



Effects of replacing maize with threshed rice head supplemented with and without enzyme on the nutrient digestibility of weaner rabbits

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ABSTRACT

A feeding trial was conducted to investigate the effect of replacing maize with threshed rice head (TRH) supplemented with and without enzyme on the nutrient digestibility of weaner rabbits. Fifty four rabbits were randomly allotted to six dietary treatments of three replicates. There were three rabbits per replicate in a 2 x 3 factorial experimental design. There were three inclusion levels (0, 7.5 and 15%) supplemented with and without enzyme in the diets. The response on TRH without enzyme inclusion showed that all the parameters measured (dry matter, crude protein, crude fibre, ether extract and ash) were significantly ($P < 0.05$) affected by the test diet except nitrogen-free extract digestibility. The results of TRH levels (0, 7.5 and 15%) with enzyme supplementation had significant ($P < 0.05$) effect on the coefficient of crude protein and crude fibre digestibility. The study indicated that TRH can be included in the diet of rabbit up to 15% with enzyme supplementation.

Key words: Rabbits, digestibility, Rice threshed head, maize

INTRODUCTION

There is a resultant increase in the demand for animal protein due to the rapid growth of human population in developing countries like Nigeria. Biobaku and Dosumu (2013) reported that this observed low animal protein consumption may be attributed to the declining animal protein production in the country. Rabbit, as a micro-livestock, is an economic animal that can bridge the wide gap between dietary protein production and consumption in Nigeria. This is because rabbit has peculiar digestive physiology which permits the use of forages and agro-industrial by-products thus making it non competitive specie with man for cereal and legume grains. According to Obeidat *et al.* (2009), sourcing for alternatives to the inadequate and expensive energy and protein feed stuffs like maize and soybean has become imperative since reducing production cost in order to maximize profit is the main objectives of farmers. Researches have shown over the years that different rice parts during and after harvesting contain various nutrients that favours their use as animal feed. Proximate analysis of threshed rice head revealed relatively good values of crude protein (8.06%), crude fibre (13.15%), ash (4.18%), ether extract (2.68%), nitrogen free extract (66.41%) and metabolizable energy (2259.70kcal/kg) at 92.48% dry matter content.

MATERIALS AND METHODS

Experimental Animals, Design and Management

A total of fifty four healthy five weeks old weaner rabbits were used in this study. They were randomly selected and allotted to six experimental diets in a 2 x 3 factorial design. There were three replicates per treatment and each replicate had three rabbits, comprising of nine animals per treatment. The rabbits were housed in a cage with wire meshed hutches. The cage was raised above the ground in a well ventilated pen. Feed and water were supplied *ad-libitum*

Sources and Processing of Threshed Rice Head (TRH)



The threshed rice head was collected from rice farms in Gwagwalada, Abuja. After drying, the threshed rice head were then crushed in a feed mill and sample was taken for proximate analysis before inclusion into diets.

Experimental Diets

Six experimental diets were formulated with the threshed rice head (TRH) with and without enzyme supplementation at different levels of replacement. Diets 1, 3 and 5 contained 0, 7.5 and 15% TRH without enzyme while diets 2, 4 and 6 contained 0, 7.5 and 15% TRH with enzyme supplementation. Maxi grain enzyme was used in this study.

Digestibility Study

At the end of the 8th week feeding trial, nutrient digestibility study was conducted. Rabbits closest to the average mean weight in each replicate were selected for the study. The rabbit were housed in a metabolic cage. Wire mesh was used to separate the faeces and the urine was collected from the tray beneath the cage. Faecal samples were collected for a period of seven days. The faeces were separated from feeds and other extraneous materials, sundried and bulked. The dried samples were then weighed, grinded and taken to the laboratory along with samples of feed for proximate analyses. Samples were analyzed for crude protein, crude fibre, ether extract, ash and nitrogen free extract. Nutrient retention was calculated with the formula: Nutrient intake - Nutrient output divided by nutrient intake multiplied by 100.

Data Analysis

Data collected were subjected to statistical analysis using general linear model according to SAS (2001). Significant differences were separated using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

The data for nutrient digestibility of rabbits fed diets containing Threshed Rice Head (TRH) with and without enzyme supplementation as partial replacement for maize are presented in Table 1. Rabbits fed 15% TRH level had higher coefficient of crude protein, crude fibre, ether and ash digestibility than those fed 0 and 7.5% TRH levels. Rabbits fed 0 and 15% levels of TRH had similar dry matter digestibility which were significantly ($P < 0.05$) higher than that of 7.5% TRH level. However, there was no significant ($P < 0.05$) difference in the Nitrogen free extract digestibility across all TRH levels. Results on CP digestibility contradicts the reports of Adeniji (2008) who fed bovine rumen content to rabbits and attributed the low CP digestibility to the high fibre content of the feed. The increased digestibility of ether extract and total ash absorption with increased levels of TRH in the diets of the rabbits also disagrees with the result of Igwebuike *et al.* (1998) who reported that increased crude fibre levels in rabbit diets depresses ether extract digestibility and total ash absorption. Nitrogen free extract digestibility was not significantly affected by the test material in the diets, thus, suggesting efficient utilization of soluble carbohydrates in all the diets. The result of this study is in line with the findings of Onifade *et al.*, (1999) who reported high digestibility of readily available carbohydrates by rabbits in a feeding trial involving alternative tropical energy feed resources in rabbit diets. Generally, the results of this study disagree with the submission of Alawa and Amadi (1991) who reported that nutrient digestibility significantly decreases with increasing levels of dietary crude fibre. The results obtained in this study might be due to the fact that gut micro organisms in the digestive tract of the rabbits helped to properly degrade the fibrous content of the feed thereby making the nutrients available to the experimental animals.



The observed improvement in crude protein and crude fibre digestibility due to enzyme supplementation in this study is in line with the results of Gidenne and Jehl (2000) who reported that enzyme supplementation reduces intestinal viscosity thereby improving contact between nutrients and digestive enzymes, thus, leading to improved digestibility coefficients. The enzyme supplementation result of this study is probably due to the enhanced effect of the exogenous enzymes on gut micro-flora and volatile fatty acids production thus resulting in improved nutrient digestibility. Even though Biobaku and Dosumu (2013) earlier reported that enzyme supplementation had no effect on fibre digestion in rabbits, the higher crude protein and crude fibre digestibility in this study is in agreement with the report of Abaza and Omara (2011) who observed similar results in fibre digestibility when corn cobs were supplemented with enzyme in the diet of growing rabbits. Adeyemo *et al.* (2014) also recently reported improved crude protein and crude fibre digestibility in rabbits fed enzyme supplemented diets.

Conclusion

It can be concluded that weaner rabbits can efficiently utilize TRH up to 15% in their diets especially when supplemented with enzyme.

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Table 1 Apparent nutrient digestibility of rabbits fed diets containing graded levels of threshed rice head with and without enzyme supplementation as partial replacement for maize



	Dry matter (%)	Crude protein (%)	Crude fibre (%)	Ether extract (%)	Ash (%)	NFE (%)
TRH Levels						
0%	75.75 ^a	84.90 ^b	75.30 ^b	80.70 ^b	82.70 ^c	69.80 ^a
7.5%	74.70 ^b	82.10 ^c	75.00 ^b	78.60 ^c	84.50 ^b	69.40 ^a
15%	75.50 ^a	86.55 ^a	79.00 ^a	87.00 ^a	85.65 ^a	69.90 ^a
SEM	0.25	0.23	0.19	0.19	0.20	1.27
LOS	S	S	S	S	S	NS
Enzyme Level						
No enzyme	75.36 ^a	83.60 ^b	76.10 ^b	82.03 ^a	83.46 ^b	64.90 ^a
Enzyme	75.26 ^a	85.43 ^a	76.76 ^a	82.16 ^a	85.10 ^a	63.83 ^a
SEM	0.13	0.19	0.15	0.15	0.16	1.22
LOS	NS	S	S	NS	S	S
Interaction	S	S	S	S	S	S

^{a, b, c}: means with different superscripts within the same row differ significantly ($P < 0.05$); NFE-Nitrogen free extract; TRH-Threshed rice head; SEM-Standard error of means; LOS-Level of significance; NS-Not significant; S-Significant