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Effect of enzyme supplementation on performance of broiler in poultry farm of Gaya District

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Abstract
A trail on effect of enzyme supplementation was conducted in field condition on poultry farm of farmers in Gaya district (Bihar) with different doses of enzymes (Phytase, xylanase and galactose) in broiler feed to increase the productivity. Inclusion rate of enzymes were @ 250g, 500g and 1000g per ton of feed of broiler. The result showed that inclusion of enzyme @ 1000g per ton was significantly beneficial in terms of feed intake, weight gain and FCR than enzyme fed @ 250g and 500 g (recommended by manufacturer of enzyme) per ton. It might be due to better utilization of NSP and phytates in locally available broiler feed. From the above facts it could be concluded that enzyme fed @ 1000g per ton in broiler feed in field condition in Gaya district is more beneficial.

Keywords: Broiler, enzyme, body weight, feed conversion ratio

Introduction
There are many components of plant origin found in feed ingredients that cannot be digested by monogastric species like poultry because of the lack of or insufficient secretion of endogenous enzymes. The non-starch polysaccharides (NSP) containing ingredients like corn and soybean based meal are the main factors which reduce nutrient bioavailability. In poultry feedstuffs lignin, arabinoxylan, β-glucans, galactose and mannose are the main NSPs. Addition of exogenous enzymes to improve the performance of broilers is common practice in farmer's field.

There are different suggested modes of action for these enzymes (Adeola and Cowieson, 2011) [5]. For example, carbohydrase degrade cell wall components such as soluble and insoluble arabinoxylans, releasing encapsulated nutrients inside the cell wall and improve access of endogenous enzymes to cell contents (Cowieson, 2005) [1]. Khan *et al.* (2006) [2] reported that inclusion of enzyme increase body weight gain and improves FCR in Broiler. Amerah, *et al.* (2016) [7] reported that inclusion of enzymes in broilers diet improve weight gain and decrease FCR. Several studies have reported that a combination of xylanase (X), amylase (A), and protease (P) improve broiler performance and nutrient digestibility in corn-based diets (Olukosi *et al*., 2007; Cowieson and Ravindran, 2008; Tang *et al*., 2014) [3, 4, 8]. Romero *et al.* (2013, 2014) [9, 10] recently reported the value of adding protease on top of X and A on energy metabolize ability and nutrient digestibility. In contrast, Masey O'Neil *et al.* (2014) [6] suggested that there is no evidence to support the use of multi-carbohydrase over single enzyme activity.

Materials and Methods
This experiment was conducted on farmer's poultry farms of six villages (Gopalkheda (Fatehpur), Galudih (Fatehpur), shekha bigha (Manpur), Khekra (Manpur), Gangati (Manpur),

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Sondhi (Manpur)) selected purposely because On Farm Trial was conducted in February and March, 2016. During the experiment enzymes (Phytase, xylanase and galactose) were distributed among the poultry farmers of these villages of Gaya district to see the impact of enzymes on growth of commercial broiler. The all experimental diets were purchased which is locally available in market i.e. Pre-Starter, starter and Finisher. The experimental flocks were fed according to the schedule given in table 1 and the nutrient value of the feed was according to table 2. There were no any changes in poultry houses and lighting system from their normal routine. In this experiment Phytase, xylanase and galactose enzymes were used.

Table 1: Schedule of feeding

SL	Name of Feed	Uses
1.	Pre-Starter	1-10 days
2.	Starter	11-27 days
3.	Finisher	28 -35 days

Table 2: Nutrient value feed given to experimental flock

SL	Nutrition	Pre-starter (%)	Starter (%)	Finisher (%)
1	Moisture (Max)	11-12	11-12	11-12
2	Crude Protein (Min)	22	21.5	20.5
3	Crude Fibre (Max)	4	4	4
4	Crude Fat (Min)	4	4.5	5
5	Lysine (Min)	1.3	1.2	1.2
6	Methionine (Min)	0.6	0.5	0.5
7	Methionine + Cystine	1.1	1.0	1.0
8	Linoleic acid	1.2	1.5	1.8
9	Arginine	1.5	1.45	1.4
10	Calcium (Min)	1.2	1.2	1.1
11	Available phosphorus (Min)	0.6	0.6	0.5
12	Metabolic Energy (Min)	3,000 kcal	3,100 kcal	3,200 kcal

A total 10000 Day-old broiler chicks were obtained from a commercial hatchery and distributed to 10 randomly selected farmers (250 X 4 per farmer). Chicks were weighed, and housed in floor pens covered with wood shavings. There were 4 treatments with 250 birds in each treatment. In first treatment, not any enzyme was added (Control), in second treatment 250g, third treatment 500g (recommended by manufacturer of enzyme) and in fourth 1000g enzyme per ton of poultry feed were added. Body weight and feed intake were recorded per 250 birds of each farmer at 35th days of experiment. After that Feed conversion ratio (FCR) was calculated by dividing total feed intake (250 birds) by weight gain of live birds.

Data was analyzed by one way ANOVA. A probability value of $p<0.05$ was considered to be statistically significant in this experiment.

Results and Discussion

The table no-3reveals that the performance of commercial broilers were improved by adding enzyme in feed. It was found that, in field condition, when the inclusion rate was 250g/ton which is less than the recommended by manufacturer of enzyme i.e. 500g/ton the weight gain at 35th day was found to be only 1.284 kg with average feed intake per bird 2.222 kg leading to FCR 1.733. It was observed that at recommended inclusion rate by the manufacturer the weight gain at 35th day was 1.31kg with average feed intake of 2.216kg having FRC 1.628. But when the inclusion rate was taken 1000g per ton it was observed that weight gain at 35th day was maximum 1.351kg having average feed intake 2.086kg and best FCR of 1.545.

Table 3: Performance of broiler in different inclusion level of enzyme

Parameter	Average feed intake/bird (kg)	Weight gain at 35th day (kg)	FCR
No enzyme (Control)	2.241^{a}	1.243^{a}	1.807^{a}
Enzyme @ 250g/ton	2.222^{a}	1.284^{b}	1.733^{b}
Enzyme @ 500g/ton	2.126^{b}	1.31^{c}	1.628^{c}
Enzyme @ 1000g/ton	2.086^{c}	1.351^{d}	1.545^{d}
SEM (±)	0.008	0.004	0.233

Means in the same columns bearing different letters differ significantly ($p<0.05$).

It was quite obvious from the table that at 35th day there was no significant difference ($p<0.05$) in average feed intake per bird in case of no enzyme and enzyme @250g per ton group but there was significant difference when it was compared with enzyme @500g and 1000g per ton. So far as the weight gain at 35th day is concerned it was found that there is significant difference among no enzyme treatment and enzyme @ 250g, 500g and 1000g per ton. The FCR was significant and better (1.545) when enzyme @1000g per ton of feed was given followed by FCR 1.628 with enzyme @500g per ton and 1.733 with enzyme @250g per ton. Similar findings was also found by Khan S.H. *et al.* (2006) [2] who reported improvement in performance of broiler by adding enzyme in feed.

Conclusion

The result shows that inclusion of enzyme @1000g per ton was significantly beneficial in terms of feed intake, weight gain and FCR than enzyme fed @250g and 500 g (recommended by manufacturer of enzyme) per ton. It might be due to better utilization of NSP and phytates in locally available broiler feed. From the above facts it could be concluded that enzyme fed @ 1000g per ton in broiler feed in field condition in Gaya district is more beneficial.

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