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Influence of Biozyme Supplementation on Broiler Chickens Fed Diet Containing Rice Bran

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Abstract: *The study was conducted at Kazaure in the semi-arid zone of northern Nigeria between latitude 12^0 41' 28.7''- 13^0 00'N and longitude 07^0 50'E- 08^0 25' 21.1''E with temperature ranges from 15.85^{0}C - 39^{0}C for a period of Eight weeks, to determine the intake and carcass quality of broiler chickens fed diet containing rice bran with biozyme supplementation. Ninety-six (96) day- old broiler chickens were used for the study. The birds were randomly grouped in to four treatments, and replicated three each, with eight birds per replication. Four experimental diets each for starter and finisher were formulated such that, diet 1 (control) contained rice bran with 0% enzyme (biozyme) and diets 2, 3 and 4 contained rice bran with varying proportions of biozyme at 7%, 14% and 21% respectively. The four treatments were allocated to those four experimental diets accordingly, and laid on a Completely Randomized Design (CRD). Initial body weight, daily feed intake, weekly weight gain, final weight and carcass weight of randomly selected birds were recorded. The result obtained for daily feed intake indicated no significant difference ($p>0.05$) observed among the treatments. The findings for the growth performance revealed a significant difference ($p<0.05$) among the treatments, where T4 (2106.63g) recorded highest value and least value in T1 (1451.70g). The result for carcass weight revealed a significant difference ($p<0.05$) among the treatments, where T4 (1204.00g) recorded the highest value and the least value in T1 (824.00g) respectively. Based on the findings obtained in the study, broiler chickens could be fed diet containing rice bran with biozyme supplementation at up to 21% level of inclusion for an efficient intake, growth performance and carcass quality without any adverse effect in their performance*

Keywords: Biozyme, Supplementation, Broiler diet, Rice bran and Broiler chickens

I. INTRODUCTION

Background of the Study

Poultry can be termed as a wide range of domesticated birds of numerous species including chickens, guinea fowls, ducks, turkeys, geese, quails and certain forms of birds. They are kept domestically for the production of meat, egg and feathers for human use. The modern day chicken is the descendent of the wild red jungle fowl of India belonging to the *Gallus* species (Buba, 2012). Poultry production in the past was not recognized as an important occupation but nowadays it has developed and occupies a place of pride among the livestock enterprises due to its ability to produce available products needed by man and its rapid monetary turnover (Adepoju, 2008). Important factors in the continued growth of the poultry industry in many countries are the efficiency of poultry in converting available feedstuffs in to animal protein (Jordan & Pattison, 1996). Farming in general, has to use available inputs as efficiently as possible to achieve optimum production. Thus, allocation of available resources by the farmers does affect the production positively when applied efficiently. In poultry production, productivity would be increased if farmers make efficient use of their resources (Adebayo *et al.,* 2015).

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Poultry farmers are more interested in high production with relatively low expenditure on nutrients. Ahmad (2009) reported an energy content of feed as one of the key determinant factor of feed consumption by poultry. Poultry were non- ruminants, therefore they are incapable of digesting fibrous material efficiently, thus rice bran is more of fiber, as such the use of digestive enzyme makes it easier to stimulate an efficient digestion of rice bran in broiler diets.

In view of this, the research is aimed to evaluate an intake and carcass characteristics of broiler chickens fed diet containing rice bran with biozyme supplement.

Materials and methods

The study was conducted at Kazaure, situated at the North-western part of Jigawa State, which is located in the semi-arid zone of northern Nigeria between latitude 12^0 41' 28.7''- 13^0 00'N and longitude 07^0 50'E- 08^0 25' 21.1''E. Kazaure has a total area of 1,780km^2 and a total population of 161,494 according to 2006 census. The temperature ranges from 15.85^{0}C and 39^{0}C and fall as low as 10^{0}C during the harmattan season. Rainfall ranges from 500mm in the north to 1,200mm in the south (Abdullahi *et al.,* 2016).

Samples and Sampling Location

Ninety-six (96) day-old broiler chickens of mixed sexes were used for the experimental research. The birds are kept under deep litter housing system for a period of eight weeks.

Cages was constructed using wood, ceiling and wire mesh within the Deep litter house for separation and accommodation of the broiler chickens. The cages, feeders and drinkers were thoroughly cleaned and disinfected prior to the arrival of the birds. On the day of arrival, the birds were weighed and recorded as average initial body weight, and this process was repeated weekly thereafter. The birds were given an appropriate brooding and receive 50g of glucose with two tablets of vitamin C per one litre of water via drinking water as an anti-stress.

The birds were randomly grouped in to four treatments, and each treatment was replicated in to three replications with eight (08) birds per replication. Four experimental diets each for starter and finisher was formulated such that, diet 1 (control diet) contains Rice bran with 0% enzyme (Biozyme) and diet 2, 3 and 4 have the inclusion of Rice bran with varying proportions of Biozyme at 7%, 14% and 21% levels respectively. The four treatment groups of the birds were allocated to those four experimental diets accordingly. The experiment was laid on a Completely Randomized Design (CRD).

All conventional management practices which include proper maintenance of hygiene, adherence to vaccination schedule, medication and anti-coccidial prophylaxis were strictly observed.

Experimental diets

Four experimental diets each for starter and finisher phases was formulated using all the essential ingredients with an inclusion of rice bran, these diets were supplemented with four graded levels of biozyme at 0%, 7%, 14% and 21% (which was coded as diet 1, 2, 3 and 4) respectively. The formulated diets were shown on the tables below:

Table 1: Ingredients composition (kg) of broiler starter diet

		Dietary	Treatments	
Ingredients	Diet 1 (0%)	Diet 2 (7%)	Diet 3 (14%)	Diet 4 (21%)
Maize	38.89	38.88	38.88	38.88
Soybean meal	26.11	26.11	26.10	26.10
Rice bran	15.00	15.00	15.00	15.00
Wheat offal	7.00	7.00	7.00	7.00
Bone meal	7.00	7.00	7.00	7.00
Fish meal	2.00	2.00	2.00	2.00
Lysine	1.00	1.00	1.00	1.00

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Methionine	0.50	0.50	0.50	0.50
Vitamin premix	0.25	0.25	0.25	0.25
Biozyme	0.00	0.007	0.014	0.021
Palm oil	0.25	0.25	0.25	0.25
Salt	2.00	2.00	2.00	2.00
Total	100	100	100	100

Table 2: Ingredients composition (kg) of broiler finisher diet

		Dietary	Treatments	
Ingredients	Diet 1 (0%)	Diet 2 (7%)	Diet 3 (14%)	Diet 4 (21%)
Maize	44.44	44.44	44.44	44.43
Soybean	20.56	20.55	20.55	20.55
Rice bran	15.00	15.00	15.00	15.00
Wheat offal	7.00	7.00	7.00	7.00
Bone meal	7.00	7.00	7.00	7.00
Fish meal	2.00	2.00	2.00	2.00
Lysine	1.00	1.00	1.00	1.00
Methionine	0.50	0.50	0.50	0.50
Vitamin premix	0.25	0.25	0.25	0.25
Biozyme	0.00	0.007	0.014	0.021
Palm oil	0.25	0.25	0.25	0.25
Salt	2.00	2.00	2.00	2.00
Total	100	100	100	100

Result

Table 3: Influence of biozyme supplementation on growth performance of broiler chickens.

		Treatments		
Parameters	1 (0%)	2 (7%)	3 (14%)	4 (21%)
Final body weight (g)	1451.70^{c}	1784.59^{b}	1786.61^{b}	2106.63^{a}
Daily feed intake (g)	152.17^{c}	175.15^{b}	147.31^{c}	181.73^{a}
Daily weight gain (g)	45.95	40.75	51.81	59.01
Feed conversion ratio	3.31	4.30	2.84	3.08
Mortality (%)	4.00^{b}	3.00^{c}	5.00^{a}	3.00^{c}

^{abc} = means with different superscript on the same row are significantly different ($p< 0.05$)

Table 4: Influence of biozyme supplementation on carcass characteristics of broiler chickens.

		Treatments		
Parameters	1 (0%)	2 (7%)	3 (14%)	4 (21%)
Final live weight (kg)	1.3787^{c}	1.6487^{b}	1.7557^{b}	2.0317^{a}
Carcass weight (g)	824.00^{b}	1025.70^{a}	1015.70^{ab}	1204.00^{a}
Breast muscle (g)	331.67^{b}	436.67^{a}	358.33^{b}	438.33^{a}
Drum stick (g)	148.00^{b}	189.67^{a}	178.00^{ab}	202.00^{a}
Thigh (g)	160.33^{c}	190.33^{b}	210.33^{ab}	232.00^{a}

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Wings (g)	125.00^{c}	140.00^{bc}	154.67^{ab}	163.33^{a}
Neck (g)	81.33	104.66	101.33	116.33
Abdominal fat (g)	13.33	16.66	23.33	36.66
Gizzard (g)	36.67^{c}	43.34^{c}	60.00^{a}	51.67^{b}
Proventriculus (g)	12.00	12.00	12.33	18.66
Small intestine (cm)	170.20	165.20	189.20	182.67
Large intestine (cm)	33.37^{c}	44.41^{a}	44.74^{a}	39.47^{b}

^{abc} = means with different superscript on the same row are significantly different ($p< 0.05$)

Discussion

Growth performance of broiler chickens in response to different inclusion levels of biozyme in the diets could be achieved as the enzyme will stimulate an efficient digestibility of the fibre content, and hence productivity would be increased if farmers make efficient use of their available resources (Adebayo *et al.,* 2015).

Body weight gain and feed conversion efficiency is an indicator of feed quality and profitable production. The result of this study revealed that T4 (21% inclusion level of biozyme) recorded the highest body weight gain among the treatments examined. This could be attributed to the effective digestibility of the fibre content in the diet as influenced by high proportion of biozyme supplementation compared with other treatments. The findings in this study were in line with the findings of Zanella et al., 1999 and Kocher et al., 2023 who reported substantial body weight gain and feed conversion improvements in broiler chickens fed diet with enzyme supplementation.

Influence of biozyme supplementation on carcass characteristics of broiler chickens. The results in Table 4 indicate that graded levels of biozyme supplementation had significant effects ($p < 0.05$) on carcass traits including final live weight, carcass weight, breast muscle, drumstick, thigh, wings, gizzard, and large intestine, while traits such as neck, abdominal fat, proventriculus, and small intestine length were not significantly influenced. These findings support the hypothesis that exogenous enzyme supplementation improves nutrient utilization and growth performance in broiler chickens.

The highest final live weight (2.0317 kg) and carcass weight (1204 g) in treatment 4 (21% enzyme) affirm that enzymes enhanced the efficiency of nutrient digestion and utilization. Recent studies have documented similar improvements; Edache et al. (2025) found that multienzyme inclusion significantly increased final live weights and carcass yields in broilers fed millet-based diets, suggesting enhanced energy and amino acid availability with enzyme supplementation. Additionally, Babel et al. (2024) reported that broilers offered enzyme-supplemented diets exhibited higher eviscerated carcass yield and live weight gain compared to unsupplemented controls, particularly in high-fiber diets.

Supporting these findings, Okolo et al. (2025) demonstrated that enzyme-treated diets improved the breakdown of non-starch polysaccharides (NSP), reducing gut viscosity and improving nutrient absorption, which positively influenced carcass deposition. This corresponds closely with the progressive increase in economically important cut-parts such as breast muscle, which increased from 331.67 g in T1 to 438.33 g in T4. Gain in breast mass is particularly important commercially, and improvements here are consistent with recent enzyme efficacy reports (Goeser & Lemme, 2024).

The observed trend toward increased abdominal fat with higher enzyme levels, though not statistically significant, is also reported in other studies where enhanced energy extraction from diets resulted in surplus deposition when energy intake exceeded lean growth requirements (Hafeez et al., 2025). Such trends emphasize the multifaceted effects of enzymes on energy partitioning in broilers.

The significant increase in gizzard weight in treatments with higher enzyme levels likely reflects improved digestive function. Seo et al. (2024) reported that enzyme supplementation can alter organ development by increasing mechanical and enzymatic digestion capacity in the gizzard and proventriculus. However, since intestinal lengths were unaffected, the present findings suggest that biozyme supplementation optimized digestive function without causing pathological hypertrophy, aligning with reports by Ndavambi et al. (2025) that enzyme supplementation does not adversely affect gut morphology.

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Taken together, the carcass yields reported here are in agreement with contemporary commercial broiler performance benchmarks and research showing that exogenous enzymes can significantly enhance the efficiency of nutrient utilization, especially in diets containing fibrous or complex carbohydrates (Edache et al., 2025; Babel et al., 2024; Okolo et al., 2025).

II. CONCLUSION

In conclusion, the experiment indicated that there was a significant increase in the performance of Broiler chickens when fed diet containing rice bran with biozyme supplement for up to 21% level without any adverse effect on their performance.

Recommendation

It is therefore recommended that a broiler finisher diet containing rice bran at up to 15% inclusion level could be supplemented with an enzyme (biozyme) for up to 21% level without any adverse effect on the live weight, carcass weight and feed conversion ratio

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