Int.J.Curr.Microbiol.App.Sci (2017) *6*(11): 2542-2546

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 6 Number 11 (2017) pp. 2542-2546**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2017.611.299

Efficacy of Phytase Microbial Feed Additive on Growth Performance of Broilers Chicks

Ebrahim Mohammed Hussein Alarasi[1*] and R.K. Pandey[2]

[1]Department of Animal Husbandry and Dairying, Institute of Agricultural Sciences, Banaras Hindu University, Assistant Professor in Department of Animal Husbandry, Faculty of Agriculture and Veterinary Medicine, University of Thamar, Yemen
[2]Department of Animal Husbandry and Dairying, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi-221005, India
**Corresponding author*

Keywords

Phytase enzyme, Broilers, Performance, Carcass cuts.

Article Info

Accepted:
20 September 2017
Available Online:
10 November 2017

A B S T R A C T

This experiment was conducted with the aim to see the effect of phytase enzyme supplementation on feed broilers chicks comprising (250,500,750 and 1000 FTU/kg feed). For said purpose, two hundred ten (210) of one day-old commercial broiler chicks (VenCobb-500) were divided into five groups (T_0, T_1, T_2, T_3 & T_4) of 42 birds in each with fifteen replicate of 14 broilers in each. The birds of (T_1, T_2, T_3 & T_4) groups were feed with basal diets having (250FTU, 500FTU, 750FTU and 1000FTU/kg) respectively, while T_0 group was feed without any phytase. The experiment was conducted for 42 days and the birds of T_4 group having significantly ($p<0.05$) higher body weight gain, feed consumption and feed conversion ratio, carcass cuts, visceral organ mass (edible and inedible parts) dressing percentage and no found any mortality than T_0 (control),T_1, $T_2$and T_3 groups. But no significant difference was found in carcass cut (neck, head, legs) also visceral organ mass (edible and inedible parts) (gizzard, crop, spleen,) of broiler chickens of various groups. Thus, the results show that the phytase enzyme having better effect on growth performance than control. A forementioned trial was carried out in winter season.

Introduction

Phytate is the form in which large portion of phosphorus is present in plant feed ingredients. This makes it difficult for non-ruminants to gain their requirements out of being fed with these ingredients (Rezaei, *et al.*, 2007). Phytate can bind minerals and proteins in aqueous medium (Sebastian, *et al.*, 1997). Phytase can help in improving the availability of phytate bound phosphorus and reducing phosphorus levels in excreta from intensive livestock operations. (Nelson, 1967) and (Kornegay, 1999) reported that phytase supplementation improved the utilization of phytate P derived from plant feedstuffs, and decreased excretory P by approximately one-third without depressing performance.

Phytic acid was considered as the major storage form of phosphorus. Phosphorus from phytic acid is of great importance as this acid has a high P content (28.2%), and the major portion of poultry and pig diets consists of plant derived ingredients, where high levels of phytic acid is available. The ability of poultry

and pigs to use phytate P is poor (Ravindran, *et al.,* 2006); (Wu, *et al.,* 2003); (NRC, 1994) due to insufficient quantities or lack of intestinal phytase secretion. As a result of this, large amounts of P are excreted in feces causing environmental hazards, especially in areas of intensive livestock operations. With the above views the present study were to investigate the influence with the aim to find out the influence of phytase enzyme supplementation on feed broilers chicks comprising (250, 500, 750 and 1000 FTU/kg feed) on body weight gain, feed consumption and feed conversion ratio, carcass cuts, visceral organ mass (edible and inedible parts) dressing percentage mortality of the broiler chickens.

Materials and Methods

The trial was conducted in winter season at the poultry farm situated at Agriculture farm of the Institute of Agriculture Sciences, Banaras Hindu University, Varanasi- 221005 (India). Two hundred ten (210) of one day-old commercial broiler chicks (VenCobb-500) were divided into five groups (T_0, T_1, T_2, T_3&T_4) of 42 birds in each with fifteen replicate of 14 broilers in each. The birds of (T1, T2, T3&T4) groups were feed with basal diets having (250FTU, 500FTU, 750FTU and 1000FTU/kg) respectively, while T0 group was feed without any phytase. The birds were kept under deep litter system.

At the start of the experiment the broiler starter ration was fed from one day to 21 days containing 23% CP (Crude protein) and 2900 Kcal/ME/kg of ration. Further broiler per-starter ration containing 20% CP (Crude protein) and 3000 Kcal/ME/kg was giving from 22 days to 42 days age chicks (Table 1). Self-compounded phytase enzyme was mixed at (250FTU, 500FTU, 750FTU and 1000FTU/kg) of broiler starter and broiler per-starter ration in (T_0, T_1, T_2, T_3 & T_4) groups respectively. The control group (T0) was feed broiler starter and broiler per-starter ration without any phytase enzyme. Weekly weight amount of the feed was distributed in the feeder of each group and the feed residue left in the feeder was collected. To find out the consumed feed by each group of the chicks the feed residue was deducted from the amount of feed offered to each group. Similarly, the body weight gain (g) of each group was recorded at every week of interval to get the growth performance with the help balance. Further the performance efficiency was calculated as the ratio of body weight (kg) and feed conversion efficiency, multiplied with 100. The mortality of birds was recorded as and when it occurred. Towards the end of trial 6 birds from each group were randomly selected and slaughtered by ‘‘Modified Kosher’’ method for the dressing percentage (Korczak and Grabowicz, 2003).

Thereafter the each carcass was cut separated into breast, thighs, wings, neck, head, back and legs with help of the balance at 6 week, carcass cuts preparation and sampling at termination of the feeding trial, 6 chicks were taken randomly from each feeding group. Chicks were killed according to the routine practices adopted in commercial broiler slaughter house. Total cool carcass weight was recorded from each bird then each carcass was split into its cuts, breast, and thighs were each cut weight was recorded. Weights of wings, neck, head and feet were also recorded. Also each visceral organ mass (edible parts) (gizzard, liver and heart) and inedible parts such as (crop, spleen and glandular stomach) of broiler chickens of various groups. Finally, the data analysis by programmer (SAS, 2004) software version 9.1 (SAS, Cary, NC) using general linear model (GLM) significant differences among treatment means are separated using C.D. method.

Table.1 Chemical composition of broiler feed

S.No.	Specification	Percentage	
		Broiler Starter	Broiler per-Starter
1.	Crude protein	23.0	20.0
2.	Crude fiber	5.0	5.0
3.	Calcium	1.0	1.0
4.	Phosphorus	0.5	0.5
5.	Lysine	1.22	1.06
6.	Methionine	0.83	0.72
7.	M.E.	2900 kcal/kg	3000kcal/kg

Table.2 Effect of phytase enzyme on body weight, feed intake, feed conversion ratio, dressing percentage in different treatments of broiler

parameters	T0	T1	T2	T3	T4	C.D. at 5%
Body weight(g/bird)	1673	1925	2044	2054	2069	19.13
Feed intake (g/bird)	3881	3840	3780	3680	3650	21.26
Feed conversion ratio	1.90	1.65	1.63	1.64	1.60	0.33
Dressing percentage (%)	61.9	65.7	65.5	65.6	66.9	5.21

T_0 [Control (Standard feed)], T_1 (Standard feed+ 250FTU/kg), T_2 (Standard feed+ 500FTU/kg), T_3 (Standard feed+ 750FTU/kg), T_4 (Standard feed+ 1000FTU/kg).

Table.3 Effect phytase enzyme on edible and Inedible parts of broilers (% of live weight)

	Season/ parameters					
	winter season					
	Gizzard	Heart	Liver	Crop	Spleen	Glandular stomach
T_0	2.3	0.52	2.2	0.52	0.11	0.51
T_1	2.2	0.57	2.1	0.53	0.09	0.51
T_2	2.3	0.62	2.3	0.53	0.12	0.51
T_3	2.4	0.64	2.5	0.53	0.10	0.52
T_4	2.4	0.70	2.5	0.52	0.13	0.52
C.D. at 5%	0.2	0.18	0.4	0.01	0.04	0.01

T_0 [Control (Standard feed)], T_1 (Standard feed+ 250FTU/kg), T_2 (Standard feed+ 500FTU/kg), T_3 (Standard feed+ 750FTU/kg), T_4 (Standard feed+ 1000FTU/kg).

Table.4 Effect phytase enzyme on carcass cuts of broilers (% of live weight)

season	Parameters	Treatments					C.D. at 5%
		T0	T1	T2	T3	T4	
Winter season	Neck	4.95	4.60	4.30	4.30	4.20	0.75
	Thighs	20.7	21.3	22.1	22.3	22.3	1.6
	Head	2.30	2.10	1.99	1.80	1.80	0.5
	Back	14.0	12.8	12.8	13.1	13.0	1.2
	Legs	5.1	4.8	4.4	4.2	4.2	0.9
	Wings	8.0	7.8	7.9	7.6	7.2	0.8
	Breast	22.5	24.3	24.7	25.7	26.6	4.1

T_0 [Control (Standard feed)], T_1 (Standard feed+ 250FTU/kg), T_2 (Standard feed+ 500FTU/kg), T_3 (Standard feed+ 750FTU/kg), T_4 (Standard feed+ 1000FTU/kg).

Results and Discussion

Towards the end of trial the body weight was found highest in T_4 followed by T_3, T_2, T_1 and lowest in T_0(control) groups showed significant ($p<0.05$) variation amongst different groups. While the feed consumption showed significant ($p<0.05$) reverse trend i.e. highest amount of feed was consumed by T_0 (control) and lowest in T_4 groups. The application phytase enzyme in broiler diets might have elevated metabolic and conversion rate for effective utilization of leading to improvement in these parameters. Supplementation of phytase enzyme significantly ($p<0.05$) improved feed conversion ratio (Table 2). Feed conversion ratio (FCR) at the end of trial was higher in T_4 compared to T_3, T_2, T_1 and T_0 this results similar findings were reported by previous research (Huff, *et al.,* 1998; Sohail and Roland, 1999; Ravindan, *et al.,* 2006; Bozkurt, *et al.*, 2006; Mondal *et al.,* 2007) found that feed conversion was better when phytase enzyme was supplemented in the diet. At the end of experiment, evaluation of dressing percentage on slaughtered representative birds revealed that T_4 group had significantly higher dressed percentage followed by T_3, T_2, T_1 and lower in T_0 groups (Table 2). These results agreed with previous findings of (Bougouin, *et al.,* 2014) and (Pillai, *et al.,* 2006) who showed that phytase supplementation significantly increased percentages of most of carcass merits compared to T_0 control diets. The present data in (Table 3) showed that there were no insignificant differences in edible and inedible parts percentage gizzard, liver, heart, crop, spleen and glandular stomach among dietary treatments. These results were similar to Arumbackam *et al.,* (2004) who found that carcass characteristics in terms of blood loss, feather loss, eviscerated carcass, giblet, lower gizzard, small intestinal length and caecal length did not differ significantly either due to phytase enzyme supplementation in quails. These results are supported with Hana *et al.,* (2010) who stated that carcass characteristics showed no significant effects on whole carcass weight and/or dressing percent, weight and percent of breast, thighs and wings. While no significant differences were reported for heart, gizzard, liver and abdominal fat pad. The present data in (Table 4) showed that there were insignificant differences in carcass cuts such as thighs, back, wings and breast percentage, also without significant difference for neck, legs, and head, percentage among dietary treatments. These results are supported with Hana *et al.,* (2010) and Kamelia *et al.,* (2012) who stated that carcass characteristics showed significant effects on whole carcass weight and/or dressing percent, weight and percent of breast, thighs and wings. While no significant differences were reported for neck, legs, and head, percentage. These results were similar with other reports (Biswas *et al.*, 1999; Kidd *et al.,* 2001; Saleh *et al.,* 2005; Hang *et al.*, 2008) while these results were in agreement with Jamroz *et al.*, (1996) and Wang *et al.*, (2005) who observed that exogenous dietary phytase enzyme supplementation increased meat yield of broilers significantly. Phytase enzyme supplementation had effect on the relative weights of all organs Kongbuntad *et al.*, (2006) and Hajati *et al.*, (2009).

References

Atia, F. A., Waibel, P. E., Hermes, I., Carlson C. W. and Walser, M. M. (2000) Effect of dietary phosphorus, calcium, and phytase on performance of growing turkeys. *Poult. Science*., 79:231–239.

Bahadoran, R., Gheisari, A. and Toghyani, M. (2011). Effects of supplemental microbial phytase enzyme on performance and phytate phosphorus digestibility of a corn- wheat-soybean meal diet in broiler chicks. *African*

Journal of Biotechnology. 10(34): 6655-6662.

Biehl, R. R., and Baker, D. H. (1997). Microbial phytase improves amino acid utilization in young chicks fed diets based on soybean meal but not diets based on peanut meal. Poultry Science, 76(2), 355–360.

Boling-Frankenbach, S. D., Peter, C. M., Douglas, M. W., Snow, J. L., Parsons, C. M., & Baker, D. H. (2001). Efficacy of Phytase for Increasing Protein Efficiency Ratio Values of Feed Ingredients. Poultry Science, 80(11), 1578–1584.

Bougouin, A., Appuhamy, J. a. D. R. N., Kebreab, E., Dijkstra, J., Kwakkel, R. P., and France, J. (2014). Effects of phytase supplementation on phosphorus retention in broilers and layers: A meta-analysis. Poultry Science, 93(8), 1981–1992.

Bozkurt, M., Cabuk, M. and Alcicek, A. (2006) The effect of microbial phytase in broiler grower diets containing low phosphorous, energy and protein. *J. Poult. Sci*., 43: 29-34.

Bozkurt, M., Cabuk, M. and Alcicek, A. (2006) The effect of microbial phytase in broiler grower diets containing low phosphorous, energy and protein. *J. Poult. Sci*., 43: 29-34.

Camden, B.J., Morel, P.C.H., Thomas, D.V., Ravindran, V. and Bedford, M.R. (2001). Effectiveness of exogenous microbial phytase in improving the bioavailabilities of phosphorus and other nutrients in maize– soyabean meal diets for broilers. *Animal Science*. (73): 289–297.

Chen, J. 2000. Recent developments in phytase enzyme- protein and energy effects. Applied Science Associates Technical Bulletin. Vol 29. IOP Publishing. Bristol, UK.

Choct, M., R. J. Hughes, and M. R. Bedford. 1999. Effects of a xylanase on individual bird variation, starch digestion throughout the intestine, and ileal and caecal volatile fatty acid production in chickens fed wheat. Br Poult Sci. 40:419–422.

Ciftci, M., Bestami D. and M. Ali Azman, M. (2005) Effects of microbial phytase supplementation on feed consumption and egg production of laying hens. *International Journal of Poult. Science*. 4 (10): 758-760.

How to cite this article:

Ebrahim Mohammed Hussein Alarasi and Pandey, R.K. 2017. Efficacy of Phytase Microbial Feed Additive on Growth Performance of Broilers Chicks. *Int.J.Curr.Microbiol.App.Sci.* 6(11): 2542-2546. doi: https://doi.org/10.20546/ijcmas.2017.611.299