



## Maxizyme EX Supplementation for Improving Nutrient Utilization from Broken Rice-Based Diet in Broilers

**Aashiq Hussain\* and Shambhavi**

AGM - Technical (AHN), Department of Animal Husbandry and Nutrition, Rossari Biotech Limited, India

\*Corresponding Author: Aashiq Hussain, AGM - Technical (AHN), Department of Animal Husbandry and Nutrition, Rossari Biotech Limited, India.

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### Abstract

Increasing cost of conventional feed materials has made the alternative feed ingredients a necessity for farmers. Maxizyme EX is a cocktail enzyme with combination of NSP hydrolysing enzymes, amylases, proteases and probiotics developed to enhance the digestibility of feed ingredients while maintaining the integrity of gut. The effect of Maxizyme EX was evaluated by changing the conventional feed ingredients and opting for easily available feed ingredients for broiler diet at farm level field trial. The study was done using positive control and treatment group (containing Maxizyme EX in the formulation). The results were studied statistically, it was observed that prestarter, starter phases and finisher phase of the birds in the treatment group had 9.8% of improved body weight gain. The feed conversion ratio (FCR) of the birds in the treatment group was observed to be 0.08 points lower than the control group having a maximum improvement of FCR of 0.21 points. Thus, the results clearly depicted the influence of Maxizyme EX on increasing digestibility and absorption capability of feed alternatives.

**Keywords:** Maxizyme EX; Alternative Feed Ingredients; Broilers; Cocktail Enzyme

### Introduction

The sustainability of farms has been highly challenged due to constant flicks in cost of maize and soya globally. These highly priced conventional energy sources burden the whole supply and demand process affecting production cost and profitability. To maintain the profitable margins, it becomes essential for farmers to include unconventional feed ingredients like broken rice in poultry diet. There are large number of reports regarding the use of broken rice as an energy supplement in poultry feeding. Economically the feed costs are immensely reduced by addition of broken rice, but some extra supplementations of enzymes are required to fulfil the energy requirement of poultry diet by use of this unconventional feed ingredient.

This study was conducted to inspect the production performance of broiler chicken fed with broken rice at the rate of 20% in prestarter and 30% in later two stages (Control/basal diet). An-

other objective of conducting this study was to ascertain the effects of Maxizyme Ex supplementation on production performance of broiler chickens fed with nutritionally marginal control diet deficient in 90 kcal metabolic energy per kg, 0.14% available phosphorus and 5% digestible amino acids.

### Experimental design

The trial was conducted in commercial Vencobb 430 broiler farm of 2000 flock capacity, situated in northern part of the country. The trial was conducted in the month of April-May with an average daily temperature between 39-43°C. The farm was partitioned and was equally divided into two units of 1000 birds each designated as Control and Treatment groups.

The diet specifications followed for the Control and Treatment groups in trial are given in table 1.

Ingredients	Control Group			Treatment Group		
	Prestarter	Starter	Finisher	Prestarter	Starter	Finisher
Maize	365.6	312.355	350	352	294.3	313
Broken Rice	200	300	300	200	300	300
RB OIL	15	15	20	15	15	21
Soya DOC 45%	304	200.4	151	275	190	143.6
Soya Full Fat	41	100	110	40	80	95.6
MBM	30	30	35	30	36	30
DORB	10	10	10	59.5	59.4	70
Lys	2.66	2.73	2.69	2.5	2.8	2.758
Met	3.7	3.5	1.76	3.38	3.4	1.73
Thr	1	1	1	1	1	1
DCP	9.47	8.2	4.8	2.4	0	0.83
LSP	5.7	5.2	2.7	7.14	6.8	8.533
Maxizyme EX	-	-	-	0.400	0.400	0.400
Rate/Kg (Rs)	39.96	36.74	34.97	38.26	35.7	34.0
Nutrient Composition						
ME	2975	3075	3175	2975	3075	3175
CP%	22.5	20.5	19.1	22.5	20.8	19.3
Lys	1.27	1.15	1.05	1.25	1.15	1.05
Met	0.61	0.6	0.42	0.61	0.6	0.42
M+C	0.88	0.84	0.71	0.88	0.85	0.71
Ca	0.94	0.84	0.72	0.94	0.93	0.93
Av P	0.47	0.42	0.38	0.47	0.45	0.43
Thr	0.75	0.67	0.63	0.74	0.70	0.64

**Table 1:** Diet composition of Control and Treatment groups.

## Materials and Methods

The trial was conducted on 1000 Vencob 430 commercially procured chicks having initial mean body weight of 40 g and were set on trial period of 38 days. Adlib feed and water was offered to them during whole trial period. All the standard managerial and biosecurity procedures were followed during the trial.

The birds were fed with a pre-starter (1-14 d), a starter (15-28 d) and a finisher (28-38 d) crumbs and pellet diets which were prepared at the beginning of trial from the same lot of raw materials. The data related to body weight, feed intake, mortality and FCR was taken at weekly interval for both control and treatment groups

(Table 2 and 3). Cumulated body weight and feed intake (FI) was measured between 1-14, 15-28, 28-38 days to analyse the results for prestarter, strater and finisher phase of the growth cycle of birds. Average daily weight gain and ADFI was also calculated from the collected data for different periods of measurement.

## Results and Discussion

The nutrient matrix of Maxizyme EX (Multienzyme formulation from Rossari), was included in the nutrient calculation and diet formulation for treatment group.

Many studies have suggested that addition of enzyme in the formulation improves digestibility of starch, N and DM [1], improved

access to cellular contents associated with hydrolysis of structural carbohydrates [2] and hydrolysis of proteinaceous antinutrients [3,4]. This overall improves BWG and FCR which can be clearly observed in treatment group. After compiling the observations and analysing the results by statistical analysis it was noted that birds fed control diet had poorer BWG, feed intake and FCR than birds fed with treatment diet. However, supplementation of Control diet with 400 gm Maxizyme EX/ton of feed improved BWG by 6.16%. The conclusion drawn from the analysis of these parameters was that the inclusion of broken rice in the broilers diet decreases the feed conversion efficiency and BWG. It was noted that the Maxizyme EX supplementation in the treatment group in prestarter phase reversed the negative effects of broken rice significantly ( $p < 0.05$ ) and increased the FCR and BWG. However, no statistical difference was observed between control and treatment group of starter and finisher diets.

The data observed concluded that in comparison to prestarter and starter phases, the finisher phase of the birds in the treatment group had maximum BWG improvement of 9.8%. Also, it was observed that the FCR of the treatment group birds decreased by 0.08 points than the control group having maximum improvement in FCR by 0.21 points in the finisher phase as compared to prestarter (0.03) and starter (0.05) phases, indicating a linear relation with respect to the BWG. Another parameter observed was the mortality percentage. It was observed that mortality percentage for control and treatment groups was 7.75% and 7.15% respectively. The mortality percentage was higher in finisher phase for both the groups (4.4%, 4.0%) due to severe heat shock by high environmental temperature (45.3°C) and concurrent infections. The increased mortality in finisher phase might be the reason for high FCR in finisher phase of both control and treatment groups.

It is known that increased viscosity of intestinal contents impairs the performance by reducing the diffusion of enzymes and nutrients [5-7] detrimentally altering the microbial profile and environment within the distal gastrointestinal tract and increasing endogenous losses [2,8]. The relatively high concentration of soluble carbohydrate in the control diet, associated with the Broken rice, might have reduced performance because of an increase in dietary viscosity. Supplementation of diets with carbohydrase that hydrolyse viscosity-inducing water-soluble carbohydrates would be expected to ameliorate these effects and improve nutrient use. A similar result was seen in a study where supplementation of a high-viscosity wheat-based diet with xylanase mitigated the growth performance reduction with an accompanying decrease in duodenal and ileal digesta viscosity and a subsequent increase in nutrient use [9]. Therefore, improvement in performance of birds fed nutritionally marginal diets supplemented with Maxizyme EX in the current study was partially due to improvement in nutrient use arising from enzyme-enhanced reduction in gastrointestinal tract digesta viscosity. The combination of carbohydrase, protease and phytase improved performance. Phytase improved the digestibility of P and Ca, and carbohydrase and protease improved digestibility of energy, N and DM. The explanation for the improved performance of birds fed diets containing the combination of enzymes is that the combination improved the intake of digestible energy, N, DM, and P compared with the Control diet.

It can be concluded that Maxizyme EX can improve the digestibility of nutrients and the performance of broiler chickens fed a diet that is formulated to be suboptimal in terms of ME, CP, Ca and P. Furthermore, the use of a Maxizyme EX is highly effective in improving the performance of broilers, allowing for the formulation of lower-cost diet and contributing to the profitability of poultry production.

	7 Day	14 Day	21 Day	28 Day	35 Day	38 Day
B. wt.	172	453	857	1355	1665	1965
FI	149	548	1105	1915	2789	3325
FCR	0.86627907	1.20971302	1.28938156	1.41328413	1.67507508	1.69211196
Mortality	16	12	14	25	49	39

**Table 2:** The data related to body weight, Feed intake, FCR and Mortality of birds at weekly intervals for control group.

	7 Day	14 Day	21 Day	28 Day	35 Day	38 Day
B. wt.	181	476	883	1417	1789	2087
FI	153	562	1122	1943	2830	3365
FCR	0.84530387	1.18067227	1.27066818	1.37120677	1.58188932	1.61236224
Mortality	14	13	15	21	46	34

**Table 3:** The data related to body weight, Feed intake, FCR and Mortality of birds at weekly intervals for Treatment group.

	1 - 14 Days	15 - 28 Days	29 - 38 Days	1 - 38 Days
B. wt.	453	902	610	1965
FI	548	1367	1410	3325
FCR	1.20971302	1.51552106	2.31147541	1.69211196
Mortality	28	39	88	155

**Table 4:** Cumulative Feed Intake, Body weight, FCR and Mortality at different periods of measurement for positive control group.

	1 - 14 Days	15 - 28 Days	29 - 38 Days	1 - 38 Days
B. wt.	476	941	670	2087
FI	562	1381	1422	3365
FCR	1.18067227	1.46758767	2.12238806	1.61236224
Mortality	27	36	80	143

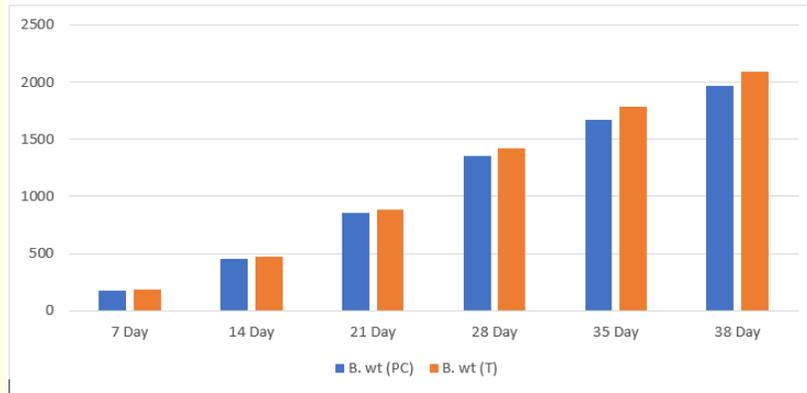
**Table 5:** Cumulative Feed Intake, Body weight, FCR and Mortality at different periods of measurement for Treatment group.

	1 - 14 Days	15 - 28 Days	29 - 38 Days	1 - 38 Days
B. wt.	32.35	64.42	61	51.71
FI	39.14	97.6	141	87.5
FCR	1.20989181	1.51505744	2.31147541	1.69212918

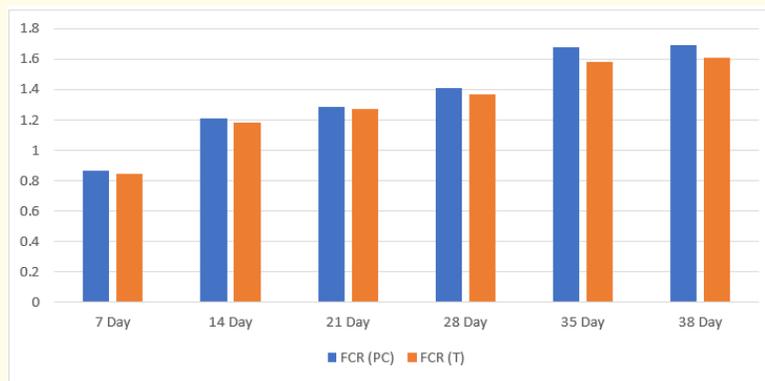
**Table 6:** Average body weight gain, daily feed intake and FCR of positive control group at different periods of measurement.

	1 - 14 Days	15 - 28 Days	29 - 38 Days	1 - 38 Days
B. wt.	34	67.21	67	54.9
FI	40.14	98.64	141	88.55
FCR	1.18058824	1.46763874	2.10447761	1.6129326

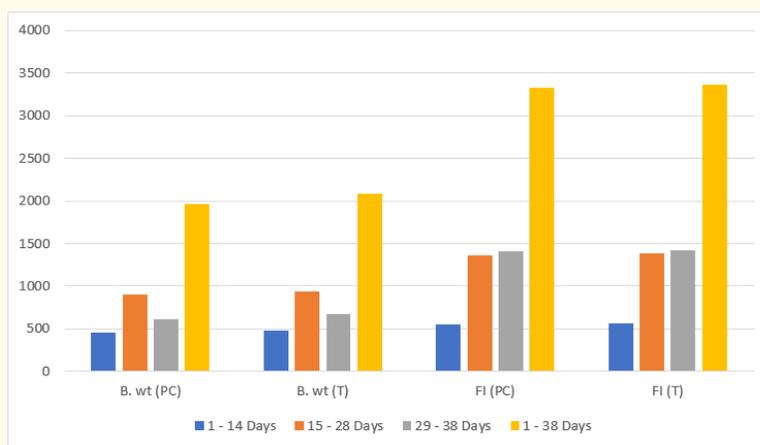
**Table 7:** Average body weight gain, daily feed intake and FCR of Treatment group at different periods of measurement.



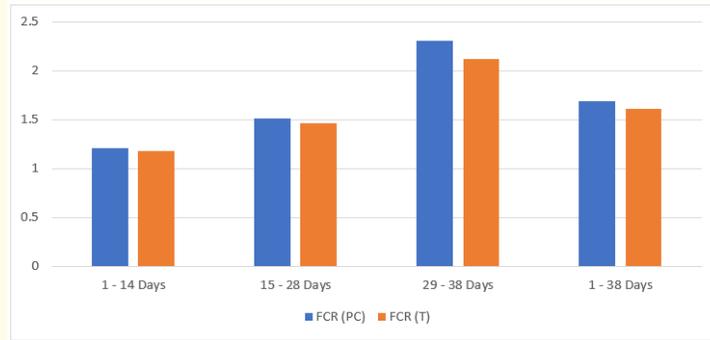
**Figure 1:** Body weight of birds at weekly intervals for positive control and Treatment groups at weekly intervals.



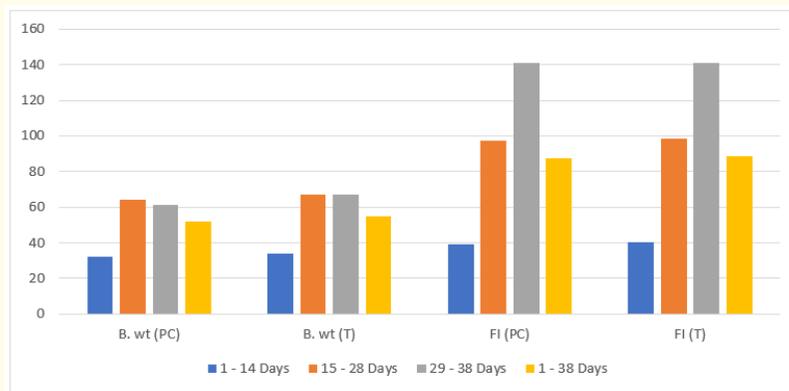
**Figure 2:** FCR of birds at weekly intervals for positive control and Treatment groups at weekly intervals.



**Figure 3:** Cumulative Body weight and Feed Intake at different periods of measurement for positive control group and Treatment Groups.



**Figure 4:** FCR at different periods of measurement for positive control group and Treatment Groups.



**Figure 5:** Average body weight gain and daily feed intake of positive control and Treatment Group at different periods of measurement.

		Control	Treatment
Feed cost/Kg diet (Rs)			
	Prestarter	39.96	38.26
	Starter	36.74	35.7
	Finisher	34.97	34
Feed Intake (Kg)			
	Prestarter	0.548	0.562
	Starter	1.367	1.381
	Finisher	1.41	1.422
	Total	3.325	3.365
Feeding cost (Rs)			
	Prestarter	22	21.5
	Starter	50.2	49.3
	Finisher	49.3	48.3
	Total	121.43	119.15
Feed cost/Kg consumed (Rs)		36.52	35.4
FCR		1.69	1.61
Feeding cost/Kg B. Wt. (Rs)		61.7188	56.994

**Table 8:** Economics of Feed and Feeding (ROI).

## Conclusions

The conclusion that can be successfully drawn from the study is that the inclusion of broken rice in the broiler has decreased the feed conversion efficiency throughout the trial period. Maxizyme EX supplementation in treatment group has significantly increased the performance efficiency of the broiler birds after 21 days of age. During the period of 1-21 days, there is a very little difference in FCR between the two groups. The improvement in body weight and FI was significant during the starter phase and at the end of the trial period (38<sup>th</sup> day) as also indicated by the average daily weight gain and ADFI. Overall, it can be analysed from the observed data that Maxizyme EX supplementation had increased the overall body weight gain and production performance of the experimental birds compared to control group along with the reduced feed cost/Kg.

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