

INFLUENCE OF EXOGENOUS ENZYME IN MAIZE COB BASED DIETS ON PERFORMANCE OF GROWING RABBITS

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Abstract

A study was conducted to evaluate the effect of exogenous enzyme in rabbits fed maize cobs (MC) based diets. Thirty weaned rabbit at 6 weeks of age, averaging 500g were randomly allotted into five (5) treatments groups, with 5 rabbits per group. Five (5) experimental iso nitrogenous diets were formulated with varied inclusion levels of MC at 10, 20, 30, 40 and 50 percent level of inclusion and a cock tail enzyme (Zymos N[®]), was included in all the treatment diets according to the manufacturers recommendation. Statistical ($P < 0.05$) difference were observed in the total feed intake, which declined significantly ($P < 0.05$) as level of MC inclusion increased across the dietary treatments, from 3241.5g at 10% MC to 2065.0g at 50% maize cobs inclusion level. Rabbits on 10 and 20 percent MC had significantly ($P < 0.05$) higher and similar final weight gain (1275 and 1200 g, respectively) and the least was observed at 30, 40 and 50 % MC inclusion levels, which were similar and lower. Feed conversion ratio (FCR) was best (5.68) at the 20 percent maize cobs inclusion level and least were on the 30, 40 and 50 % maize cobs treatment diets (8.56, 8.63 and 7.69, respectively). The result of this study indicated that increasing MC in the diet of growing rabbit supplemented with enzyme according to the manufacturer's recommendation did not result in appreciable increase in performance. As the level of MC increases, there is stepwise reduction in the performance of the rabbits

Keywords: enzyme, maize cobs, performance, rabbit

Introduction

The competition between man and livestock for available grain makes nutritional requirement at economic cost more difficult to achieve (Aduku and Olukosi 1990). This has lead to escalating cost of conventional feed stuffs, resulting in feed cost being 70-80% of the cost of production (Akinmutimi 2006). Therefore, it becomes imperative to look inwards for alternatives unconventional as well as cheaper source of feed ingredients. Research efforts are being geared towards evaluating feed ingredient for livestock (Onu and Otuma, 2008) this direction.

Maize cob has been identified as one of the unconventional under-utilized feed resource of livestock, which can be utilize properly by rabbit because fermentation of fibre in the rabbit is post gastric in the caecum which harbours larger population of micro-organisms. Recent progresses in rabbit nutrition research have increased the number of criteria included in the nutritional recommendations, especially in the domain of fibrous components (Gidenne, 1992). The high fibre content lowers digestibility, so increasing digestibility will enable the animals to meet the needs for maintenance, growth and production at less feed cost. The use of appropriate exogenous feed enzymes offers an opportunity to overcome some of these potential limitations on the use of agricultural and agro-

industrial by-products in livestock rations. The objective of this study is to determine the effect of exogenous enzymes on the performance of growing rabbits fed maize cob based diets.

Materials and Methods

The study was conducted at the rabbit unit of the Animal Science Department Teaching and Research Farm, ABU, Zaria. Thirty weaned rabbit at 6 weeks of age, averaging 500g obtained from a farm were used in this study. The rabbits were randomly distributed into five (5) treatments groups, with 5 rabbits per group. The rabbits were housed in galvanizer wire cages equipped with a small rubber bowl drinker and a clay pot feeder. The animals were given prophylactic treatment against internal and external parasites before the commencement of trial. The experimental period lasted for 6 weeks. Five (5) experimental iso-nitrogenous diets (Table 1) were formulated with varied inclusion levels of MC at 10, 20, 30, 40 and 50 percent level of inclusion. Each level of maize cobs inclusion level served as dietary treatment. A cock tail enzyme (Zymos-N[®]), was included in all the treatment diets according to the manufacturers recommendation. Average daily feed intake, average daily live weight gain, feed conservation and feed cost per key live were computed. Proximate Analysis of the experimental feeds was determined by the micro Kjeldahl method

according to (AOAC, 2005) procedure. Data collected on intake and performance were subjected to statistical analysis using the GLM procedure of SAS software (SAS Institute, 2002). Where significant difference was observed, Duncan Multiple Range Test of SAS software was used to compare treatment means. The model used:

$$Y_{ij} = \mu + T_i + e_{ij} \text{ Where}$$

Y_{ij} = Observation measured, μ = Overall mean, T_i = Effect of Maize cobs ($i = 10, 20, 30, 40, 50$), e_{ij} = Experimental error.

Results and Discussion

Composition of Maize cobs and Experimental Diets

The result of the proximate composition of the maize cobs (MC) and experimental diets are presented in table 1. The proximate composition of the MC used in this study has a low crude protein content of (4.21%) and high crude fiber level of 32.59%, higher than (Nelson *et al.*, 1985), who reported chemical analysis of the untreated maize cobs crude protein (3%). The low crude protein observed in this study of the MC is in line with the finding of (Leng, 1990), who reported that most cereal straws and stovers and residues are characterized by low crude protein and readily fermentable carbohydrate. The crude protein content of the experimental diets are adequate and within the range reported by (Aduku and Olukosi, 1990; Abdu *et al.*, 2012), for growing rabbits in the tropical region. Increasing the inclusion level of MC in the diet resulted in an increase in the crude fiber level, from 12.62 to 20.24%. This is obvious, because of the high fiber level reported in MC (32.59%) in this study.

Nutrient intake

The result of nutrient intake is presented in table 2. Statistical ($P < 0.05$) difference were observed in the parameters measured. The total feed intake declined significantly ($P < 0.05$) as level of MC inclusion increased across the dietary treatments, from 3241.5g at 10% MC to 2065.0g at 50% maize cobs inclusion level. The reduced feed intake as level of MC increased in the diet is in support of the findings of (Alawa and Amadi, 1991) who indicated that intake of highly fibrous diet by rabbits depends on the age of the rabbits, level of replacement, nature of fibrous sources and length of adaptation period of their digestive system to the fibre sources.

The average daily feed intake and nutrient intakes in this study with enzyme supplementation, declined with increase in MC inclusion, but the intake is higher than 40.62g per day reported by

(Ukachukwu *et al.*, 2011) in rabbits fed composite cassava leaf meal. The increase in feed and nutrient intake may be attributed to the enzyme supplementation, even though there is a decline with increasing inclusion of MC in the experimental diets.

The dry matter intake (DMI), Organic matter intake (OMI), and Crude protein intake (CPI) follow similar pattern, which decline significantly across the dietary treatment. This is in consonance with the report of Doma *et al.* (1999), who observed CPI to decline significantly ($P < 0.05$) from 10.26 to 8.44g as level of MC was increased from 20 to 40% in young rabbit's diet. The results of performance of rabbits fed graded levels of MC supplemented with Zymos N® are represented in table 3. There was significant ($P < 0.05$) difference in the performance characteristics measured. Animals fed 10 and 20% had the similar and highest daily weight gain, also there was a significant ($P < 0.05$) difference between 30, 40 and 50% MC. The daily weight gain decline as the level of MC increased in the diet.

Rabbits fed 10 and 20% MC diet had similar and higher final weight, while those on 30 and 40 % (959.5 and 875.0g) MC diets while the least weight was recorded in those fed 50% MC diet. The lower final weight observed with increase in the inclusion level of MC in the diet may be attributed to the lower intake. Rabbits on 10 and 20 percent MC had significantly ($P < 0.05$) higher and similar final weight gain (1275 and 1200 g, respectively) and the least was observed at 30, 40 and 50 % MC inclusion levels, which were similar and lower. Weight gain and average daily weight gain follow similar pattern.

Conclusion and Recommendation

The result of this study indicated that increasing MC in the diet of growing rabbit supplemented with enzyme according to the manufacturer's recommendation did not result in appreciable increase in performance. As the level of MC increases, there was a stepwise reduction in the performance of the rabbits

From the result of this study, it recommends that MC should not be included above 20% with enzyme supplementation according to the manufacturer's recommendation. Further studies to be conducted with increased inclusion level of the enzyme above the recommended level of the manufacturer. This is because of the difference in the nature and type of fiber in ingredients used in feeding farm animals.

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Table 1. Gross and Proximate composition of the experimental diet and maize cobs (%)

Ingredient	Percent inclusion level of maize cobs					MC
	10	20	30	40	50	
Maize offal	65.05	52.90	40.15	27.70	15.30	
SBM	22.45	24.60	27.35	29.80	32.20	
Maize cob	10	20	30	40	50	
Bone meal	2.0	2.0	2.0	2.0	2.0	
Salt	0.5	0.5	0.5	0.5	0.5	
Enzyme	0.0083	0.0083	0.0083	0.0083	0.0083	
Total	100	100	100	100	100	
Dry matter	88.290	88.107	87.920	87.740	87.57	92.87
Organic matter	81.37	81.33	81.27	81.23	81.18	85.01
Crude protein	17.80	17.43	17.35	17.18	16.99	4.21
Crude fibre	12.62	14.53	16.42	18.34	20.24	32.59
Ether extract	8.03	7.59	6.097	5.96	5.83	7.86
NFE	54.277	54.118	53.869	53.660	53.469	54.34

NFE=Nitrogen free extract

Table 2. Nutrient intake of growing rabbits fed maize cobs based diets supplemented with enzyme Zymos- N®

Parameter (g/day)	Maize cobs inclusion levels					SEM
	10	20	30	40	50	
Total Feed Intake	3241.5 ^a	2982.5 ^b	2935.0 ^b	2315.0 ^c	2065.0 ^d	54.8
ADFI	77.179 ^a	71.012 ^b	69.881 ^b	55.119 ^c	49.167 ^d	1.30
Dry Matter Intake	71.521 ^a	66.907 ^b	65.877 ^b	57.972 ^c	43.30 ^d	3.39
Organic Matter Intake	66.458 ^a	62.093 ^b	60.105 ^b	47.408 ^c	43.350 ^d	1.14
Crude Protein Intake	12.364 ^a	11.2838 ^b	11.2648 ^b	8.8466 ^c	8.0191 ^d	0.21
Crude Fiber Intake	20.730 ^a	20.405 ^a	19.828 ^b	15.814 ^c	13.983 ^d	0.36

^{sabc} Means on the same row having different superscripts are significantly different ($P < 0.05$) Ave. Daily Feed Intake (ADFI)

Table 3. Performance of rabbits fed maize cobs diets supplemented with Zymos N®

Parameters	Percent inclusion level of maize cobs					SEM
	10	20	30	40	50	
Initial weight (g)	750	637.5	592.5	562.5	562.5	0.00
Final weight (g)	1275 ^a	1200 ^a	959.5 ^b	875.0 ^b	849.5 ^b	58.67
Weight gain (g/d)	525.0 ^a	562.5 ^a	367.0 ^b	312.5 ^c	287.0 ^c	36.84
ADWG	11.67 ^a	12.50 ^a	8.16 ^b	6.39 ^c	6.39 ^c	0.82
FCR	6.61 ^b	5.68 ^a	8.56 ^c	8.63 ^c	7.69 ^{bc}	0.80

^{abc} = Means with different superscript on the same row differ significantly ($P < 0.05$) SEM = Standard error of mean ADWG = Ave daily weight gain(g), Feed Conversion Ratio (FCR)