

## Utilization of maize bran-based diets supplemented with Enzymic by broilers

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### Abstract

In a trial, one hundred and fifty broilers were randomly assigned to 5 dietary treatments of 3 replicates each. Five diets (Diet 1: basal, maize-based, with no Enzymic enzyme; Diet 2: 20% maize bran with Enzymic; Diet 3: 20% maize bran without Enzymic; Diet 4: 40% maize bran with Enzymic and Diet 5: 40% maize bran without Enzymic) were formulated and offered to the birds. The aim was to compare the performance of the birds on the enzyme-supplemented diets and the unsupplemented diets with those on the maize-based diets. Feed intake and weight gain were significantly ( $P<0.05$ ) higher in birds on the enzyme-supplemented diets compared to those on the basal diets or diets without enzyme supplementation. The birds on the 40% maize bran-based diets with Enzymic recorded the lowest cost/weight gain: 100/kg compared with birds on the basal diet with 155/kg. There was no significant difference in the apparent nutrient digestibility among the 5 dietary treatments. The results indicated that maize bran can be incorporated in broiler feed at 40% with supplementation with Enzymic without any deleterious effect on the birds.

**Keywords:** Broilers, maize bran, performance, Enzymic

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### Introduction

Maize constitutes the main energy source in formulated feeds for broilers. It represents about 45 - 55% of most poultry diets (Bamgbose et al., 2004). Over the years, the increase in the price of maize among other ingredients, due in part to the competition for it between man and livestock, has caused a rise in the price of poultry feed and consequently poultry products. There is thus the need to search for alternative energy sources that are cheaper than maize and readily available. The incorporation of agro-industrial by-products (AIBs) in poultry feeds hold tremendous potential in alleviating the critical situation of high cost and inadequate supply of feed (Longe 1985; Babatunde, 1989). These AIBs however cannot be included in poultry feeds at high levels because they contain high amounts of non-starch polysaccharides (NSPs) which can account for some 70 - 95% of the cell wall (Oldale, 1996). These NSPs are such that the enzymes present in the gastrointestinal tract of the bird cannot fully digest

or absorb (Bedford and Classen, 1992). Exogenous enzymes, added to the feed or used during feedstuff processing, have the ability to improve feed efficiency, reduce pollution associated with poultry manure and increase the use of low cost ingredients (Bedford et al., 1991). This study reports the supplementation of maize bran-based diets with an enzyme preparation (Enzymic) on the performance of broilers.

### Materials and Methods

#### Management of experimental birds

The experiment was conducted at the Poultry Unit of Agricultural Research Institute of Iran. Maize bran used in the study was obtained from a local poultry feed shop. Enzymic used for the study was purchased from Farmer's Partner. One hundred and fifty day-old broiler chicks (Abor Acre Plus Strain) used for the feeding trial were obtained from local market. The birds were given a commercial diet for 7 days after which they were randomly assigned to 5 dietary treatments with 3

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replicates each. Each replicate had 10 birds. Five diets were formulated each for the starter and finisher phases. Diet 1 had no maize bran and served as the control. Diet 2 contained 20% maize bran and was supplemented with Enzymic. Diet 3 contained 20% maize bran without the enzyme. Diet 4 contained 40% maize bran and was supplemented with the enzyme and diet 5 contained 40% maize bran without the enzyme. Enzymic was added to the diets at the rate of 150g/tonne of feed. The initial weights of the birds were taken at the beginning of the feeding trial and subsequently on a weekly basis. They were given the starter diets for 28 days after which they were switched to the finisher diets which they were fed for another 28 days.

### Digestibility Studies

At the end of the finisher phase, 2 birds per replicate were kept in metabolic cages and their excreta was collected for 5 days (after a 4-day acclimatization period). The excreta samples were oven-dried at 70°C for 48 hours. The oven-dried samples were then ground in a 1mm sieve and kept for laboratory analysis in order to determine the apparent nutrient digestibility.

### Chemical Analysis

Samples of the test diets and excreta were analyzed for proximate composition using the procedure of A.O.A.C. (1990).

### Statistical Analysis

Data were analyzed by Analysis of Variance (ANOVA) procedure of (SAS, 1999). The means were separated using the Duncan Multiple Range Test.

## Results

**Diet composition:** The gross composition of the experimental starter and finisher diets are shown in

Tables 1 and 2 respectively. The crude fibre values of the diets increased as the dietary inclusion of maize bran increased. However the energy values decreased as the level of maize bran inclusion in the diets increased.

### Performance characteristics of broilers fed maize bran-based diets with or without Enzymic

Results of the performance of broilers fed the experimental diets with and without Enzymic are shown in Table 3. Significant differences were observed in the weight gain and feed intake of the birds with birds on diet 4 (40% maize bran with Enzymic) having the higher feed intake and weight gain (5835.23g and 2250.50g respectively) than birds on the other diets. Birds on the enzyme-supplemented diets (at both levels of maize bran inclusion) recorded significantly higher weight gain and feed intake than those on the unsupplemented diets. No significant differences were observed in the final weight and feed conversion ratio of the birds on all the dietary treatments. Except for birds on diet 3 (20% maize bran without Enzymic), feed intake was higher for birds on the experimental diets than for birds on the control diet. Birds on diet 3 (20% maize bran without enzyme) recorded the lowest feed conversion ratio- 2.24 while birds on diet 4 (40% maize bran with Enzymic) had the highest feed conversion- 2.59.

**Apparent nutrient digestibility:** The results of the apparent digestibility of nutrients in broilers fed the different diets are shown in Table 4. The results show that there was no significant difference in all the parameters studied. In numerical terms however, diet 2 (20% maize bran with Enzymic) had the highest digestibility values: dry matter digestibility of 79.25%; crude protein digestibility of 71.68%; crude fibre digestibility of 54.08%; ether extract digestibility of 59.79% and ash digestibility of 72.15%. It was also observed that birds on the enzyme-supplemented diets

**Table 1: Gross composition (g/100g) of experimental broiler starter diets (n = 3 replicates of 10 birds each).**

Ingredients	Control	20% MB+ Enzyme	20% MB- Enzyme	40% MB+ Enzyme	40% MB- Enzyme
Maize	56.00	36.00	36.00	16.00	16.00
Maize bran	-	20.00	20.00	20.00	20.00
SBM	20.00	20.00	20.00	20.00	20.00
GNC	17.30	17.285	17.30	17.285	17.30
FM (72%CP)	1.00	1.00	1.00	1.00	1.00
Oyster shell	1.00	1.00	1.00	1.00	1.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Lysine	0.85	0.85	0.85	0.85	0.85
Methionine	0.35	0.35	0.35	0.35	0.35
Salt	0.25	0.25	0.25	0.25	0.25
Broiler Premix *	0.25	0.25	0.25	0.25	0.25
Enzymic	-	0.015	-	0.015	-
Total	100.00	100.00	100.00	100.00	100.00
Calculated Nutrients					
CP (%)	22.51	22.30	22.31	22.10	22.11
CF (%)	3.30	5.29	5.30	7.29	7.30
ME (kcal/g)	2.95	2.75	2.76	2.57	2.58

**Table 2: Gross composition (g/100g) of experimental broiler finisher diets (n = 3 replicates of 10 birds each).**

Ingredients	Control	20% MB+ Enzyme	20% MB- Enzyme	40% MB+ Enzyme	40% MB- Enzyme
Maize	63.00	43.00	43.00	23.00	23.00
Maize bran	-	20.00	20.00	40.00	40.00
SBM	20.00	20.00	20.00	20.00	20.00
GNC	10.30	10.285	10.30	10.285	10.30
FM (72%CP)	1.00	1.00	1.00	1.00	1.00
Oyster shell	1.00	1.00	1.00	1.00	1.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Lysine	0.85	0.85	0.85	0.85	0.85
Methionine	0.35	0.35	0.35	0.35	0.35
Salt	0.25	0.25	0.25	0.25	0.25
Broiler Premix *	0.25	0.25	0.25	0.25	0.25
Enzymic	-	0.015	-	0.015	-
Total	100.00	100.00	100.00	100.00	100.00
Calculated Nutrients					
CP (%)	20.06	19.85	19.86	19.65	19.66
CF (%)	2.90	5.08	5.09	7.08	7.09
ME (kcal/g)	3.00	2.80	2.81	2.62	2.63

**Table 3: Performance characteristics of broilers fed maize bran-based diets with or without Enzymic**

Parameter	Control	20% MB + Enzyme	20% MB-Enzyme	40% MB + Enzyme	40% MB +Enzyme	SEM
Initial Weight (g)	121	120	121	119	120	
Final Weight (kg)	2.33	2.34	2.32	2.37	2.31	20.6
Weight gain (kg)	2.21 <sup>b</sup>	2.22 <sup>ab</sup>	2.20 <sup>c</sup>	2.25 <sup>a</sup>	2.18 <sup>bc</sup>	13.4
Feed Intake (kg)	5.25 <sup>d</sup>	5.35 <sup>c</sup>	4.92 <sup>e</sup>	5.83 <sup>a</sup>	5.45 <sup>b</sup>	25.2
FCR	2.38	2.41	2.24	2.59	2.49	0.02

abc: means along the same row with different superscripts are significantly different ( $p < 0.05$ ).

**Table 4: Apparent nutrient digestibility in broilers fed graded levels of maize bran-based diets with or without Enzymic**

Parameter	Control	20% MB+Enzyme	20% MB-Enzyme	40%MB+Enzyme	40% MB-Enzyme	SEM
Dry matter	82.1	79.3	79.2	74.2	73.2	4.74
Crude protein	69.9	71.7	70.8	68.7	64.1	3.63
Crude fibre	48.1	54.1	48.2	50.5	46.5	3.59
Ether extract	60.7	59.8	55.5	55.0	55.2	3.68
Ash	72.6	72.2	71.4	72.2	71.6	0.61

utilized the feeds better than those on diets without enzyme-supplementation.

## Discussion

**Performance characteristics:** Results of the performance of broilers on the different diets showed that birds on the enzyme- supplemented diets recorded higher weight gain than those on diets without enzyme supplementation. Except for birds on diet 3 (20% maize bran without Enzymic), feed intake was higher for birds on the maize bran diets than for birds on the control diet. This could be explained with the fact that when fibrous feed ingredients are fed to birds, there is an increase in feed intake resulting from birds trying to satisfy their energy requirements (Atteh, 2004). Birds on the enzyme-supplemented diets showed better growth than birds on the diets without enzyme supplementation. This could be attributed to the fact that the Enzymic broke down the fibre component in the feed thereby making available the nutrients to the birds. This report is in line with the report of McNab

and Smithand, (1992) that Enzymic complements the digestive enzymes of poultry to enhance the utilization of non-starch polysaccharides in cereals and their by-products. It could also be associated with an improved retention of protein and crude fibre. The increased weight gain and feed intake observed in the experiment are in agreement with the findings of Pourreza et al. (2007). The authors reported that a supplemental enzyme (a xylanase) significantly improved the body weight (BW), body weight gain (BWG), feed intake (FI) and feed conversion ratio (FCR) in broiler chicks maintained on triticale (a viscous cereal). The increase in feed intake in the birds on the enzyme-supplemented diets corroborates the earlier report of Tuleun et al. (1998) that enzyme supplementation enhanced feed intake by broilers.

## Apparent nutrient digestibility of broilers fed graded levels of maize bran-based diets with and without Enzymic

The results of the apparent digestibility of nutrients in broilers fed the different diets showed that birds on

the enzyme-supplemented diets utilized the feeds better than those on diets without enzyme-supplementation. The observed increased crude protein, crude fibre and fat digestibility in this case is supported by the reports of Noy and Sklan, (1995); Vukic and Wenk, (1996) and Taibipour and Kermanshahi, (2004) that apparent metabolizable energy, lipid digestibility and protein digestibility were all significantly improved when arabinoxylanase and beta-glucanase enzymes were added to wheat-soybean meal-based diets. The results are also in agreement with the findings of Han, (1997) who reported that a commercial enzyme preparation (CEP) improved dry matter digestibility (DMD), organic matter digestibility (OMD) and apparent protein digestibility (U-APD) in chicks fed a barley-based diet. Myashauskene et al. (1984) also reported that the use of an enzyme in broiler feed caused greater proteolytic activity in the stomach and duodenum that ultimately improved the digestibility of crude protein. Of the nutrients, the least digested was the crude fibre with digestibility values lowest in birds on diet 5 (40% maize bran without Enzymic). This could be attributed to the fact that the maize bran content was high and also because the diet had no enzyme added to it.

### Conclusions

With Enzymic supplementation at 150g/tonne, corn bran can be incorporated in the diets of broilers at 40% level without eliciting any deleterious effects on growth and performance. Looking at the high cost of maize and its scarcity sometimes, corn bran-based diets supplemented with Enzymic fed to broilers can help to reduce the cost of production. However, considering the final live weight, weight gain, feed conversion ratio, cost and other parameters, it is more economical to incorporate corn-bran in the diet of broiler at 20% level supplemented with Enzymic.

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