PJN
ISSN 1680-5194

PAKISTAN JOURNAL OF NUTRITION

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

Pakistan Journal of Nutrition 15 (1): 76-79, 2016
ISSN 1680-5194

Effect of Dietary Phytocee and Zist on Broiler Performance and Carcass Characteristics

Mohamed E. Ahmed, Nasir H. Mohamed and Talha E. Abbas
Department of Animal Production, Faculty of Agricultural Technology and Fish Sciences,
Alneelain University, P.O. Box 12702, Postal Code 11121, Khartoum, Sudan

Abstract: The present study was aimed at evaluation of growth performance and carcass characteristics of broiler chicks fed dietary polyherbal formulation Phytocee and Zist. One hundred and twenty day-old, unsexed broilers (Ross 308) with an initial live body weight of 46.78g ± 0.21 were randomly assigned to 3 dietary treatments, each consisting of 4 replicates with 10 birds each. The three starter and finisher experimental diets consisted of control (0.0% phytocee and 0.0% Zist), 0.03% phytocee and 0.03% Zist. Dietary treatments indicated no significant ($p \geq 0.05$) effect on all live performance parameters through starter, finisher and overall period. However, overall body weight gain, FCR and PER were improved in Zist diet by 10.84, 11.68 and 9.80%, respectively compared to control. Carcass characteristics and internal organs showed no significant ($p \geq 0.05$) differences in response to dietary treatments. The result of the current study revealed that Zist improves live performance parameters during different growth phases. Based on this finding, Zist could be added to either starter or finisher broiler diet with positive effects on broiler performance.

Key words: Phytocee, zist, broiler, performance, carcass

INTRODUCTION

Poultry in tropical countries experience high environmental temperature and used to be susceptible to heat stress, which intern deteriorates the performance and efficiency of immune system (Borges *et al*., 2003). Hot conditions also negatively affect broiler performance in term of feed intake, growth rate, feed conversion, livability, yield and quality of meat (Geraert, 1998; Sandercock *et al*., 2001).

It is well known that poultry does not require any dietary source of vitamin C as it has the ability to synthesize vitamin C, in their body (McDowell, 2000). However, environmental stressors are known to alter vitamin C use or synthesis or both in the fowl (Pardue and Thaxton, 1986). So, it was reported that the negative effects of environmental stress could be prevented by the use of some minerals and vitamin supplements such as vitamin C (Daghir, 1995; Sahin *et al*., 2001). Although synthesis in the neonatal chick is apparently limited (Horning and Frigg, 1979), it is generally assumed that the endogenous synthesis is adequate to meet biological demands in poultry. During certain conditions vitamin C supplementation provides benefit to poultry (Pardue and Thaxton, 1986).

Several methods are available to alleviate the negative effects of high environmental temperature on performance of poultry. Sahina *et al*. (2003) and Sabah *et al*. (2008) claimed that dietary manipulations can be adopted to influence productivity, health and physiological processes occurring in the body of broilers reared in elevated ambient temperatures. In this regards, several herbs and herbal formulations have been used to protect tissues from superoxide radicals and enhance cell survival by stimulating antioxidative enzymatic systems (Saravanan *et al*., 2007). Scientific evidence is available for antioxidant activity of the polyherbal formulation Phytocee containing *Emblica officinalis*, *Ocimum sanctum* and *Withania somnifera* as principal ingredients (Joseph *et al*., 2015). Therefore, the present study was conducted to evaluate the effect of dietary Phytocee and Zist on broiler performance and carcass characteristics.

MATERIALS AND METHODS

This experiment was conducted at the poultry unit (open-house system) of Faculty of Agricultural Technology and Fish Sciences, University of Alneelain, Jebal-Awlia, Khartoum south. One hundred and twenty day-old, unsexed broilers (Ross 308) were obtained from a commercial hatchery with an initial live body weight of 46.78 g±0.21.

The chicks were randomly assigned to 3 dietary treatments, each consisting of 4 replicates with 10 birds each. The three dietary treatments consisted of control (0.0% phytocee and 0.0% Zist), 0.03% phytocee and 0.03% Zist. Three isocaloric and isonitrogenous starter and finisher diets were formulated according to nutrient specifications recommended by National Research

Corresponding Author: Talha E. Abbas, Department of Animal Production, Faculty of Agricultural Technology and Fish Sciences, Alneelain University, P.O. Box 12702, Postal Code 11121, Khartoum, Sudan

Council (NRC, 1994). Presatrter diet was provided for the first 5 days. The chicks were then fed on starter diets till weak 3 and allocated to finisher diets till the end of the experiment. The composition of starter and finisher diets is presented in Table 1 and 2, respectively.

Before allocation of chicks, the house was carefully cleaned and disinfected. The chicks were raised on 12 floor pens (1 m^2 each) covered with wood shavings. Each pen was furnished with 1 metallic drinker and 1 metallic tubular feeder. Feed and water were provided *ad libitum*. Birds were exposed to 24 h of light per day by a combination of natural and artificial light. All birds were vaccinated against IB and Newcastle at 6 days of age and infections bursal disease (Gumboro) at 2 weeks of age and repeated at 4 weeks of age.

Weekly feed intake and live body weight were determined for each pen. Feed conversion ratio (FCR) was calculated as feed intake per weight gain. While protein efficiency ratio (PER) was calculated as weight gain per protein consumed. Mortality was recorded throughout the experiment as it occurred. At the end of the experiment, the birds were fasted from feed for an overnight and then weighed. After fasting, 2 birds from each pen were randomly selected, manually slaughtered and carcass traits were determined.

A completely randomized design was used to test the effect of different dietary treatments. Data were statistically analyzed by the general linear model (GLM) procedure of SAS (SAS Institute, 2003). Moreover, Duncan's multiple range test (Steel and Torrie, 1980) was used to separate the treatment means with significant differences.

Table 1: Composition of broiler starter diets containing dietary Phytocee and Zist

	---------- Dietary treatments ----------		
Ingredients (%)	Control (A)	Phytocee	Zist
Sorghum	60.80	60.70	60.70
Phytocee	0.00	0.03	0.00
Zist	0.00	0.00	0.03
Sesame cake	8.00	7.97	7.97
groundnut cake	21.00	21.00	21.00
Wheat bran	0.50	0.50	0.50
Super concentrates*	5.00	5.00	5.00
Lime stone	0.80	0.80	0.80
Dicalcium phosphate	0.50	0.50	0.50
Enzymes	0.10	0.10	0.10
Lysine	0.10	0.10	0.10
Choline	0.10	0.10	0.10
Vegetable oil	2.90	3.00	3.00
Mycotoxin binder	0.20	0.20	0.20
Calculated analysis			
ME (kcal/kg)	3140	3144	3144
CP (%)	22.4	22.3	22.3
Crude fiber (%)	4.39	3.61	3.61
Ether extract (%)	4.30	3.37	3.37
Ca (%)	0.99	0.99	0.99
Available phosphorous (%)	0.43	0.43	0.43
Lysine (%)	1.11	1.11	1.11
Methionine (%)	0.47	0.47	0.47
Methionine±Cystine (%)	0.72	0.72	0.72

*Cp 35%, ME 1900 kcal/kg, C.fiber 3.0%, EE 3.0%, Ash 33%, Ca 6.5%, Av. P 6.5%, Lysine 11%, Methionine 4.2%, Methionine ± Cystine 4.5%.

Vitamin A 250000 IU/kg, Vitamin D3 50000 IU/kg, Vitamin E 500 Mg/kg, Vitamin K3 40 Mg/kg, Vitamin B1/Thiamin 20 Mg/kg, Vitamin B2/Riboflavin 100 Mg/kg, Niacin Vitamin PP 600 Mg/kg, Pantothenic acid/Vitamin B3 160 Mg/kg, Vitamin B6/Pyridoxine 30 Mg/kg, Vitamin B12 300 Mcg/kg, Biotin/Vitamin H 1000 Mcg/kg, Choline 7000 Mg/kg, Folic Acid 15 Mg/kg. Copper 300 mg/kg, Zinc 1.100 mg/kg, Iron 600 mg/kg, Manganese 1.200 mg/kg, Cobalt 4.0 mg/kg, Iodine 20.0 mg/kg, Selenium 4.0 mg/kg, Anti-oxidant Added, Phytase Added, Mould inhibitor Added, Salinomycin 1200 mg/kg

RESULTS AND DISCUSSION

The effect of dietary Phytocee and Zist on live performance of broiler is presented in Table 3. Dietary treatments had no effect ($p \geq 0.05$) on all live performance parameters through starter, finisher and overall periods. However, during starter phase, Zist improved body weight gain, FCR and PER by 9.31, 12.50 and 12.72%, respectively versus control. During finisher phase body weight gain, FCR and PER of birds fed Zist containing diet were superior by 11.96, 11.42 and 8.52%, respectively compared to control. Overall body weight gain, FCR and PER were improved in Zist diet by 10.84, 11.68 and 9.80%, respectively versus control. These findings are consistent with Pena *et al*. (2008) who found no effect of ascorbic acid and citric flavonoids (quercetin and rutin) on body weight and feed intake of broilers.

Table 2: Composition of broiler finisher diets containing dietary Phytocee and Zist

	---------- Dietary treatments ----------		
Ingredients (%)	Control (A)	Phytocee	Zist
Sorghum	72.10	72.10	70.35
Phytocee	0.00	0.03	0.00
Zist	0.00	0.00	0.03
Sesame cake	3.60	1.57	3.12
groundnut cake	9.00	11.00	12.10
Wheat bran	6.20	6.20	5.40
Super concentrates*	5.00	5.00	5.00
Lime stone	0.90	1.00	0.90
Dicalcium phosphate	0.10	0.0	0.0
Enzymes	0.10	0.10	0.10
Choline	0.10	0.10	0.10
Vegetable oil	2.70	2.70	2.70
Mycotoxin binder	0.20	0.20	0.20
Calculated analysis			
ME (kcal/kg)	3143	3144	3143
CP (%)	17.75	17.78	18.54
Crude fiber (%)	3.89	3.54	3.60
Ether extract (%)	3.25	3.52	3.52
Ca (%)	0.84	0.85	0.83
Available phosphorous (%)	0.35	0.33	0.33
Lysine (%)	0.84	0.85	0.87
Methionine (%)	0.40	0.39	0.41
Methionine±Cystine (%)	0.59	0.57	0.60

*As shown in Table 1

Table 3: Effect of dietary Phytocee and Zist on broiler performance

	Dietary treatments			
Parameter	Control (A)	Phytocee (B)	Zist (C)	±SEM
0-3 week				
Feed intake	1198.99±62.33	1228.13±45.46	1162.37±19.33	22.96
Body weight gain	757.48±74.75	785.93±40.51	828.00±23.62	25.47
FCR	1.60±0.24	1.57±0.08	1.40±0.04	0.07
PER	2.83±0.40	2.87±0.15	3.19±0.09	0.13
4-6 week				
Feed intake	2636.63±176.01	2545.79±126.92	2606.84±98.42	68.78
Body weight gain	1043.31±111.23	1043.89±171.01	1168.06±117.22	67.92
FCR	2.54±0.21	2.48±0.31	2.25±0.22	0.13
PER	2.23±0.18	2.30±0.28	2.42±0.26	0.12
0-6 week				
Live body W. (g/bird)	1847.56±149.44	1876.39±165.58	2043.06±130.56	74.61
Feed intake (g/bird)	3835.62±129.71	3773.92±86.68	3769.21±91.46	52.20
Body weight gain (g/bird)	1800.79±149.60	1829.81±165.42	1996.06±130.73	74.63
FCR (g feed/g Bwt gain)	2.14±0.17	2.07±0.15	1.89±0.12	0.07
PER (Bwt gain/protein consumed)	2.45±0.19	2.52±0.19	2.69±0.18	0.09

Values are means of 4 replicates per treatment (10 bird\replicate).
SEM: Standard error of the means from ANOVA d.f 9

Table 4: Effect of dietary Phytocee and Zist on carcass characteristics

	Dietary treatments			
Parameter	Control (A)	Phytocee (B)	Zist (C)	±SEM
Dressing (%) on hot base	75.76±4.45	74.09±1.59	75.73±5.68	2.09
Absolute wt of Abdominal fat	33.18±9.65	35.83±8.13	28.20±9.10	6.98
Relative wt of Abdominal fat	1.84±0.56	1.81±0.40	1.67±0.57	0.34
Absolute wt of breast	219.38±12.58	223.30±24.98	181.67±58.37	15.95
Relative wt of breast	16.02±1.26	15.79±0.86	13.84±1.70	0.71
Meat bone ratio of breast	4.20±2.40	6.45±2.63	4.18±0.46	0.98
Absolute wt of thigh	143.68±35.30	138.93±50.11	126.87±15.55	17.00
Relative wt of thigh	10.46±2.31	10.20±2.60	9.86±1.63	1.09
Meat bone ratio of thigh	2.08±0.52	3.63±1.49	3.93±1.54	0.58
Absolute wt of drumsticks	115.60±11.15	115.25±12.99	104.13±24.94	7.68
Relative wt of drumsticks	8.41±0.40	8.21±1.91	7.98±2.13	0.25
Meat bone ratio of drumsticks	2.59±1.20	3.03±0.58	3.15±0.30	0.39

Values are means of 4 replicates per treatment.
[abc]Means±SD with different superscripts in the same row are significantly different ($p \leq 0.05$).
SEM: Standard error of the means from ANOVA d.f. 9

Table 5: Effect of dietary Phytocee and Zist on internal organs

	Dietary treatments			
Parameter	Control (A)	Phytocee (B)	Zist (C)	±SEM
Absolute wt of liver	34.90±4.88	32.88±4.31	32.85±8.77	3.14
Relative wt of liver	1.92±0.19	1.72±0.15	1.89±0.22	0.09
Absolute wt of gizzard	28.03±3.54	29.10±4.09	25.05±3.26	1.83
Relative wt of gizzard	1.54±0.15	1.54±0.28	1.47±0.18	0.11
Absolute wt of heart	10.05.90±1.38	10.13±1.39	9.05±2.74	1.36
Relative wt of heart	0.55±0.06	0.53±0.06	0.51±0.13	0.04
Length of Intestine	160.00±27.17[a]	141.50±21.14[ab]	117.50±5.00[b]	10.04

Values are means of 4 replicates per treatment.
[ab]Means±SD with different superscripts in the same row are significantly different ($p \leq 0.05$).
SEM: Standard error of the means from ANOVA d.f. 9

Moreover no significant difference in body weight gain and feed efficiency was observed among the control, polyherbal premix contains P. emblica, Ocimum sanctum, Terminalia chebula, Withania somenifera and Shilajit and synthetic vitamin C until the 3rd week of the experiment (Sujatha *et al*., 2010). However, those authors revealed significant difference in body weight in treated groups compared to the control group during the 4th and 6th week.

Supplementation the basal diet with antioxidants has been scientifically well proven to improve growth and performance in broilers (Sahin *et al*., 2003). Moreover the increased overall body weight gain supported by Sapcota *et al*. (2006) and Maini *et al*. (2007), who found

an increase in body weight gain of broilers, fed Phyllanthus emblica. Furthermore Mujeeb (2000) and Pradhan (1995) also observed increased body weight gain in broilers on Stresroak (polyherbal formulation) compared to a control group.

Carcass characteristics and internal organs as influenced by dietary treatments are depicted in Table 4 and 5, respectively. There was no significant ($p \geq 0.05$) difference in carcass parameters and internal organs. The results regarding carcass characteristics are in agreement with Tavarez *et al.* (2011) who found no effect of antioxidant supplementation on carcass weight, dressing percentage and breast yield.

Conclusion: Although it is numerical rather than statistical, the result of the current study revealed that Zist improves live performance parameters during different growth phases. Based on this finding, Zist could be added to either starter or finisher broiler diet with positive effects on broiler performance.

REFERENCES

Borges, A.S., A. Maiorka and A.V. Da Silva, 2003. Fisiologia do estresse calorico e a utilizacao de eletrolitos em frangos de corte. Ciencia Rural, 33: 975-981.

Daghir, N.J., 1995. Nutrient requirements of poultry at high temperature, in Poultry production in hot climate, CAB International, UK, pp: 101-125.

Geraert, P.A., 1998. Amino acid nutrition for poultry in hot conditions. Proceeding Australian Poultry Science Symposium, 10: 26-33.

Horning, M.P. and M. Frigg, 1979. Effects of age on biosynthesis of ascorbate in chicks. Arch. Gefluegelkd, 43: 108-112.

Joseph, J.A., U. Radhakrishnan, S. Mutyala, K.S. Goudar, U.P.T. Ayyappan and A. Agarwal, 2015. Antioxidant and protective effects of Phytocee™ against carbon tetrachloride-induced oxidative stress. J. Nat. Sci. Biol. Med., 6: 183-187.

Maini, S., S.K. Rastogi, J.P. Korde, A.K. Madan and S.K. Shukla, 2007. Evaluation of oxidative stress and its amelioration through certain antioxidants in broilers during summer. J. Poult. Sci., 44: 339-347.

McDowell, L.R., 2000. Vitamins in Animal and Human Nutrition. 2nd ed. Iowa State University Press, Ames, Iowa.

Mujeeb, A.M.A., 2000. Polyherbal additive proves effective against vertical transmission of IBD. World Poult., 16: 50-51.

National Research Council, 1994. Nutrient Requirements of Poultry. 9th rev. ed. National Academic Sciences, Washington, DC.

Pardue, S.L. and J.P. Thaxton, 1986. Ascorbic acid in poultry: A review. World's Poult. Sci. J., 42: 107-123.

Pena, J.E.M., S.L. Vieira, J. Lopez, R.N. Reis, R. Barros, F.V.F. Furtado and P.X. Silva, 2008. Ascorbic Acid and Citric Flavonoids for Broilers Under Heat Stress: Effects on Performance and Meat Quality. Braz. J. Poult. Sci., 10: 125-130.

Pradhan, N.R., 1995. Effect of Stresroak performance of broilers. Int. J. Poult. Sci., 30: 82-84.

Sabah Elkheir, M.K., M.M.A. Mohammed and S.M. Abdel Gadir, 2008. Effect of Feed Restriction and Ascorbic Acid Supplementation on Performance of Broiler Chicks Reared under Heat Stress. Res. J. Anim. Vet. Sci., 3: 1-8.

Sahin, K., N. Sahin, M. Onderci, S. Yaralýoglu and O. Kucuk, 2001. Protective role of supplemental vitamin E on lipid peroxidation, vitamins E, Aand some mineral concentrations of broilers reared under heat stress. Vet. Med-Czech., 46: 140-144.

Sahina, K., N. Sahin and O. Kucuk, 2003. Effects of chromium and ascorbic acid supplementation on growth, carcass traits, serum metabolites and antioxidant status of broiler chickens reared at a high ambient temperature (32°C). Nutr. Res., 23: 225-238.

Sandercock, D.A., R.R. Hunter, G.R. Nute and M.A. Mitchel, 2001. Acute heat stress induced alterations in blood acid base status and skeletal muscle membrane in broiler chickens at two ages: implications for meat quality. Poult. Sci., 80: 418-425.

Sapcota, D., R. Islam and T.N. Upadhyaya, 2006. Dietary supplementation of Emblica officinalis for amelioration of experimental aflatoxicosis in commercial broilers. Anim. Nutr. Feed Technol., 6: 65-71.

Saravanan, S., R. Srikumar, S. Manikandan, N. Jeya Parthasarathy and R. Sheela Devi, 2007. Hypolipidemic effect of triphala in experimentally induced hypercholesteremic rats. Yakugaku Zasshi, 127: 385-388.

SAS Institute, Inc, 2003. SAS/STAT(R) User's Guide, Version 9, Cary, North Carolina, USA.

Steel, R.G.D. and J.H. Torrie, 1980. Principles and procedures of statistics. A biometrical approach. 2nd ed. McGraw-Hill Book Co., Inc., New York.

Sujatha, V., J. P. Korde, S.K. Rastogi, S. Maini, K. Ravikanth and D.S. Rekhe, 2010. Amelioration of heat stress induced disturbances of the antioxidant defense system in broilers. J. Vet. Med. Anim. Health, 2: 18-28.

Tavarez, M.A., D.D. Boler, K.N. Bess, J. Zhao, F. Yan, A.C. Dilger, F.K. Mckeit and J. killefer, 2011. Effect of antioxidant inclusion and oil quality on broiler performance, meat quality and lipid oxidation. Poult. Sci., 90: 922-930.