

Effects of Replacing Maize with Sun-Dried Rice Straw Meal on Growth Performance, Carcass Characteristics and Economics of Production of Meat Type Rabbit

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Abstract

Fifty rabbits of mixed sexes with an average initial weight of 0.71kg were used to determine the effects of replacing maize with sun-dried rice straw meal on growth performance, carcass characteristics and economics of production of meat type rabbits. The rabbits were randomly allotted to five diets formulated with sun-dried rice straw meal replacing maize at 0%, 10%, 20%, 30% and 40% levels. The results showed that inclusion of sundried rice straw meal in rabbit diet did not exert deleterious effect on the animals. No significant difference was observed in the feed intake and feed gain ratio. Sundried rice straw meal inclusion at 40% level of maize replacement significantly increased the weight gain of the tested animals. Tested diets did not influence the percentage weights of the carcass primal parts. Feed price per kilogramme reduced with increased sundried rice straw diet and consequently decrease in price per kilogramme rabbit produced.

Key words: Rice straw, growth performance, carcass characteristics

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Introduction

One of the possible solutions to the increasing shortage of meat production problem is by using small ruminant and semi-ruminant species, as rabbits (Mashoub, 2007). Rabbits have been recognised to have a very important role to play in the supply of animal protein to Nigerians especially in the rural and per-urban areas. They are efficient converters of feed to meat and can utilize up to 30% fibre as against 10% by most poultry species (Egbo *et al*, 2001).

Rabbit, as micro-livestock, is an economy animal that could bridge the wide gap in dietary protein in Nigeria. This is because rabbit is socially acceptable on the combined basis of space requirement and absence of religious taboo as well as peculiar digestive physiology which permits the use of forages and agro-industrial by-products thus making it non competitive species with man for cereal and legume grain. In addition, rabbit can turn 20% of the protein they eat into edible meat while the value for broiler chicken is 22-23%, 16-18% for pigs and 8-12% for beef (Ojebiyi *et al* 2010).

In Nigeria, the high cost and scarcity of conventional food and feed sources for human and livestock has caused men and livestock to compete with each other for some food supply. Hence, livestock for use should be those that are less dependent and are capable

of converting crop waste into meat. Joseph and Awosanya (2000), found that rabbits with short generation interval fulfils such criteria in utilizing plant materials and crop wastes more efficiently and are very suitable as panacea to protein deficiency and low meat supply in Nigeria.

There is the need therefore to search for by-products and crop wastes with a view to finding feed supplements which can maintain physiological balance and enhance livestock productivity. Studies in the utilization of agro industrial by-products and plant materials in animal feed has increased in the past two decades. Many animal nutritionist have utilized some non-conventional feed sources as alternative to maize and other conventional feed ingredients such as sun-dried yam peel meal (Ayoola and Akinbani, 2011); sun-dried cassava waste meal (Olagunju, 2001) and Cassava leaf + peel meal (Ojebiyi *et al*, 2010).

However, little or nothing has been done on the possibility of replacing maize with sun-dried rice straw meal in rabbit diet. This research work therefore aimed at determining the growth performance, carcass characteristics and economic of production of rabbit fed maize replaced with sun-dried rice straw meal diet.

Materials and Method

Rice straw was collected from the rice plantation located at Ipetu-ijesa, Osun state. The material which was collected in bags was sun-dried on a clean cemented floor for 3-4days. Then the dried sample was grounded and packed in sacks and stored at room temperature. Other ingredients used include: maize, soya bean, wheat offal, bone meal,

salt and vitamin premix. The feeds used were purchased at Akinwekomi feed mill in Oka, Ondo town.

Fifty (50) weaned rabbits of mixed sexes were used for the experiment. The animals with an average weight of 8.71kg were randomly allocated into five (5) dietary treatments with six animals per treatment..

Five (5) experimental diets were formulated such that maize was replaced with sun-dried rice straw meal at the level of 0%, 10%, 20%, 30% and 40% as shown in Table 1 below:

Table 1: Composition of Experimental Diets

Feed ingredients	Levels of replacement (%)				
	0	10	20	30	40
Maize.	32	28.80	25.60	22.40	19.20
Rice straw meal	—	3.20	6.40	9.60	12.80
Wheat offal.	6	6	6	6	6
Corn bran.	27.5	27.5	27.5	27.5	27.5
Soya bean meal.	9	9	9	9	9
Palm kernel cake	16.5	16.5	16.5	16.5	16.5
Fish meal.	5	5	5	5	5
Bone meal.	3.5	3.5	3.5	3.5	3.5
Vitamin premix.	0.25	0.25	0.25	0.25	0.25
Salt.	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100

The initial weights of the animals were taken before introducing them to the experimental diet. The experimental rabbits were offered growers pelleted mash for one week which served as adaptation week after which the animals were distributed into their various treatments. Water and weighed feeds were offered to the rabbits twice daily at 8.00am and 4.00pm. Coccidiostat (Embazing forth) was included in their drinking water (1g/litre) to prevent diarrhoea and coccidiosis. Water was supplied in stainless plates and feeds in feed containers that were well formed in order to avoid tipping over by the animals. The left over feeds and water were removed every morning before new feeds and fresh water were given. The records of feed offered and left over were kept daily in order to estimate the amount of feed consumed by the rabbit per day.

The animals were weighed on weekly basis throughout the experimental period.

At the end of 8th week, three rabbits from each treatment making a total of fifteen rabbits were selected, weighed and starved overnight to clear the gut. These were stunned and slaughtered using the conventional method. The slaughtered animals were bled and their tails close to the base were first removed and then the head limbs and pelt. The carcass were eviscerated, the internal and external organs were removed and weighed and expressed as percentage of live weight. The primal parts were expressed as percentage of dressed weight.

The data collected were analysed using a statistical tool known as Analysis of Variance (ANOVA). The data were later subjected to Duncan multiple range test for Mean separation with the aid of Statistical Package for Social Sciences (SPSS), version 13.

Results and Discussion

Table 2: Growth performance of rabbits fed maize replaced with sun-dried rice straw meal diet

Parameters	Levels of replacement					SEM
	0%	10%	20%	30%	40%	
Total feed consumed (kg)	5.54	5.62	5.63	5.52	5.94	0.08NS
Weekly feed consumed (g)	694.45	638.57	704.82	687.69	750.95	16.91NS
Daily feed consumed (g)	99.10	100.38	101.67	99.24	104.43	1.48NS
Initial weight (kg)	0.71	0.74	0.76	0.67	0.70	0.02NS
Final weight (kg)	1.47	1.58	1.59	1.49	1.64	0.02NS
Total weight gain (g)	755.00 ^a	840.00 ^{ab}	830.00 ^{ab}	825.00 ^{ab}	935.00 ^b	23.07
Weekly weight gain (g)	94.40 ^a	105.02 ^{ab}	103.76 ^{ab}	103.17 ^{ab}	116.90 ^b	2.88
Daily weight gain (g)	13.48 ^a	15.01 ^{ab}	14.83 ^{ab}	14.81 ^{ab}	16.70 ^b	0.41
Feed gain ratio	7.96	7.04	7.05	7.64	6.32	0.26NS
Feed efficiency	0.14 ^a	0.14 ^a	0.27 ^b	0.15 ^{ab}	0.16 ^{ab}	0.02

^{ab} mean value within row carrying different superscripts differ significantly.

The result of growth performance of rabbit fed maize replaced with sun-dried rice straw diet is as presented in Table 2. The results showed that there was no significant difference ($P>0.05$) in total, weekly and daily feed intake. This showed that inclusion of sun-dried rice straw meal did not influence feed consumption in rabbits. This result is contrary to that of Adeniyi (2003), who reported that an increase crude fibre would result in increased voluntary feed intake for growing rabbits.

There was no significant difference ($P>0.05$) in the initial weight of the animals used for the experiment. This showed that initial weight of animals used could not be a source of variation to the experiment.

It was observed that rabbits fed 40% level of maize replacement showed a significant difference in weight gain when compared with the conventional diet. At 40% level of maize replacement, total, weekly and daily weights of the animals were significantly ($P < 0.05$) higher when compared with the control. Agunbiade *et al* (1999), observed similar results when cassava peel and leaves were included in the diets of growing rabbits. Growth rate per day was significantly higher ($P < 0.05$) in rabbits fed 10% replacement diet when compared with the control.

No significant difference was observed in the feed gain ratio of rabbits fed the tested diets, however the feed efficiency was observed to be significantly different at 20% level of replacement. Feed efficiency was higher than that of the control. This results suggest that inclusion of sun-dried rice straw meal in place of maize in rabbit diet will improve growth performance and feed efficiency in rabbits.

Table 3: Carcass primal cuts of rabbits as influenced by the diets

Parameters	Levels of replacement					SEM
	0%	10%	20%	30%	40%	
Loin weight (%)	23.07	23.47	21.80	20.53	23.77	0.76NS
Shoulder weight (%)	23.66	26.90	24.10	23.96	26.03	0.57NS
Thigh weight (%)	24.60	38.80	35.66	34.81	36.40	2.31NS
Rib weight (%)	12.20	10.92	11.37	10.83	11.76	0.35NS
Length of carcass (cm)	33.33	31.40	32.33	31.33	31.66	0.31NS
Dressed carcass weight (%)	45.97	46.53	52.57	49.00	47.07	1.09NS

Ns- Not Significant ($P > 0.05$)

The influence of maize replaced with sun-dried rice straw in rabbit diet on the primal parts of rabbit is as presented in Table 3.

The result showed that dietary treatment did not influence the weight of primal parts ($P>0.05$). It was observed that dressed carcass mean values of rabbit fed rice straw meal included diet were higher than that of the control diet. However, these were not statistically different ($P>0.05$). Shoulder weight, thigh weights, rib weights and carcass length were observed to be higher in value for rabbit fed treated diet when compared with the control. However, the values were not significantly different ($P> 0.05$). This result is in conformity with the observation of Ayoola and Akinbani (2011), when rabbits were fed with maize replaced with sun-dried yam peel diet. They observed no significant difference in the weights of shoulder, thigh and rib of the animals. This result is also similar to the result obtained by Ngodigha and Mepba (1992), for rabbits fed graded levels of cassava peel meal.

Table 4: Effect of maize replaced with sun-dried rice straw meal on internal and external offal of meat type rabbit

Parameters	Levels of replacement					SEM
	0%	10%	20%	30%	40%	
Head (%)	9.63 ^{ab}	10.20 ^b	9.00 ^{ab}	9.00 ^{ab}	8.90 ^a	0.19NS
Pelt (%)	9.13	8.98	9.07	8.61	8.90	0.22NS
Tail (%)	0.54 ^a	0.95 ^b	0.52 ^a	0.65 ^a	0.68 ^a	0.05
Hind and fore limbs (%)	2.37	2.83	2.85	2.70	2.46	0.12NS
Lung (%)	2.37	2.08	1.80	1.75	1.76	0.21NS
Heart (%)	0.63	0.68	0.35	0.68	0.88	0.05NS
Kidney (%)	1.48 ^{ab}	1.36 ^{ab}	1.18 ^a	1.41 ^{ab}	1.72 ^b	0.08
Liver (%)	5.88 ^b	5.86 ^b	3.81 ^a	4.93 ^{ab}	5.07 ^{ab}	0.26
Intestine full of content (%)	19.97	18.11	14.61	16.74	18.58	0.82NS
Inguinal fat (%)	0.80 ^a	0.88 ^a	0.80 ^a	1.99 ^b	1.43 ^b	0.15
Interscapular fat (%)	0.81 ^{ab}	0.79 ^a	0.90 ^{ab}	1.59 ^b	1.13 ^{ab}	0.11
Pherirenal fat (%)	1.98	1.96	2.23	3.50	3.03	0.28

Mean value within row carrying different superscript differ significantly ($P<0.05$)

Result of maize replaced with sundried rice straw meal on internal and external offals of rabbits is as presented in Table 4.

Results showed that inclusion of sundried rice straw meal in rabbit diet did not exert any significant effects on the percentage weights of rabbits, pelt, hind and fore limbs, lung, heart and intestine. This result showed that the tested diet did not have any deleterious effect on the lungs and the heart of the experimental animal. Inguinal fat deposition is significantly higher in rabbits fed 30 and 40% levels of inclusion when compared with other treatments. Liver weight of the animal fed the control diet is not significantly different from those fed 10%, 30% and 40% levels of inclusion. It could therefore be concluded that maize replaced with sun-dried rice straw meal in rabbit diet did not have deleterious effect on major internal organ of rabbits like lung and heart that could be used to assess the toxicity of the feed.

Results on economics of production of rabbits fed maize replaced with sun-dried rice straw meal is as presented in Table 5. The result showed that price per kilogramme feed decreased with increased level of sun-dried rice straw meal in rabbit diets. This suggests that inclusion of sun-dried rice straw meal in rabbit diet reduced cost of feed formulated.

Price per kilogramme weight of rabbit produced decreased with increasing levels of sun-dried rice straw meal in the diet. This could be attributed to the decrease in price per kilogramme feed as the sun-dried rice straw meal inclusion increased.

Rabbit fed 40% level of maize replacement diet has the best price per kilogramme weight gain. Decrease in feed cost per kilogramme gain with dietary replacement of costly ingredients with cheaper ones has been reported (Igwebuike *et al.* 2000). Olagunju

(2001), also reported that maize replaced with sun-dried cassava peel meal in growing rabbit diet reduced cost per kilogramme weight gain.

Table 5: Economics of production of rabbits fed maize replaced with sun-dried rice straw meal diet

Parameters	Levels of maize replacement					SEM
	0%	10%	20%	30%	40%	
Total feed intake (kg)	5.54	5.64	5.63	5.52	5.94	0.08NS
Weekly feed consumed (g)	694.45	638.57	704.82	687.69	750.95	16.91NS
Daily feed consumed (g)	99.10	100.38	101.67	99.24	104.43	1.48NS
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Daily weight gain (kg)	13.48 ^a	15.01 ^{ab}	14.83 ^{ab}	14.89 ^{ab}	16.70 ^b	0.41
Feed gain ratio	7.96	7.04	7.05	7.64	6.32	0.26NS
Feed efficiency	0.14 ^a	0.14 ^a	0.27 ^b	0.15 ^{ab}	0.16 ^{ab}	0.02
Price/kg feed (₦)	209.52883	194.596	179.66167	164.72833	149.795	
Price/kg weight gain (₦)	1666.40 ^b	1089.90 ^a	1265.60 ^a	1258.40 ^a	946.00 ^a	64.33

^{ab} means within row carrying different superscript differ significantly.

Conclusion

It could be concluded that inclusion of sun-dried rice straw meal in rabbit diet did not exert deleterious effect on the animals. No significant difference was observed in feed intake and feed gain ratio. Sun-dried rice straw meal inclusion at 40% level of maize replacement significantly increased the weight gain of the tested animals. Tested diets did not influence the percentage weights of the carcass primal parts. Feed price per

kilogramme reduced with increased sun-dried rice straw diet and consequently decreased in price per kilogramme gain or cost of production.

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