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Effect of Nutrase Xyla® Supplementation on Growth Performance of Grower Pigs Fed Low or High Fibre Diets

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Abstract: A 49-day feeding trial was conducted to determine the effects of fibre and Nutrase xyla® enzyme supplementation on the growth performance of grower pigs. Sixteen Landrace x Large white cross bred pigs were used in a 2 x 2 factorial arrangement with 2 enzyme levels (0 and 100 ppm) and two dietary fibre levels (10 and 15%). Sixteen weaned crosses of Landrace x Large white piglets were used in a 2 x 2 factorial arrangement having 2 enzyme levels (0 and 100 ppm) and 2 dietary fibre levels (10 and 15%). Four isonitrogenous (18% CP) experimental diets with marginal variation in caloric content tagged T_1, T_2, T_3 and T_4 were compounded. Treatments 1 and 2 contained 10% crude fibre level (low fibre), while treatments 3 and 4 contained about 15% crude fiber levels (high fibre). Treatments 1 and 3 served as the control diets for treatments 2 and 4, respectively. Performance data such as feed intake, initial weight and final weight were recorded and used to calculate weight gain, feed conversion ratio, protein efficiency ratio, feed cost/kg and feed cost/unit weight gain. There were no significant ($p>0.05$) effects of dietary fibre levels and enzyme supplementation or their interactive effects on average daily feed intake, feed: gain ratio, protein efficiency ratio and feed cost per unit weight gain. The economic analyses revealed that the use of Nutrase xyla® at 100ppm in these diets resulted in increased feed cost but higher level of dietary fibre reduced the cost of feed.

Key words: Nutrase xyla®, fibre, grower pigs, rice offal

INTRODUCTION

Farm animals constitute a very important source of animal protein which are rich in amino acids, minerals and vitamins that are useful for a healthy human existence, but inadequate supply for human needs underscores the need to increase the production of these farm animal products (Ogunfowora and Fetuga, 1975). The high costs of meat and meat products tend to make the matter worse. High increases in costs of animal products are mainly due to high cost of raw materials for the feed industry especially maize. The high cost of maize is compounded by its low production and high demand for human food, industrial use and animal feeds (Fadipe, 1996).

Pigs being simple stomach animals compete directly with humans for food, especially the staple grains and oil seeds. This can be partly overcome by making maximum use of crop by-products, waste feeds and grains unsuitable for human consumption (Holness, 1991). Many of these agro-industrial by-products (rice offal) are fibrous in nature and their use in farm animal diets is therefore limited due to the fibre handling abilities of the livestock, which is about 5-7% for monogastrics (NRC, 1977; Olomu, 1979). This is because non-ruminant animals lack the enzyme cellulase that can digest the components of the fibre in these fibrous by-products. This is so, at least in the small intestinal tract, which is the site for most nutrient absorption (Holness, 1991). There is evidence that pre-digestion or any attempt to initiate the hydrolysis of feed components often enhances the digestibility and utilization when fed in animal diets. One of such techniques is the use of exogenous treatment of feedstuff with enzyme preparations (Bio-Ingredients Ltd, 2004). Although the use of commercial feed enzymes has gained world-wide acceptability, its use in Nigeria is still not popular. The uses of exogenous enzymes are known to help in the digestibility of feed ingredients and allow for the use of cheaper, poorer quality materials to obtain optimum performance in animals. This study therefore, intends to investigate the effects of the Nutrase xyla® enzyme supplementation on performance indices of grower pigs fed high and low fibre diets.

MATERIALS AND METHODS

Study area: The study was carried out at the Piggery Unit of the Teaching and Research Farm of the University of Agriculture Makurdi which is located between longitude 6-10° East and latitudes 6-8° North. Four iso-nitrogenous experimental diets tagged T_1, T_2, T_3 and T_4

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Table 1: Proximate chemical composition of the grower diets (%DM)

	Main treatment means			
Nutrients	T_1 (-ELF)	T_2 (+EHF)	T_3 (-ELF)	T_4 (+EHF)
Dry matter	90.02	89.71	90.14	90.05
Crude protein	18.03	18.03	18.02	18.02
Crude fibre	10.05	10.05	15.01	15.01
Ether extract	5.97	5.89	6.07	6.17
Ash	7.71	7.86	7.82	8.02
NFE	60.29	59.92	60.14	60.14
[a]Calcium	0.93	0.93	0.93	0.93
[a]Phosphorus	0.59	0.59	0.62	0.62
[b]ME (kcal/kg)	3321.11	3317.15	3278.16	3397.37

[a]Calculated from NRC (1977).
[b]Calculated from Pauzenga (1985)

were compounded to contain 18% crude protein. Treatments 1 and 2 contained 10% crude fibre level (low fibre), while treatments 3 and 4 contained 15% crude fibre level (high fibre). Treatments 2 and 4 also contained 100 parts per million of the enzyme (Nutrase xyla®). Treatments 1 and 3 served as the control diets for treatments 2 and 4 respectively. All the four dietary treatments varied marginally in caloric content. The chemical composition and energy values of the diets are shown in Table 1.

Experimental animals and design: Sixteen Landrace x Large white cross bred pigs with an average live weight of 31.0 kg were obtained from the University of Agriculture Research Farm for the experiment. The animals were randomly assigned to four experimental treatments and were equalized for sex. Each treatment had four individually housed pigs where feed and water were given *ad libitum* for 7 weeks during which records of feed intake, initial weight and final weight were collected and used to calculate weight gain, feed: gain ratio, protein efficiency ratio and feed cost per weight gain. Standard swine production practices were observed. The experimental design was a 2 x 2 factorial and all data collected were subjected to Analysis of Variance (ANOVA) using the procedure recommended by Steel and Torrie (1980). When significant difference ($p<0.05$) was observed, treatment means were separated using the Duncan's Multiple Rage Test (Duncan, 1955).

RESULTS AND DISCUSSION

The analyzed and chemical compositions of the experimental diets are presented in Table 1. All the values recorded were within the normal range for this category of pigs as recommended by the National Research Council (1977). The result of the effect of fibre and enzyme supplementation on the performance of grower pigs is presented in Table 2. Final weight, daily weight gain, feed intake, feed gain ratio and protein efficiency ratio were not significantly ($p>0.05$) affected by dietary fibre. Feed cost per weight gain did not also vary significantly ($p>0.05$). This result is in agreement with the findings of Tuleun *et al*. (1998), Atteh (2000) and Thompson and Webs (1981) who observed increase in feed intake as dietary fibre levels increased in the diets of starter chicks. Increased feed intake, which has been linked to low energy diets, is associated with high fibre diets. The calculated feed analysis showed that all essential nutrients were adequate. The only variables in the experimental diets were the dietary fibre and the enzyme supplementation.

It is known that one of the general effects of fibre is depressed digestibility and reduced availability of nutrients. It is therefore possible that the pigs on the high fibre ate more to compensate for the reduced energy density of the diet. The result did not agree with the earlier findings of Tajudeen and Eruvbetine (2002) who investigated the effect of Nutrase xyla® inclusion in unpeeled cassava root meal and observed that enzyme application produced faster growth rate and enhanced feed consumption.

The interactive effects of fibre and Nutrase xyla® enzyme supplementation on the performance of grower pigs is shown in Table 3. The final weights, daily weight gain, feed intake, protein efficiency ratio, feed: gain ratio and feed cost per weight gain of animals did not vary significantly ($p>0.05$) among treatments. The result tallied with the findings of Atteh (2000) who investigated the response of broilers to diets in which brewer's dried grain replaced maize with or without Nutrase xyla® and noted that feed intake was not significantly affected although the birds on enzyme treatments ate slightly higher than non-enzyme treated diets. The slight increase in feed intake due to enzyme supplementation could be as a result of the fact that enzymes are known

Table 2: The effect of fibre and nutrase xyla® enzyme supplementation on performance indices of grower pigs

	Main treatment means		
Performance indices	(Low fibre) -Enzyme	(High Fibre) +Enzyme	SEM
Initial weights (kg)	31.04 (30.88)	30.82 (30.98)	0.11ns (0.05ns)
Final weights (kg)	51.07 (49.44)	49.13 (50.75)	0.97ns (0.66ns)
Daily weight gain (kg)	0.41^{b} (0.38^{a})	0.56^{a} (0.41^{b})	0.02 (0.01)
Daily feed intake (kg)	1.52 (1.52)	1.52 (1.52)	0.02 (0.53ns)
Feed/gain ratio	3.78 (4.07)	2.73 (3.82)	0.53ns (0.13ns)
Protein efficiency ratio	1.69 (1.56)	1.55 (1.68)	0.17ns (0.06ns)
Feed cost/weight gain (Naira/kg)	116.31 (108.89)	102.04 (109.46)	14.27ns (9.04ns)

Ns = Not significant ($p>0.05$). a,b = Means bearing different superscript on the same row differ significantly ($p<0.05$).
Values in parenthesis are due to enzyme effect

Table 3: The interactive effects of fibre and nutrase xyla® enzyme supplementation on performance indices in grower pigs

	Main treatments means				
Performance indices	T_1 (-ELF)	T_2 (+ELF)	T_3 (-EHF)	T_4 (+EHF)	SEM
Initial weight (kg)	30.75	31.33	31.00	30.63	1.37ns
Final weight (kg)	49.63	52.50	49.25	49.00	2.41ns
Daily weight gain (kg)	0.39	0.43	0.37	0.38	0.03ns
Daily feed intake (kg)	1.51	1.52	1.53	1.51	1.31ns
Feed/gain ratio	4.01	3.34	4.13	4.10	0.25ns
PER	1.59	1.79	1.53	1.57	0.10ns
Feed cost/weight gain (Naira/kg)	116.16	116.46	101.62	102.46	11.81ns

Ns = not significant (p>0.05)

to improve digestibility of feeds and to also enhance absorption of nutrient after digestion. The animals placed on enzyme supplemented diets units thus, utilized and consumed the feeds within a shorter time compared to those on no-enzyme supplementation feeds.

Conclusion/recommendation: From the results of this study it was consistently observed that between the 2 dietary fibre levels (low and high); the high fibre levels gave the optimum performance when enzyme was supplemented. Economic use of the feed (feed conversion ratio) was best at the high level when enzyme was supplemented; thus it was summarized that enzyme supplementation (Nutrase xyla®) at 100 ppm in rice offal-based fibrous diets resulted in better performance and is economically profitable. Rice offal is a valuable and qualitative alternative feed ingredient for pig feeding. Farmers can include up to 37% (for grower) rice offal with 100 ppm Nutrase xyla® without adversely affecting the performance of grower pigs.

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