level in the blood meal is relatively high (7-8%), which makes it an excellent supplemental protein source to be used with plant derived feed ingredients that are low in lysine. Schingoethe (1991) also reported that in blood meal, isoleucine and methionine were 1st and 2nd limiting amino acids, when compared to values in milk. Fresh blood is however difficult to dry and easily prone to microbial contamination due to its high moisture level (Donko, 1999). Uncoagulated blood may be mixed with maize offal and then sun-dried, milled and incorporated into the diets (Makinde and Sonaiya, 2011). Schingoethe (1991) concluded that during the starting and finishing periods of growth, the chickens fed diet containing 3% blood meal gained ($p<0.01$) maximum weight compared to chickens fed other diets . Similarly, Nuarautelli *et al.*, 1987; and Ikram *et al.*, 1989 reported that blood meal can be effectively used up to 3% without any adverse effect on growth of broiler chickens. However, weight gain in broiler chickens was reduced with higher concentrations of blood meal due to the very low levels of the sulphur containing amino acids and isoleucine (Onwudike, 1981). Finally, the economics of 3% blood meal diet was more encouraging, as it generated more profitability than those of control and high level blood meal diets. The above findings suggested that blood meal up to 3% can be incorporated in broiler starter and finisher diets without any adverse effect on production parameters. Limited research has been conducted in using higher level of blood meal in broiler diets when supplemented with essential amino acids. It is also not known whether including blood meal as a substitute for soybean meals in the grower diets makes any difference compared to using blood meal in the starting and finishing diets.

A major limitation in the use of blood meal is that poorly processed blood meal is laden with *Salmonella typhimurium* and other deleterious microorganisms, and for this reason farmers that use blood meal are somewhat forced to depend on a heavy use of antibiotics. Though antibiotics have been in use as growth promoters for over 50 years its ban as a growth promoter in animal production is in place because of the residue and increased bacterial resistance for both humans and animals (Tang *et al.*, 2011). Promoting limited use of antibiotics and use of alternatives with equal efficacy have been advocated (Bae *et al.*, 1999). Farm animal producers have however been encouraged to use other means for maintaining the gut microflora without negative consequences on humans, through the introduction of "natural" alternatives to antibiotics. Some of these natural alternatives include

prebiotics, probiotics, enzymes, acidifiers, herbs, essential oils, and immune-modulators and are known not to have withdrawal periods when included in animal feeds. Acidifiers are compounds that have acidic properties: they may be organic or inorganic acids. Acidifiers as organic acids have been used for decades in feed preservation, protecting feed from microbial and fungal destruction or to increase the preservation effect of fermented feeds. However, acidifiers are believed to enhance growth by improving gut health through reduction of pH and buffering capacity of diets, improvement of pancreatic secretions that increase nutrient digestibility, or promotion of beneficial bacterial growth while inhibiting growth of pathogenic microbes (Partanen and Mroz, 1999). Chicks are most susceptible to salmonella infection at the hatchery stage and it is therefore not recommended to include the blood meal in the diets of broilers in the starter phase, hence, chicks were not fed blood meal in the starter phase. The addition of salmonella reducing cultures have been reported to reduce the salmonella load in chickens just before slaughtering (Corrier *et al.*, 1998, Bailey *et al.*, 2000). The objective of this study was to assess the effect of acidifier on growth and carcass indices of broiler finishers.

MATERIALS AND METHODS

Location and duration of experiment

The experiment was carried out for four weeks at the Teaching and Research Farm, University of Ibadan, Nigeria.

Acidifer

A commercial acidifier product (Biotronics SE) was used and added where applicable at an inclusion rate of 0.3% of the diets. Biomin's acidifier line, Biotronics SE is a combination of formic and propionic acids as well as their corresponding salts. The acidifer consisted of formic acid (17%) and ammonium formate (12.4%).

Experimental Design

One hundred and eighty un-sexed 4-week old Abor acre broiler chicks were distributed into four approximately homogenous treatments of three replicates of 15 birds each in a one-way ANOVA experimental design. The birds had earlier been raised from day old on a standard broiler starter diets devoid of blood meal and acidifier. Birds were reared on the deep litter floor for four weeks. The four diets (Table 1) met nutrient requirements for broilers consisted of a control without blood meal and acidifier (T1). Birds on treatment 2 (T2) in addition to common ingredients had blood meal and acidifier; birds on treatment 3 (T3) had blood meal and birds on treatment 4 (T4) had acidifier without blood meal. The birds were raised on respective diets and water was provided to the birds *ad libitum* for four weeks. The birds were kept under observation and their live weight, body weight changes, feed intake were monitored. The feed conversion ratio (FCR) was calculated and corrected for mortality recorded during the feeding trial.

Carcass cut-ups

At the end of 4th week of feeding trial the birds were deprived of feed for 12 h, three birds were randomly selected per replicate, tagged, weighed and slaughtered by cutting the jugular vein. The carcasses were dressed, eviscerated and cut into parts and warm weights were taken using sensitive digital weighing balance, live weight, dressed weight, thighs, drumsticks, shank, breast and back. The cut parts expressed as a percentage relative body weights.

Statistical Analysis

The data collected were subjected to one-way analysis of variance using the ANOVA programs of SAS (2000). The treatment means were compared using the Duncan procedure of the same software.

RESULTS AND DISCUSSION

Growth Performance

The performance characteristics of the chickens are presented in Table 2. Daily feed consumption of the birds was not significantly different among treatment but varied between 71.42 and 74.56 g/bird. The final body weight of the birds varied between 1532.16 and 1740.76 g/bird however when values were expressed in average daily body weight gain birds in all treatments had similar body weights except those fed blood meal based diet without addition of acidifier.

Body weight and weight gain were increased by the inclusion of acidifer ($p < 0.05$). The reduction in final body weight gain in broilers fed blood meal without acidifier was expected because of the presumed negative microbial actions of blood meal inclusion. Feed intake was however not affected by the inclusion of acidifer. The FCR was not also affected by the dietary treatment ($p > 0.05$) except for birds fed blood meal without acidifier based diet. The mortality recorded varied between 2.22 and 22.2% with birds on blood meal based diet having the highest. The control diet without blood meal inclusion did better than those on blood meal alone based diets. Blood meal is a major source of microbial contaminants such as salmonella. The inclusion of acidifier in the blood meal based diets therefore possibly alleviated the negative effects of inclusion of blood meal. The quality of blood meal had been reported to be affected by methods of preparation (McDonald *et al.*, 1992) and most blood meals prepared from cattle blood are poorly prepared by solar-drying and application of direct heat, and for this reason

microbial contamination cannot be totally eliminated.

Table 1: Composition of experimental finishers' diet

Ingredients (As fed basis, %)	T1	T2	T3	T4
Maize	50.0	50.0	50.0	50.0
Soya bean meal	30.0	26.0	26.0	26.0
Wheat offals	15.24	16.94	17.24	18.94
Palm oil	2.0	2.0	2.0	2.0
Oyster shell	0.5	0.5	0.5	0.5
Di-Calcium phosphate	1.5	1.5	1.5	1.5
DL-Methionine	0.15	0.15	0.15	0.15
L- Lysine	0.05	0.05	0.05	0.05
Table salt (NaCl)	0.25	0.25	0.25	0.25
Vit-Min premix*	0.25	0.25	0.25	0.25
Avatec	0.06	0.06	0.06	0.06
Blood meal	-	2.0	2.0	-
Biotronics SE® **	-	0.30	-	0. 30
Total	100.00	100.00	100.00	100.00
Calculated nutrient level				
Crude protein, %	18.52	19.57	19.60	18.21
ME, Kcal/kg	2793.0	2774.86	2778.6	2743.08
Ca, %	1.04	1.03	1.04	1.05
Total phosphorus, %	0.60	0.60	0.60	0.62

**Vitamin premix provided one tonne of diet with Vitamin A; 10,000,000 IU, Vitamin D_3: 2,000,000 IU, Vitamin E: 40,000mg, Vitamin K_3: 2,000 mg, Vitamin B_1: 1,500 mg, Vitamin B_2: 5,000 mg, Vitamin B_6: 4,000 mg, Vitamin B_{12}: 20 mg, Niacin: 40,000mg, Calpan: 10,000 mg, Folic acid: 1,000mg, Biotin: 100 mg, Anti-oxidant: 100,000 mg, Manganese: 80,000mg, Iron: 40,000mg, Zinc: 60,000mg, Copper: 8,000mg, Iodine: 800mg, Cobalt: 300mg.*
***Contained 17.4% Formic acid, 14.1% Ammonium propionate, 12.4% Propionic acid, 8.4% Ammonium oligosaccharide as carrier*

Mortality

Birds fed blood meal based diet without supplementation with acidifier had the highest mortality of 22.2% when compared with other treatments where mortality of 2.22 and 4.44% were recorded for treatments T1, T4 and T2, respectively. The level of mortality recorded for birds fed blood meal without acidifer supplementation may possibly confirm that the blood meal was contaminated with microbes that were mitigated by the addition of acidifer. *Salmonella* has been reported to be a major microbe isolated in poorly processed blood meal especially during the rainy season when processing of blood meal is difficult. Most of the blood meal produced is poorly processed and high humidity might increase the deleterious microbial load.

Table 2: Performance indices of broilers fed acidifer based diets.

Parameters	T1	T2	T3	T4	SEM
Initial body weight (g)	558.56	548.32	555.20	545.67	10.21
Average daily feed intake (g)	71.42	73.34	73.21	74.56	4.09
Final body weight (g)	1775.56^{a}	1743.33^{ab}	1528.9	1700.0^{a}	58.86
Average daily body weight (g)	43.46^{a}	42.68^{a}	34.77^{b}	41.23^{a}	5.56
Feed conversion ratio	1.63^{b}	1.73^{b}	2.13^{a}	1.81^{b}	0.004
Mortality (%)	2.22	4.44	22.2	2.22	

Table 3: Carcass characteristics of broilers fed acidified diets

Parameters	T1	T2	T3	T4	SEM
Final body wt (g)	1775.56^{a}	1743.33^{ab}	1528.89^{c}	1700.00^{a}	58.86
Carcass wt (g)	1206.67	1161.11	1177.78	1177.78	116.29.
Carcass yield (%)	$67. 9^{ab}$	66.6^{b}	64.12^{ab}	69.28^{a}	3.55
Other parameters expressed as % body weight					
Head	4.02	3.73	3.92	3.98	0.018
Neck	5.41^{a}	5.39^{a}	4.81^{b}	4.83^{b}	0.003
Drumsticks	16.18	15.88	16.36	16.64	0.141
Thighs	15.60	15.71	15.33	15.11	0.112
Wings	13.06	13.45	13.65	13.73	0.113
Breast	32.79	31.67	32.91	32.79	1.308
Back	20.49	21.96	20.99	20.94	0.365
Full proventriculus	0.72	0.73	0.73	0.79	0.001
Full gizzard	5.21	5.49	5.09	6.23	0.034
Empty gizzard	3.72^{ab}	4.00^{ab}	3.50^{b}	4.23^{a}	0.034
Heart	0.62	0.66	0.64	0.60	0.003
Liver	2.54^{b}	2.79^{a}	$2,39^{bc}$	2.53^{b}	0.016

Means with different superscripts along the same row differ significantly ($p<0.05$)

SEM = Standard Error of Mean
T1 = Control diet
T2 = Acidifier and blood meal based diet
T3 = Blood meal based diet
T4= Acidifier based diet

Carcass characteristics

Compared with the control group, all the other dietary treatments had no effect on the abdominal fat, heart, back, wings, thighs, drumsticks, head and carcass weight. However birds fed blood meal without acidifier had lower livers weights compared to birds on other dietary treatments.

Since inclusion of acidifier in blood meal based diets resulted in improved performance, it can be safely concluded that acidifier perhaps had competitiveness for deleterious microbes leading to the development of useful microbial population in the chicken gut. Higgins *et al.*, 2011 had earlier reported that addition of a probiotic culture devoid of blood meal also reduced salmonella in salmonella-challenged neonatal chicks.

CONCLUSION

The present study indicates that the addition of acidifier to diets containing blood meal improved the performance of broiler finishers. It appears that acidifier can be included at 0.3% level when blood meal is included at 2.0% without any major negative effects on growth performance of broiler finishers.

REFERENCES

Bae, K. H., T. G. Ko, J. H. Kim, W. T. Cho, Y. K. Han, and I. K. Han (1999). Use of metabolically active substances to substitute for antibiotics in finishing pigs. Korean J. Anim. Sci. 41: 23-30.

Bailey, J.S., N. J. Stern, and N. A. Cox (2000). Commercial field trial evaluation of mucosal starter culture to reduce Salmonella incidence in processed broiler carcasses. *J. Food Prot. 63: 867-870.*

Corrier, D. E., D. J. Nisbet, J. A. Byrd, B. M. Hargis, N. K. Keith, M. Peterson, and J. R. Deloach (1998). Dosage titration of a characterized competitive exclusion culture to inhibit *salmonella* colonization in broiler chickens during growout. *J. Food Prot. 61: 796-801.*

Donko, A, Atuahene, C.C., Anang, D.M and Ofori, S.K. (1999). Chemical composition of solar dried blood meal and its effect on performance of broiler chicks. *Animal feed Sci and Tech.*81:229-307.

Higgins, S. E., A. D. Wolfenden, G. Tellez, B. M. Hargis and T. E. Porter (2011). Transcriptional profiling of cecal gene expression in probiotics and salmonella-challenged neonatal chicks. **Poultry Science** (90): 901-913.

Ikram, H., M. N. Ahmed and M. M. Ehtisham, (1989). Effect of different levels of blood meal on broilers performance. *Pak. J. Vet. Res., 2:51-54.*

Makinde, O. A., and E. B. Sonaiya, 2011). Utilization of sun-dried maize offal with blood meal in diets for broiler chickens. Open *Journal of Animal Sciences Vol.1, No.3, 106-111*

McDonald, P., Edwards and J.F.D. Greenhalgh (1992). Animal Nutrition. 4th Edn. Published in the United States with John Wiley and Sons. Inc. New York, 455-483.

NRC,1994. National Research Council. **National Requirements of Poultry. 9th Rev**. Edn., National Academy Press, Washington, DC. USA.

Nuarautelli, A., A. Anghinelli, and A. Blanco, (1987). Use of spray dried blood meal in broilers diet. Medicinia Veterinaria, Universita di Parma, Italy, pp: 333-353.

Onwudike, O.C., (1981). Effect of various protein sources on egg production in a tropical environment. Trop. **Anim. Prod., 6: 249-256.**

Partanen KH, Mroz Z. (1999) **Organic acids for performance enhancement in pig diets**. *Nutr Res Rev.* 999;12: 117–145.

SAS Institute, (2000). SAS/STAT Guide for personal computers. Version 8 Edition. SAS Institute Inc. Cary, NC.

Schingoethe, D., (1991). Amino acid profiles of some common feeds. Feedstuffs. 18th March, pp: 11-12.

Tang, X. Y., J. S. Gao, F. Yuan, W. X. Zhang, Y. J. Shao, F. Sakurai and Z. D. Li (2011). Effects of sophy β-glucan on growth performance, carcass traits, meat composition and immunological responses of Peking ducks. **Poultry Science 90: 737-745.**

Uzegbu, H.O., Ndelekwute, E.K. and Abdu, L.S. (2007). Effect of inclusion of Bambara groundnut waste meal on the metabolizable energy and protein of broiler chickens. proc. 41st annual conf. Agric. Soc. Nig Pp 348-352.