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The Value of Rice Husk Fed with or Without Probiotics and Enzymes Supplementation to Replace Groundnut Cake in the Diets of Grower Rabbits

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ABSTRACT

Seventy two (72) 8 weeks old, mixed sexes cross bred rabbits were used to investigate the effect of replacing rice husk for groundnut cake (GNC) with or without probiotics and enzyme supplementation in the diets of grower rabbits. Dietary GNC was replaced with rice husk at 3 levels (0, 30, 60%) with 4 supplementation levels (No supplement added (NSA), Probiotics A, Probiotics B and enzyme) using 3X4 factorial of completely randomized design. The experiment lasted for a period of eight (8) weeks. The results showed that, increase in the inclusion level of rice husk had significant effect (P <0.05) on feed to gain ratio, nitrogen digestibility but feed cost efficiency showed no significant effect (P>0.05) as the level of rice husk increased from 0 — 60%. There were significant effect (P<0.05) of supplementation on the feed to gain ratio but showed no-significant effect (P>0.05) on the feed cost efficiency. The interaction between the varying level of rice husk and supplements had significant effect (P<0.05) on feed to gain ratio, nitrogen digestibility but no-significant different (P>O.05) in feed cost efficiency. On nitrogen digestibility, the interaction between enzyme and probiotics showed no-significant effect (P>0.05) on all the parameters, where as it showed non-significant effect (P>O.05) on feed cost efficiency. However, the interaction revealed comparable figures between enzyme and probiotics on cost of feed consumed and cost of rearing but show significant effect (P>O.05) on profit and gross profitability. Conclusively, the research has shown that, rice husk has high potential as substitute for high cost protein GNC. 60% of GNC can be replaced with rice husk because of a reasonable weight gain, best feed to gain ratio and high nitrogen digestibility obtained in this study. Supplementation of rice husk with probiotic A is also recommended because it has better feed to gain ratio compared to enzyme and probiotic B supplemented diet.

Key words: Grower Rabbits; Rice husk; Groundnut cake, Enzyme supplementation; Probiotic

INTRODUCTION

Inadequate animal protein in the diet of people in developing countries like Nigeria has called for the integration of some non-conventional meat sources in to the farming system as source of animal protein. Productivity of these livestock species will depend to a large extent on their ability to utilize feeds that are not consumed or competed for by humans. Rabbits have a number of characteristics that might be advantageous to small holder subsistence type integrated farming system. The small body size, short generation internal, rapid growth rate, genetic diversity and high productive potential are characteristics which make rabbit suitable as meat producing small livestock in developing countries of the world (Anjeniwa, 2000).

Although rabbits can survive on all forage diets, optimum performance can only be insured in a mixed feeding regime involving forage and formulated feed (Harris et al., 2004 and Cheek et al., 2007). While some studies have been carriec1ut on the replacement or supplementation of i4ce husk in rabbits -production as alternative protein energy source (Omole and Ajayi, 2006) however, little is known about the potential of rice husk when supplemented with probiotics in rabbits nutrition (Raharjor et al, 2008) noted that rice husk has high digestive energy contents for rabbits. One of the major limiting factor to livestock production is the high cost of feed stuff such as Groundnut Cake (GNC). However, many feed stuff especially agro industrial by products which are usually of no feeding value to humans (Omole and Tewe, 2005) could alternatively be fed at cheaper cost to monogastric animals like rabbits. Rice husk which is a by product of rice milling is more cheaper and available than Groundnut Cake (GNC). Although, husk is a cheap agro-based industrial by-product which has been fed to rabbit (Adeluku et al, 2004), it is a fibrous ingredient with about 39-42% crude fibre content that has limited the extent to which it can used in the diet of rabbits (Torrie, 2000).

However Ehrlien et al. (2003) observed that rabbits are non-ruminant herbivore and can consumed high s fibre diets hence regarded as hind gut digesters. Never the less, fermentation of cellulose and other fibrous components is post gastric, this occurs in the caecum and coloH which are well developed in rabbits, and harbor a considerable amount of microbial population (Abdel Rahman et al, 2008) This microorganisms are involved in digestion of starch and cellulose. In view of this, it becomes imperative therefore to replace highly cost GNC with rice husk to reduce the cost of feeding rabbit for improvement of livestock production1This study was aimed to determining the amount of GNC that can be replaced by rice husk in the diet of grower rabbits when supplements with enzymes and or probiotics.

MATERIALS AND METHODS

Seventy two (72) grower rabbits of about 8 weeks old and of mixed breeds were housed in a metabolism cage. Before the commencement of the experiment, a 7 day acclimatization period was allowed so that the animals could adapt to the cage and also to stabilize after transportation. Feed and water were supplied ad-libitum during the 56 days feeding trial. The rice husk fed was purchased from a commercial grain miller while the probiotics and enzymes used as supplements were purchased from an Agro-vet shop in Abuja. The 12 experimental diets fed with or without supplements were such that, rice husk was fed to replace 0.30 and 60% of dietary groundnut cake while there ere 4 supplemnts (no supplements, probiotics A, Probiotics B and Enzyme). Each treatment had 3 replicate hutches containing 2 rabbits each. Nitrogen digestibility was conducted immediately after the experiment. Records kept include weekly weight gain and daily feed intake. Proximate analysis of the ingredients,. The faecal and urinary samples were carried out using the procedures described by A.O.A.C. (1990). Data obtained for each responds criterium was subjected to analysis of 3X4 factorial appropriate for the Complete Randomized Design (CRD) and where significant treatment means were compared by Duncan Multiple Range Test (Duncan, 1955).

RESULTS

Growth performance of grower rabbits fed varying level of rice husk with or without probiotics and enzyme supplementation in replacing groundnut cake are presented on Table 4.1

There was no significant effect (P>0.05) of the treatment on the obtained daily feed intake by the test rabbits. The feed intake values ranged between 78.36 and 78.42g per rabbit per day which is comparable (P>0.05). Similarly there was no significant effect (P>0.05) of supplementation on the obtained feed intake values. The values obtained on rabbits fed on no supplements Added (NSA), probiotics A, Probiotics B and enzyme were used comparable to one another. An interaction between the level of rice husk and supplements had effect (P<0.05) on the daily feed intake obtained on the test rabbits. The varying level of rice husk had significant effect (P<0.05) on the efficacy of feed utilization.

The rabbits fed 0% inclusion level of rice husk had the poorest feed to gain ratio (7.1 8g) while the ‘best feed to gain ratio (6.33g) was recorded on the rabbits fed 30% inclusion levels of rice husk, hence there was significant decrease (P<0.05) in feed utilization as the rice husk inclusion level increased from 30 to 60%. The dietary supplements had significant influence (P<0.05) on the feed to gain ratio of the test rabbits. The feed was best utilized in rabbits fed with no supplement added with a feed to gain ratio of 6.32g which is comparable to 6.36g obtained on rabbits fed probiotics A supplemented diet and the poorest feed to gain ratio (7.42g) was obtained on rabbits fed probiotics B. the rabbits fed enzyme utilized the feed better (P<0.05) with a feed to gain ratio of 7.07g. e efficiency of feed utilization was significantly affected (P<0.05) by the interaction between level o rice usk and the supplements. As presented on Table 4.2 The nitrogen intake of the test rabbits were significantly different (P<0.05). Similarly there were significant (P<0.05) of supplementation in the nitrogen intake of the test rabbits. The rabbits fed no supplement diet had the highest nitrogen intake of 3 .74g which is significantly higher (P<0.05) than those fed on enzyme supplemented diet (3.60g), probiotics B supplemented diet (3.63g), probiotics B supplemented diet (3.63g) and probiotics A supplemented diet (3.52g).

However, there were significant effect (P<0.05) of the treatment on the rate of nitrogen output obtained. The highest value of 2.85g was obtained at 60% rice husk inclusion level which is significantly higher (P<0.05) than 2.73 and 2.60g obtained at 0 and 30% rice husk inclusion level respectively. There were significant effect of supplementation on the rate of nitrogen output obtained. Rabbits fed probiotics B supplemented diet had the highest value of 2.56g which is comparable to 2.53g obtained on the rabbits fed probiotics A supplemented diet but significantly higher (P<0.05) than 2.47g and 2.45g obtained on the rabbits fed enzyme and no supplemented diet respectively, which are also comparable to each other.

There was significant effect (P<0.05) of the treatment the nitrogen digestibility obtained. This indicates that rabbits fed 30% inclusion level of rice husk had the lowest nitrogen digestibility (69.89)) X —A while the highest value (78.51) was obtained in rabbits fed 60% inclusion of rice husk which is (significantly higher (P<0.05) than 76.90’obtained at 0% inclusion level. Also, there was significant effect (P<0.05) of supplementation on the nitrogen digestibility values obtained on the test rabbits. The highest nitrogen digestibility value (71.89g) was recorded on probiotics A fed rabbits, which is significantly higher (P<0.05) than values obtained, probiotics B fed rabbits, Enzyme and no supplements fed rabbits respectively. An interaction between the level of rice husk and supplementation had significant effect (P<O.05) on the nitrogen digestibility values of the test rabbits.

Financial Implication of grower rabbits fed rice husk with or without probiotics and enzyme supplementation is presented on Table 4.3.

Feed cost of producing 1kg of feed decreased (P<0.05) with increased level of rice husk from 0 to 60%. There was no significance effect (P>0.05) of supplementation in the cost of feed per kg. all values are comparable. There was significant decrease (P<0.05) in the rearing cost as the level of rice husk in the diet increased from 0 to 60%. In terms of supplements, rearing cost increased in this sequence: diets with no supplements <enzymes supplemented diets<probiotics A supplemented diet < priorities B supplemented diet, all values were significantly different P<0.05).

The value of selling price was Ni 700 per rabbit across all experimental diets. Hence no significance difference in the selling price across all experimental diets (P>0.05). there was significant effect (P<0.05) of treatment on the profit made in this experiment. The profit increased as rice husk level increased from 0-60%. In terms of supplement the profit was highest (N308.30) at rabbits fed with no supplements and least (N304.90) at rabbits fed with probiotics B supplemented diets. However, the profit made on rabbits fed probiotics A supplemented diets (N306.00) was lesser than that of rabbits fed with enzyme supplements.

The varying level of rice husk had significant effect (P<0.05) on the gross profitability made in this experiment. The increase in rice husk level from 0 to 60% inclusion resulted in the increased gross profitability (P<0.05). values recorded were: 20.60, 21.96 and 23.44% at 0, 30, and 60% inclusion level of rice husk respectively. In term of supplements, there

was a significant increased (P<0.05) in gross profitability in this sequence. Diet supplemented with probiotics B<probiotics A supplemented diets < enzyme supplemented diet < no supplements diet, with the following corresponding values. 21.87, 21.96, 22.02 and 22.15%. Similarly, the increased level of rice husk from 0 to 60% causes significant increase (P<0.05) in the feed cost efficiency. Values recorded were 0.33, 0.37, and 0.42 at 0, 30 and 60% inclusion of rice husk respectively. There was no significant effect (P>0.05) of supplementation on the feed cost efficiency. The value of feed cost efficiency in all the supplemented diet obtained was 0.37 except for rabbits fed probiotics B which had 0.36 and also comparable to the remaining diets, hence no significant difference (P>0.05).

DISCUSSION

The reduction in the rate of gain per day as observed with increased level of rice husk from 0 to 60% could be attributed to the conconimitant increase in the level of crude fibre content in the diets which may not allow proper utilization of nutrients. The variation in weight gain per day at different level of rice husk inclusion in the study is in conformity with several reports which indicated that rate of gain reduces with increase amount of crude fibre in the diets of monogastric Animals (Numbela, 2001 and Eva, 2004). The use of supplements (Probiotics A, B, and Enzyme) resulted in significantly lower rate of gain (12.33, 10.61 and 11.08 respectively) when compared to rabbits fed on supplemented diet (12.36g) in this experiment. Its however noted that, the rabbits fed on no supplemented diet, though had the higher gain (12.36) but is comparable to those fed on probiotics a supplemented diets (12.33g). the least gain of l0.61g and 11 .OXg were obtained on the rabbits fed probiotics B and enzyme supplemented diets respectively and may due to the effect of the chemical constituent of the supplements which sometimes affect digestion of nutrient in the gut (Valencia, 2003).

However studies have revealed that, there was an improvement in the rate of weight gain when monogastric animals (Chicken, pigs, and rabbits) are fed with probiotics supplementation (Adeniji, 2009, Sese 2004 and Reharjor et. al., 2005). Notably, the significant different rate of gain per day between the rabbits fed probiotics 1A supplemented diets (12.33g) and those fed probiotics B supplemented diets (10.6kg) could be as a result of difference in the preparation of probiotics A and B as the composition, (beneficial micro organism) is of different brand hence the efficacy of action could differs (Abdel Rahma et al., 2008).

The similarities in values of feed intake recorded at all level of rice husk could be due to the effect of age on the rabbits since they were of the same age and also may be due to similarity in management practices ((% kiponafrt al., 2008). This study agrees with the general observation that feed intake reduced with increased fil*e content in the diet of monogastric animals (rabbits, pigs and poultry) (Ademokun, 1999; Adeleye, 2001 and Adeyinka, 2004). It was also reported however that, fibre create bulkiness of the feed in the gut and this reduces the feed consumption in monogastric animals (Adeniji, 2001). In terms of supplements, the feed intake significantly decreased in this order; Rabbits fed probiotics B supplemented diets > rabbits fed probiotics A rabbits fed enzyme> rabbits fed no supplements. This signifies that there was a higher feed intake in rabbits fed supplements when compared to rabbits fed no supplements. Although there is no evidence to suggest that enzymes and probiotics improve palatability of ckets, the improvement in feed intake may be due to a reduction in bulkiness and intestinal viscosity as provçn efficacy of enzyme and probiotics, hence higher feed intake to satisfy the nutritional requirement (Oluwale, 2001; Ademokun 1999 and Adeniji, 2001).

A similar finding was observed when biodegradable level of rice husk was fed, weaner rabbits (Adekunle, 2000; Allen et a!., 2006 and Babalola, 2001). The utilization of increased level of rice husk decreased, this indicates that fibre depress utilization of essential nutrients. This is an evidence that the feed was best utilized in the sequence of; rabbit fed no supplements > rabbits fed prohiotics A < rabbits fed enzyme > rabbits fed probiotics B. this contradicts the facts that the supplements (Probiotics A, probiotics B, and enzyme) increased the nutritional value of rice husks and the nutrient locked up in the fibrous diet were better utilized (Allen, 1998; Okewu et al, 2000). The better utilization of feed (6.36) is recorded on rabbits fed probiotics A when compared rabbits fed probiotics B (7.42) could be attributed to difference in strain of micro-organism used in the preparation of the probiotics (Oyelu and Aduku (2002). However, the feed to gain ratio of 7. 1 recorded on rabbits fed control diets (0% rice husk level) was higher than that obtained by Cheek et a!. (2006) (5.16)' this could be due to differences in environmental conditions and management practices (Omole, 1996). The differences in values of nitrogen intake of the test rabbits across all experimental diets could be attributed to different feed being fed to the test rabbits used in the experiment or such 1ittl variation is expected (Reharjor et al., 2008). However, this is in agreement with the findings of Maw et al. (2000) L1\ who revealed that 'different diet given to monogastric animals (poultry, rabbits and pigs) affect nitrogen intake of the animals.

The increase in the rate of nitrogen output as observed with increased level of rice husk from 30 to 60% could be as a result of the concomitant increase in the level of fibre content in the diet which may not allow for proper utilization of nutrients. The trend in nitrogen output at varying level rice husk in this study is in conformity with reports which indicated that, the rate of nitrogen output increases with increased amount of fibre in the diet of monogastric animals; (Numbela, 2001; Alonge, 2001 and Egun, 1992). The use of supplements (probiotics A, B and enzyme) proved significantly higher rate of nitrogen output values (2.53g, 2.56g, and 2.47g) when compared to rabbits fed no supplements (2.45) in this experiment this is in agreement with the findings of Longe and Odegbe (1989) who recorded a slight increment hi nitrogen output when they supplemented enzymes in diets of weaner rabbits but contradicted the studies of Sese (2004) and Reharjo et al. (2008) who reported a decrease in nitrogen output when monogastric animals were fed with probiotics supplementation.

Notably, there was a significantly higher rate of nitrogen output (2.56g) in rabbits fed probiotics B which was comparable to (2.63g) obtained on rabbit fed probiotics This could be as a result of similarities in (the preparation of the two probiotics as the composition beneficial micro organism) may be the same, hence the efficacy of action could also be the same (Adeyemi, 1998 and Akinmutimi, 2007). The similarities in values of the urinary nitrogen at all levels of rice husk could be due to the effect of age and also to similarities in the management practice (Alaw, et al, 2000).

The nitrogen intake values (3.55g) obtained o,/the rabbit fed control diet (0% rice husk level) was higher than that obtained by Oluwae (2006); (2-41). In terms of supplements the nitrogen intake significantly decrease in this sequence; Rabbits fed no supplemented diet> rabbits fed enzyme > rabbits fed probiotics B>rabbits fed probiotics his signifies that there is higher nitrogen output in the rabbits)ç fed no supplements diets compared to those fed supplements (probiotics A, B and enzyme). This may be due to a reduction in bulkiness of the feed and intestinal viscosity as proven efficacy of enzyme and probiotics hence low nitrogen output to satisfy the nutritional requirement of the test rabbits (Numbela and Valencia 2003; Ward 2003). A similar finding was observed when yeast was supplemented in the diet of weaner rabbits (Allen et a!., 2006 and Cheeke et al., 2007).

The trend in nitrogen balance at varying level of rice husk in this study is in conformity with several reports which indicated that nitrogen retention is generally affected with an inraese amount of crude fibre in the diets of monogastric animals (Olupona, 2008). The nitrogen balance values recorded decreased in the following sequence; 30% rice husk inclusion>0% rice husk inclusion ?6% rice husk inclusion level. This signifies that the rabbits fed 30% rice husk inclusion level had the highest nitrogen retention amongst all the test rabbits in this study compared to tose fed 0% and 60% inclusion of rice husk level and this may be due to an increment in the bulkiness of the feed and intestinal viscosity (Saver et a!., 1991; and Rhule, 1996). The use of supplements (Probiotics A, B, and enzymes) prove significantly higher rate of nitrogen balance values recorded (2.47, 2.53, and 2.56g) when compared to rabbits fed no supplements (2.45g) in this experiment studies have shown that enzyme degrade non cellular wall of polysaccharides of rice husk improving the nutritional value of feed (Alonge, 2001 and Valencia, 2003).

The highest nitrogen balance was recorded on the rabbit fed 30% rice husk inclusion level but appeared to have least nitrogen digestibility (6 8.89%) and this may be attributed to gastro intestinal effects of the rabbits in the treatments. (Summer and Leeson, 1985). In terms of supplements, the rabbits fed no supplements showed the least value (65.11%) of nitrogen digestibility compared to 67.12, 70.52 and 71.87% obtained at the rabbits fed supplemented diet of enzyme, probiotics B and probiotics A respectively. This is in agreement with several reports which indicated the relevance of supplementing fibrous feed of monogastric with enzyme or probiotics (Adeniji and Omonijo, 2004; Adeniji, 2001 and Adeyinka, 1998).

The significant decrease in the cost of producing 1kg of feed as a result of the increase level of rice husk from 0 to 60% can be linked to the lower price of rice husk (N10 per kg) as at the time of this research (November 2012) as against the price of groundnut cake (N105 per kg). But in supplements, the results showed that there was no significant difference in the cost of producing 1kg of feed. This may be as a result of little or no variation in the prices of supplements (probiotics A and B. N700, Enzyme N 500) and also may be as a result of the difference in the quality of supplement used at the recommended rate (probioties A = 0.OO5kgllOOkg, Probiotics B = 0.04kg! 100kg and enzyme = 0.OO4kgIlOOkg of feed). Similarly, the cost of feed consumed is the same as observed with the cost of feed per kg. this signifies that the higher the cost of feed per kg, the higher the dry matter intake and this could be attributed to increase palatability by the addition of supplements to boost the nutrient level of the feed. This was in agreement with the findings of, Oyenuga (2003); Oyedele and Akon (2004) and Sese (2004) who reported that rice husk inclusion reduces the cost of feed consumed when fed to monogastric animals.

However, the results indicated, cost of feed consumed (N261 .47) recorded in diet with no supplement was comparable to that obtained on rabbits fed with enzyme supplementation (N262.20) but significantly lower than. The cost of feed consumed by rabbits fed probiotics A and B supplementation (N262.80 and N263.83). this revealed that supplements degraded the fibre fractions of rice husk reducing the intestinal viscosity and enhancing feed intake which resulted to higher cost of feed consumed in supplemented diets when compared to no supplement diet. The higher cost of feed consumed recorded in probiotics A and B supplemented diet was in agreement with the findings of Aduka et al. (2004) who reported high cost of feed consumed when probiotics and enzyme supplementation was fed to poultry.

Decrease in the rearing cost of the grower rabbits was also revealed as a result of the increase in the level of rice husk in this study. And this could be attributed to the lower price of rice husk (N10 per kg) as against groundnut cake (N105 per kg) and also the resultant decrease in feed intake and cost of feed consumed with increased level of rice husk. The additional cost of purchasing supplements (probiotics A, B and enzyme) revealed higher rearing cost of the supplemented diets when compared to rabbits fed no supplements. The increased level of rice husk from 0 to 60% inclusion resulted in the increased profit (N294.40, N306. 10 and N322.90) at 0, 30 and 60% inclusion of rice husk respectively. This revealed that increased in the inclusion of cheaper feed stuff (rice husk) leads to increased profit. Addition of supplements reduced the profit values, profit obtained were; N308.30, N306.00, N304.90 and N306.60 for rabbits fed no supplements diet, rabbits fed probiotics A, rabbits fed probiotics B and rabbits fed enzyme supplemented diet respectively. This could be evidence to the increase in rearing cost associated with the additional cost of purchasing the supplements. Similarly, increase in rice husk level resulted in the increase gross profitability and there was higher gross profitability on rabbits fed no supplements when compared to rabbits fed supplemented diets. Although an increase in the inclusion level of rice husk resulted in a substantial decrease in cost of feed, the economic sense of such a reduction will depend on the utilization of the feed and the weight gain per day.

This study shows that rice husk can replace 60% of GNC in the diets of rabbits, particularly when supplanted with probiotics A.

REFERENCES

Abdel Rahman, M. S., Biobaku, W. U., Abdul, E. A. and Babalola E. B. (2008). Growth responses of rabbits fed graded level of groundnut shell; Effect on weight and enzyme acitivites. Journal of Pure and Applied Science. 1:44 — 50.

Adeniji, A. A., (2009). Effects of dietary grit inclusion on the utilization of palm kernel cake by pullet chicks animal Nutrition and Feed Technology 9:29 -36.

Adeniji, A. A. and Omonijo, 0. A. (2004. e replacement value of palm kernel cake for groundnut cake in the diet of weaner rabbits ivestbck Production Science 85: 287— 291.

Adekunle, E. 0. (2000). Trends in Agro by products and their feeding potentials in sub-saharan Africa, working document No 14 ILCA, Addis-Ababa. Pp 12-19.

Adeyemi, 0. J. (1998). The Effect of varying level of rice husk on growth performance and ass characteristics of Pigs.Proc. iW — 19' Ghana Anzmal Science Association syinpox US7' Kwnasi Pp. 54- **57.**

Adeyinka, E. E. (1998). Rabbit production in the tropics and the potential for using enzyme preparatlim in rabbit and swine production.Pp 40-44.

Ademokun, A. 0. (1999). The nutritive value of rice husk for animal feed.Rice development, No. 40, June 1999, Thailand rice board.Pp 61-66.

Aduku, A. A., Aduke, M. E., Harris, E. E. and Eva, S. (2002). The value of rice husk diet, Aimual report, Institute of animal research, Mankon, Cameroun, Pp. 34 -36.

Akinmutimi, E. A. (2007). Growth rate, Carcass characteristics and organoleptic quality of broiler rabbits Fed. Biodegraded level of rice husk. International Journal of Animal Science 4(5): 230- 233.

Alawa, M. E., Hans, 0. J. and Onwudike, 0. C. (2000). Morphometnic studies of the gastro intestinal tract and internal organs of rabbits consuming fibre. Tropical Journal of Agricultural Science 35(4) 337—341.

Alonge, A. (2001). The nutritive value of rice husk measured invivo and using rumen fluid and enzymatic technique. Livestock Production Science 60: 200 -216.

Anjeniwa, M. (2000) The rabbit husbandry, health and production, AHPP series No 21, FAO, Italy.Pp 88-

Association of Official analical chemist (AOAC) (1 990) Official methods of analysis **15th** Edition. Washington DC.

Babalola, A. E. (2000). Response of rabbits to cereal by product as energy sources diets Animal Feed Science And Technology (183) 285 —294.

Cheeke, P. R., Patton, N. M.; and Chen, M. (2006).Rabbit production and research in the People's Republic of China Journal of Applied Rabbit Research, 10: 68-75.

Ehrllen, E. S., Aduku, 0. A. and Olukosi, J. 0, (2003) Rabbits management in the tropics. Living book K series GU, Publications, Abuja. Pp 22-31.

Numbela, E. R. (2001). Effect of replacing palm kernel cake with rice husk in the diets of growing pigs.Animal Production Journal. Vol.2 (4) 33- 41.

OluPona 0. 0., Nuhu, F. and odedire, J. A., (2008). Effects of enzyme supplementation of Brewers Dried Gram (BDG) on the performance of growing rabbits. International Journal of Animal Science 4(2) 50— 60.

Olusola. 0. A., (2002). The value of rice and maize byproducts in rabbit nutrition. Presented at the FAO/ILCA workshop on utilization of Agro-industrial byproducts and crop residues in Animal feeding. Dakar Senegal. 21-25. September 2002. Pp 100.

Oluwale, A. 5. (2006). Nutrient Utilization and growth performance of broiler rabbits fed rice husk meal. Asian Australasian, Journal of Animal Science (14) 1223-51232.

Omole, T. A. and Ajayi, 0. E. (2006). Improving the nutritive value of rice by chemical treatments; World Animal Reviews 20: 11-31.

Oyedele, A. E. and Akon, T. (2004) Effect of concentrate supplementation on growth and reproductive performance of rabbits under rural condition p.60-66.

Oyelu, 0. S. and Aduku, A. A. (2002).Evaluation of the nutritive potential of rice bran and wheat offal on growth performance of pre-pubertal rabbits. Bowei3Journal of Agriculture 5: 105- 110.

Tome, A. A. (2000). Effects of starch and Protein sources, Heat processing and exogenous enzyme. In the diets of growing rabbit Animal Feed Science And Technology. 90 (3) 170 — 178.

Valencia, C. A. (2003). Effects of dietary fat in fertility and rearing ability of rabbits, fattening performance and carcass yield of hybrid rabbits. Animal Science And Technology. 63(3): 133-135.

Table 1; Composition of the Experimental Diet (KgIlOOkg)

Level of rice husk	0% rice husk				30% rice husk				60% rice husk			
	1	2	3	4	5	6	7	8	9	10	11	12
Ingredients	GNC	12	12	12	12	8.4	8.4	8.4	8.4	4.8	4.8	4.8
Rice husk	0	0	0	0	3.6	3.6	3.6	3.6	7.2	7.2	7.2	7.2
Prob A	-	0.005	-	-	-	0.005	-	-	-	0.005	-	-
Prob B	-	-	0.04	-	-	-	0.04	-	-	-	0.04	–
Enzyme	-	-	-	0.000	-	-	-	0.000	-	-	-	0.0004
				4				4				
Maize	36.7	36.7	36.7	36.7	36.7	36.7	36.7	36.7	36.7	36.7	36.7	36.7
Corn bran	26	26	26	26	26	26	26	26	26	26	26	26
Wheat offal	20	20	20	20	20	20	20	20	20	20	20	20
Bone meal	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Salt	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
V. Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Lysine	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	100	100	100	100	100	100	100	100	100	100	100	100
Proximate composition		87.13	87.13	87.13	87.12	87.12	87.12	87.12	87.13	87.13	87.13	87.13
Dry matter	87.13											
Crude Protein	15.53	15.53	15.53	15.53	14.05	14.05	14.05	14.05	13.96	13.96	13.96	13.96
Ether extract	3.62	3.62	3.62	3.62	3.72	3.72	3.72	3.72	3.84	3.84	3.84	3.84\
Crude Fibre	6.15	6.15	6.15	6.15	6.8	6.8	6.8	6.8	7.95	7.95	7.95	7.95
Ash	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MEKcalfkg	2601	2601	2601	2601	2623	2623	2623	2623	2516	2516	2516	2516

Composition of premix fed;
Vitamin-mineral (premix) supplied the following;
1kg diet: vitamin A-8000 lu; Vitamins D 1 u; vitamin E-81u; vitamin k — 2mg; vitamin B1 1mg; vitamin B2 0
2.5mg; vitamin B12 — l5mkg; niacin — 10mg; panthothetic — 5mg; anti oxidant — 6mgs; folio acid — 0.5mg; chlorine
150mg; Iron — 20mg; manganese — 80mg; copper -8mg; zinc — 5 0mg; cobalt — 0.255mg; Iodine — 2mg; selenium — 0.1mg.
Coccidiostat used Amprolium P with active ingredient Improlium 9.6%.

Table 2; Effects of replacing Groundnut cake with rice husk with or without probiotics and enzymes on growth performance of grower rabbits

Rice Husk Inclusion	Initial body weight (g)	Final body weight (g)	Feed intake g/rabbit/day	Weight gain g/the	Feed to Gain ratio
0%	788.75a	**1443.75b**	78.42	l0.92	7.18a
30%	781.25a	1525.00a	78.45	**12.40b**	6.32c
60%	**727.50b**	1420.00	78.36	1l.54	**679b**
SEM	±9.65	±15.89	±0.03	±1.10	±0.01
SUPPLEMENTATION					
NSA	721.66c	1463.33c	78.17	12.36a	6.32c
ProbA.	**751.66b**	1491.66a	78.42	12.33a	6.36c
Prob B.	850.00a	**1486.66b**	78.71	10.61c	7.42a
Enzyme	**740.00b**	**1405.00d**	78.31	**11.08b**	**7.07b**
SEM	±15.00	±10.42	±0.93	±1.41	±0.03
LOS	*	*	NS	*	*
Interaction	*	*	*	*	*

NS: not significant
SEM: Standard error of mean
L.O.S. level of significant
a, b, c; Treatment means in the same column with different superscripts are significantly different (P<0.05)

Table 3:Effects of replacing Groundnut cake with rice husk with or without probiotics and enzymes supplementation on Nitrogen digestibility of grower rabbits.

Rice-husk Inclusion	Nitrogen intake (g)	Faecal nitrogen (g)	Urinary nitrogen (g)	Total nitrogen output(g)	Nitrogen balance (g)	Nitrogen Digestibility (%)
0%	3.55^{a}	**2.67^{b}**	0.06	2.73b	**0.82^{b}**	76.9^{b}
30%	3.72^{a}	2.55^{c}	0.05	2.60^{c}	1.12^{a}	69.89^{c}
60%	363^{b}	2.79^{a}	0.06	2.85^{a}	0.78^{c}	78.51^{a}
SEM	±0.03	*0.04	±0.02	±0.04	±0.06	±1.44
SUPPLEMENATION						
NSA	374a	238	0.07	**245b**	1.29a	**6511d**
Prob A.	**3.52^{d}**	2.78	005	2.53a	0.99^{c}	71.87a
ProbB.	3.63^{c}	**251b**	0.05	2.56a	**1•07b**	**7052b**
Enzyme	**368^{b}**	2.41^{c}	0.06	**247b**	1.21a	67.12’
SEM	±0.03	±0.05	±0.01	±0.05	±0.07	±1.81
LOS	*	*	NS	*	*	*
Interaction	*	*	*	*	*	*

NS; not significant
SEM: Standard error of mean
L.O.S. level of significant
a, b, **C;** Treatment means in the same column with different superscripts are significantly different (P < 0.05).