

NUTRIENT DIGESTIBILITY OF WEANER RABBITS FED DIETS SUPPLEMENTED WITH DIETARY MULTI-ENZYME (FULLZYME®)

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Abstract

This study was carried out to investigate the nutrient digestibility of growing rabbits fed diets containing Fullzyme®, a dietary multienzyme. A total number of twelve (12) weaner rabbits of mixed breeds and sexes were randomly allotted into four (4) dietary treatments having three (3) replicates each in a completely randomized design. Four experimental diets were formulated with Fullzyme® supplementation at 0.00, 0.15, 0.25 and 0.35%, respectively. A seven-day faeces collection from three rabbits per treatment (one per replicate) was carried out to determine the nutrient digestibility of the proximate components. Before the commencement of the trial, rabbits were weighed, confined individually in metabolism cages and weighed quantity of feed was offered to each rabbit daily. Daily feed consumption was recorded as the difference between the quantity offered and the quantity left after 24 hours. The Faeces were oven-dried to determine moisture content. At the end of the collection period, all faecal samples from each rabbit were bulked and preserved for proximate analysis. Results revealed that there were no significant differences ($P > 0.05$) in all parameters measured except for ash retention ($P < 0.05$). Fullzyme® supplemented at 0.25% gave the highest values for dry matter, crude protein, ether extract, ash and nitrogen free extract measured which indicated that there was adequate digestion and absorption of nutrients.

Keywords: Digestibility, Fullzyme® supplementation, Rabbits

Introduction

The huge animal protein deficit in the diet of Nigerians can be addressed by placing emphasis on the production of highly prolific and short cycle animal species such as rabbits (Hasanat *et al.*, 2006). Rabbits however, require a good balance dietary protein for their maximum performance. Conventional feeds are short in supply, expensive and highly consumed by human in Nigeria. This constitutes a major setback to increased rabbit production in the country and calls for research into less conventional sources of protein for rabbit feeding. The use of unconventional feed ingredients in compounding livestock feed in order to reduce cost of production is documented in literature (Abeke, 2008 and Duru, 2010). Non-conventional feedstuffs offer the best alternatives in our environment for reducing feed cost and therefore a reduction in the cost of meat productions (Dafwang *et al.*, 2001). The ban on the use of antibiotics as growth promoters has emphasized the interest in establishing further restrictions to feed formulation aiming to minimize enteric diseases. An excessive supply of protein in the diet could increase mortality in the growing period by leading to a high nitrogen ileal flow (Gutiérrez *et al.*, 2003). Several studies have been attempted for incorporating exogenous enzymes into rabbit diets to improve nutrients availability, however, in most trials, rabbits appeared less responsive and variable effects were observed on their performances (Falcao-e-Cunha *et al.*, 2007). The decrease in mortality (García *et al.*, 2005) found with proteases and proteases + xylanases (probably reducing protein flow to the caecum) was the most prominent finding. Some positive results were also obtained by other researchers. The benefits of adding enzymes to diets of non-ruminant animals particularly poultry, have become more common in recent years (Campell and Bedford, 1992). Moreover, the use of multi-enzyme supplementation is one of the important techniques for enhancing the efficiency of feed utilization in monogastric nutrition (Midau *et al.*, 2011). The objective of this study was to investigate the effect of Fullzyme® supplementation on the nutrient digestibility of growing rabbits.

Materials and Methods

The experiment was carried out at the Rabbitry Unit of the Department of Animal Science Teaching and Research Farm, Ahmadu Bello University, Zaria. Twelve (12) weaner rabbits of mixed breeds and sexes were randomly allotted into four (4) dietary treatments having three (3) replicates in a Completely Randomized Design (CRD). Four experimental diets were formulated to meet the requirements of growing rabbits according to NRC, 1994. These include T₁ (diet without Fullzyme® and used as control); T₂ (diet with Fullzyme® at 0.15%); T₃ (diet with Fullzyme® at 0.25%) and T₄ (diet with Fullzyme® at 0.35%) as shown in Table 1.

Table 1: Composition of experimental diets

Ingredients	Graded levels of enzyme supplementation			
	T1+0.00%	T2+0.15%	T3+0.25%	T4+0.35%
Maize	38.33	38.33	38.33	38.33
Soya bean cake	4.17	4.17	4.17	4.17
Boiled sorrel seed meal	15.00	15.00	15.00	15.00
Groundnut Haulms	40.00	40.00	40.00	40.00
Bone meal	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25
Premix*	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Calculated nutrient analysis				
Metabolizable energy (Kcal/kg)	2781	2781	2781	2781
Crude protein (%)	18.52	18.52	18.52	18.52
Crude fiber (%)	8.54	8.54	8.54	8.54
Ether Extract (%)	5.72	5.72	5.72	5.72
Calcium (%)	0.68	0.68	0.68	0.68
Phosphorus (%)	0.57	0.57	0.57	0.57
Lysine (%)	0.78	0.78	0.78	0.78
Methionine + cysteine (%)	0.66	0.66	0.66	0.66
Ca:p	1.4	1.4	1.4	1.4
Feed cost/kg diet (₦)	110.22	117.72	122.72	127.72

*Bio-premix supplied per kg of diet: Vit A, 12500 I.U; Vit D₃, 2500 I.U; Vit E, 50mg; Vit K₃, 2.5mg; Vit B₃, 3.5mg; Vit B₆, 6mg; Niacin, 40mg; Pantothenic acid, 10mg; Biotin, 0.8mg; Vit B₁₂, 0.25mg; Folic acid, 1mg; Choline chloride, 300mg; Manganese, 100mg; Iron, 50mg; Zinc, 45mg; Iodine, 1.55mg; Selenium, 0.1mg; Copper, 2mg; Cobalt, 20mg.

**Fullzyme: a complex enzyme that contains Amylase, Protease, Cellulose, Lipase, Pectinase, Xylanase, β-Glucanase and Phytase

Nutrient digestibility trial

A seven-day faeces collection from three rabbits per treatment (one per replicate) was carried out to determine the nutrient digestibility of the proximate components. Before the commencement of the trial, rabbits were weighed, confined individually in metabolism cages and weighed quantity of feed was offered to each rabbit daily. Daily feed consumption was recorded as the difference between the quantity offered and the quantity left after 24 hours. A polythene sheet was placed under each cage to allow for individual faecal and urine collections. A small opening was made on the polythene sheet to allow urine drip into a bowl placed beneath the cage. The faeces were oven-dried at 105°C for 3 hours to determine moisture content. At the end of the collection period, all faecal samples from each rabbit were bulked and preserved for proximate analysis according to AOAC (2005). The nutrient digestibility was calculated using the formula below

$$\text{Apparent Nutrient Digestibility (\%)} = \frac{\text{Nutrient intake} - \text{Nutrient output}}{\text{Nutrient intake}} \times 100$$

Statistical analysis

Data generated in the study were subjected to analysis of variance (ANOVA) using General Linear Model (GLM) Procedure of SAS (2008) software package. Significant difference between treatment means were separated using Dunnett (Steel and Torrie, 1998).

Results and Discussion

The results obtained from this study indicated that enzyme (Fullzyme®) supplementation had no significant ($P>0.05$) effect on nutrient digestibility except for ash digestibility ($P<0.05$) which was affected. The result agreed with the findings of Daveby *et al.* (1998) who showed that enzyme supplementation had no effect in digestibility while Steinfeld *et al.* (1998) and Choet *et al.* (1995) disagreed with it. Both reporters agreed that increase in the level of enzymes increases dry matter and crude protein coefficients. The best result for ash retention was observed for rabbits fed diets supplemented with 0.25 and 0.35% enzyme supplementation. The results obtained from this study were within the range observed by Faisullah *et al.* (2010) though reported no significant effect in ash digestibility when Natuzyme plus® was supplemented in the diet of rabbits for nutrient utilization and growth performance. The percentage dry matter (DM), crude protein (CP), ether extract (EE), ash retention and nitrogen free extract (NFE) increased at 0.25% supplementation. The increase in DM and CP digestibility could be as a result of the rapid development of beneficial bacteria in the caeca thereby creating a convenient environment for efficient digestion and absorption process. The significantly ($P<0.05$) higher values of EE and NFE could be attributed to the improved metabolism of microbes by increasing digestive enzyme activity and decreasing bacterial enzyme activity (Mountzouris *et al.*, 2017).

Table 2: Effect of boiled sorrel seed meal with enzyme supplementation on nutrient digestibility of grower rabbits

Parameters (%)	Graded levels of enzyme supplementation				SEM	LOS
	T1+0.00%	T2+0.15%	T3+0.25%	T4+0.35%		
Dry Matter	69.27	66.75	67.80	60.34	3.62	NS
Crude Protein	72.05	66.46	77.75	66.14	3.70	NS
Crude Fibre	47.77	47.76	44.26	32.51	10.22	NS
Ether Extract	76.12	84.33	85.24	80.96	3.01	NS
Ash Retention	54.56 ^c	61.59 ^b	71.28 ^a	68.61 ^a	3.26	*
Nitrogen Free Extract	66.42	64.84	66.64	59.13	4.24	NS

^{abc}: means with different superscript on the same row differ significantly at $p<0.05$,

SEM: standard error of mean LOS: level of significance NS: Not significant *: significant

Conclusion and Recommendation

Rabbits fed diets supplemented with Fullzyme® do not have any deleterious effect on the digestibility parameters measured. Rabbits fed diet with 0.25% Fullzyme® supplementation gave the highest values of the nutrient digestibility components indicating adequate digestion and absorption of nutrients.

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