Haryana Vet. **49** (December, 2010), pp 59-61

Research Article

EFFECT OF PERIOD OF SUPPLEMENTATION OF MULTI-ENZYME ON CARCASS YIELD AND SERUM MINERALS IN BROILERS DURING HOT HUMID WEATHER

JITENDRA SINGH, C. P. VERMA[1] and R. K. SHARMA
Department of Livestock Production Management, College of Animal Sciences
CCS Haryana Agricultural University, Hisar-125 004

ABSTRACT

The present study was undertaken to determine the effect of supplementation of multi-enzyme in the basal diet for a period of 0-2 (T2), 0-4 (T3) and 0-6 (T4) weeks of age on the carcass yield and serum minerals of broilers reared in hot humid weather. Two hundred and forty, one- day-old commercial broiler chicks were randomly divided into four groups of 60 chicks each. Each group was further sub divided into four replicates with 15 chicks in each replicate. Standard managemental practices were followed during the experimental period. Carcass yield and mineral levels in serum were studied. Addition of multi-enzyme in the ration of broiler chickens up to six weeks of age had no significant effect on carcass yield and serum calcium level. However, serum inorganic phosphorus level was significantly improved ($P<0.05$) in T4 group.

Key words: Multi-enzyme, broilers, carcass yield, serum calcium and phosphorus

India, being a tropical country, has high environmental temperature during summer months, which has detrimental effect on growth, feed efficiency, liveability and overall performance of poultry. High temperature (>30^{0}C) accompanied by high humidity is one of the most important stress factors affecting the performance of broilers (Cahaner and Leenstra, 1992). Enzymes act as catalysts in different biochemical reactions taking place in the body. Enzymes can bring about difficult chemical changes in a specific way at body temperature and over a wide pH range.

The metabolizable energy (ME) of soybean meal is notably low for poultry due to non starch polysaccharides (NSP) in the cell wall matrix (Pierson *et al.*, 1980). Approximately 10 % of the protein in soybean meal is located in the dry matter (DM) within the cell wall matrix (Chesson, 2001). This source of protein and energy can be made available to broiler chickens by degradation of NSP by carbohydrases (Mandels, 1985). Indeed, digestibility of crude protein (CP) and energy sources increased when carbohydrases were added to the corn soybean meal diet (Mathlouthi *et al.*, 2003; Saki *et al.*, 2005). The present investigation was conducted to study the effect of supplementation of multi-enzyme on the performance of broiler chickens during hot humid climate from 0-6 weeks of age.

[1]Corresponding author

MATERIALS AND METHODS

Two hundred and forty, one-day-old broiler chicks were randomly divided into four treatment groups (T1, T2, T3 and T4) of 60 chicks each. Each group was further subdivided into four replicates of 15 chicks each. The chicks were given corn soybean based mash diet *ad libitum* formulated according to the BIS specifications (BIS, 1992) from 0-6 weeks of age. The birds of all the groups were fed broiler starter diet (2800 Kcal ME/kg feed with 23% crude protein) from 0-4 weeks and broiler finisher diet (2900 Kcal ME/kg feed with 20% crude protein) from 4-6 weeks of age. The feed was supplemented with commercially available multi-enzyme containing amylase, xylanase, pectinase, glucanase, lipase, cellulase, protease and phytase @ 50g/100kg feed for a period of two, four and six weeks in group T2, T3 and T4, respectively. The birds of T2 and T3 groups were given control group diet (without multi-enzyme supplementation) for the rest of the experimental period i.e. for the last four and two weeks period, respectively. Birds in group T1 acted as negative control. After six weeks, eight birds per treatment (two birds from each replicate) were randomly selected and sacrificed on 43rd day of age after fasting for 12 h. The eviscerated weight, giblets weight (heart, liver and gizzard) and drawn weight were recorded. The musculature from breast area and the legs (thigh and

drum-stick) was separated from the bones and meat bone ratios were recorded for these two parts. Different parameters were estimated by the formulae given below:

Dressed weight = Live weight - (Weight of blood + feathers + shanks + head)

Dressed % = (Dressed weight/Live weight) × 100

Eviscerated weight = Dressed weight - Weight of viscera

Eviscerated % = (Eviscerated weight/Live weight) × 100

Giblets weight = Weight of heart, liver and gizzard

Giblets % = (Weight of giblets/Live weight) × 100

Drawn weight = Eviscerated weight + weight of giblets

Drawn % = (Drawn weight/Live weight) × 100

Breast meat bone ratio = Breast meat weight/Breast bone weight

Leg meat bone ratio = Leg meat weight/Leg bone weight

At the time of sacrificing, blood was collected from each bird. Serum was separated and analyzed for calcium (Ca) and inorganic phosphorus (P) levels following standard procedure (Fiske and Subbarow, 1925). Data obtained were subjected to statistical analysis as per Snedecor and Cochran (1994) using Completely Randomized Design and Randomized Block Design. Means were compared by calculating critical difference (C.D.) at $P<0.05$.

RESULTS AND DISCUSSION

Carcass yield: There were no significant difference among different treatment groups regarding carcass characteristics such as eviscerated weight, giblets weight and drawn weight (Table 1). The breast meat and leg meat bone ratios also had no significant differences among different treatment groups (Table 1).

The results of the present findings are in agreement with those of Azcona *et al.* (2000), Bharathidasan and Chandrasekaran (2000) and Ahlawat (2007) who also observed a non significant effect of multi-enzyme supplementation on carcass yield of broilers. A non significant improvement in carcass weight of broilers on feeding enzyme supplemented diet was observed by Berwal *et al.* (2009). However, Ahmed *et al.* (2004), Tahir *et al.* (2006), Sarvestani *et al.* (2006) and Omojola and Adesehinwa (2007) reported that different carcass traits were significantly higher for multi-enzyme fed broilers as compared to controls which might be due to feeding of different types of feed supplemented with different dose rate of multi-enzymes.

Serum calcium and inorganic phosphorus: The concentration of serum Ca improved non significantly in birds fed multi-enzyme for a period of six weeks (Table 2). A significant increase ($P<0.05$) in serum P concentration was observed in broilers of group T4 fed multi-enzyme supplemented diet up to six weeks of age as compared to all other groups. Whereas, no effect was observed in the birds of other two groups when they were deprived off feeding multi-enzymes after two or four weeks of age. The results of the present study are comparable to those of Rama Rao *et al.* (1999) who also reported non significant effect of phytase supplementation on serum Ca levels in broiler chickens. In contrast, Broz *et al.* (1994) and Sebastian *et al.* (1994) observed a decrease in plasma Ca level by phytase supplementation in broilers. The improved serum Ca concentration, as found in the present study, may be attributed to the release of Ca from Ca phytate complex, thus increasing the availability of Ca as reported by Ahmad *et al.* (2000). The findings of this study related to inorganic P are in agreement with the results of Broz *et al.* (1994) and Sebastian *et al.* (1994) who also reported an increase in plasma inorganic P as a result of phytase supplementation in broiler chickens. The increase in serum P level can be attributed to increased phytate hydrolysis by phytase as reported by

Table 1
Effect of multi-enzyme on mean carcass yield of broilers

Treatments	Eviscerated weight (%)	Giblets weight (%)	Drawn weight (%)	Breast meat bone ratio	Leg meat bone ratio
T1 (Control)	66.62±0.67	4.62±0.10	71.24±0.67	5.53±0.40	3.17±0.09
T2 (Multi-enzyme for 0-2 weeks)	67.24±0.52	4.68±0.14	71.93±0.57	5.88±0.64	3.23±0.11
T3 (Multi-enzyme for 0-4 weeks)	67.73±0.78	4.50±0.07	72.24±0.80	5.59±0.17	3.19±0.11
T4 (Multi-enzyme for 0-6 weeks)	66.56±0.53	4.67±0.10	71.23±0.53	5.47±0.30	3.11±0.09

Values are Means±S.E. of eight birds in each group

Table 2
Effect of multi-enzyme on serum calcium and inorganic phosphorus concentration in broilers

Treatments	Serum calcium (mg/dl)	Serum phosphorus (mg/dl)
T1 (Control)	10.07^{a} ±0.78	5.38^{b} ±0.11
T2 (Multi-enzyme for 0-2 wks)	10.07^{a} ±0.27	5.38^{b} ±0.16
T3 (Multi-enzyme for 0-4 wks)	10.14^{a} ±0.72	5.40^{b} ±0.05
T4 (Multi-enzyme for 0-6 wks)	10.83^{a} ±0.35	6.15^{a} ±0.14

Values are Mean±S.E. of eight birds; Values with in a column bearing different superscripts differ significantly (P<0.05)

Mohammad *et al.* (1991).

It can be concluded from this study that the supplementation of multi-enzyme in the broiler chickens diet may not be useful to enhance carcass yield and serum calcium concentration.

REFERENCES

Ahlawat, M. (2007). Studies on pellet binder, pelleting and enzyme supplementation on the performance of broilers fed diets containing barley, pearl millet and sunflower meal. Ph. D. thesis, CCSHAU, Hisar.

Ahmad, T., Rassol, S., Sarwar, M., Haq, A. and Hasan, Z. (2000). Effect of microbial phytase produced from a fungus *Aspergillus niger* on bioavailability of phosphorus and calcium in broiler chicken. *Anim. Feed Sci. Technol.* **83**: 103-114.

Ahmed, F., Rahman, M.S., Ahmed, S.V. and Miah, M.Y. (2004). Performance of broilers on phytase supplemented soybean meal based diet. *International J. Poult. Sci.* **3**: 266-271.

Azcona, J.O., Mallo, G.D., Ciacciariello, M, Morettini, M. and Golin, A. (2000). Biological evaluation of commercial phytase (Natuphos) in broiler diets: Broiler performance. *Proc. XXI World Poultry Congress*, Canada.

Berwal, R.S., Lohan, O.P. and Sihag, Zile S. (2009). The effect of feed particle size, enzyme supplementation and pelleting on carcass characteristics of broiler chickens. *Indian J. Anim. Nutr.* **26**: 191-198.

Bharathidasan, A. and Chandrasekaran, D. (2000). Enzyme supplementation on performance of broilers. *XX Indian Poultry Sci. Assoc. Conference*, Chennai.

BIS (1992). Indian Standard, Poultry Feeds Specifications. Bureau of Indian Standards, 4th Review. Manak Bhawan, 9, Bahadur Shah Zafar Marg, New Delhi, India.

Broz, J., Oldane, P., Perrin-Voltz, A.H., Rechen, G., Schulze and Nuches, C.S. (1994). Effect of supplemental phytase on performance and phosphorus utilisation in broiler chickens fed a low phosphorus diet without addition of inorganic phosphorus. *Br. Poult. Sci.* **35**: 273-280.

Cahaner, A. and Leenstra, F. (1992). Effect of high temperature on growth and efficiency of male and female broilers from lines selected for high weight gain, favourable feed conversion and high or low fat content. *Poult. Sci.* **71**: 1237-1250.

Chesson, A. (2001). Non starch polysaccharide degrading enzymes in poultry diets: influence of ingredients on the selection of activities. *World Poult. Sci. J.* **57**: 251-263.

Fiske, C.H. and Subbarow, Y. (1925). The colorimetric determination of phosphorus. *J. Biol. Chem.* **66**: 375-400.

Mandels, M. (1985). Application of cellulases. *Biochemical Society Transactions* **13**: 414-415.

Mathlouthi, N., Mohamoed, M.A. and Larbier, M. (2003). Effect of enzyme preparation containing xylanase and B-glucanase on performance of laying hens fed wheat/barley or maize/ soybean meal-based diets. *Br. Poult. Sci*. **44**: 60-66.

Mohammad, A., Gibney, M.J. and Taylor, T.G. (1991). The effect of dietary levels of inorganic phosphorus, calcium and cholecalciferol on the digestibility of phytate-P by the chick. *Br. J. Nutr.* **66**: 251-259.

Omojola, A.B. and Adesehinwa, A.O.K. (2007). Performance and carcass characteristics of broiler chickens fed diets supplemented with graded levels of Roxazyme G. *Int. J. Poult. Sci.* **6**: 335-339.

Pierson, E.E.M., Potter, L.M. and Brown, R.D. (1980). Amino acid digestibility of dehulled soybean meal by adult turkeys. *Poult. Sci.* **59**: 355-360.

Rama Rao, S.V., Reddy, V.R. and Reddy, R.S. (1999). Enhancement of phytate phosphorus availability in the diets of commercial broilers and layers. *Anim. Feed Sci. Technol.* **79**: 211-222.

Saki, A.A., Mazugi, M.T. and Kamyab, A. (2005). Effect of mannanase on broiler performance, ileal and in vitro protein digestibility, uric acid and litter moisture in broiler feeding. *Int. J. Poult. Sci.* **4**: 21-26.

Sarvestani, T.S., Dabiri, N., Agah, M.J. and Norollahi, H. (2006). Effect of pellet and mash diets associated with biozyme enzyme on broilers performance. *Int. J. Poult. Sci.* **5**: 485-490.

Sebastian, S., Touchburn, S.P. and Chaver, E.R. (1994). Enhancement of mineral utilization and growth performance of broiler chickens by microbial phytase supplementation of a corn-soyabean meal diet. *Proc. XX World Poultry Congress,* India.

Snedecor, G.W. and Cochran, W.G. (1994). Statistical Methods. (6th edn.), the Iowa State University Press, Ames, Iowa, USA.

Tahir, M., Fuad S. Akira, O. and Kunioki, N. (2006). Pectinase plays an important role in stimulating digestibility of a corn soybean meal diet in broilers. *J. Poult. Sci.* **43**: 323-329.