

Performance Characteristics of Weaned Rabbit Fed Plantain Peel as Replacement for Maize

¹F.O. Ajasin, ²A.J. Omole, ²J.A. Oluokun, ²O.O. Obi and ¹A. Owosibo

¹Federal College of Animal Health and Production Technology, Institute of Agricultural Research and Training, Ibadan, Nigeria

²Obafemi Awolowo University, Ile Ife, Nigeria, Institute of Agricultural Research and Training, Moor Plantation, Ibadan, Nigeria

Abstract: A total of forty weaned rabbits of mean weight 515.2±4.6 g were used to determine the effects of partial or total replacement of maize as a source of energy but expensive with less expensive, sun dried ripe plantain peels (Agro-by-product) in the diet of weaned rabbits. Completely Randomized Design was used for the research. The feeding trial had five treatments, T₁, T₂, T₃, T₄ and T₅ in which maize fraction of the diets was replaced at 0, 25, 50, 75 and 100%, respectively. The parameters taken were weight gain, feed intake. Record on mortality was taken as it occurred in the course of the study. Feed conversion ratio, total feed cost and cost per weight gain were calculated. The trial lasted for twelve weeks. Significant differences were observed in the mean weekly weight gain of the rabbits with control diet T₁ having the highest weight gain but relatively similar to that of T₂ and T₃ (p>0.05). Total feed cost reduced as the level of the plantain peel increased while the lowest cost/weight gain was observed in T₄. The inclusion of plantain peel in all the diets has no detrimental effect on the animals in all the treatments. It is recommended that the study should be repeated for longer period using pregnant or lactating does and other species of animal such as broilers and pigs, etc., Based on the present results plantain peel should be included as one of the alternative feed and rabbit farmers should be encouraged to incorporate plantain peel up to 75% as substitute for maize in the diet of rabbit so as to reduce the total feed cost which constitute above 60% of production cost.

Key words: Weaned rabbit • plantain peel • maize • feed utilization • farmer • Nigeria

INTRODUCTION

The high cost of feed coupled with keen competition between man and animal, for grains like maize, sorghum, etc., have been the most important factor militating against increased commercial livestock production in Nigeria [1]. Results on previous investigations on the use of alternative feed stuffs such as maize offal, cassava peel and biscuit waste to replace maize in broilers and layers. etc., have been reported [2-5].

Plantain serves as a staple food in Africa and it is a good source of income to farmers. Fresh plantain peel is usually given to livestock especially the ruminant as a source of energy. Plantain peel is the by-product after the pulp has been removed and it is readily available at restaurants, among plantain roasters and those that use plantain for flour, porridge, juice and chips etc., Plantain is rich in minerals like potassium and phosphorus. The protein content of the peel ranges between 8-11% [3]. Present reserach was designed to evaluate the effect of partial or total replacement of maize with plantain peel on performance characteristics and costs advantage of weaned rabbits.

MATERIALS AND METHODS

The experiment was carried out at the rabbitry unit of the Institute of Agricultural Research and Training (I.A.R. & T),

Ibadan, located on longitude 03°51'E, latitude 07°23'N and altitude 650", lies in the humid zone of South western Nigeria. A total of forty weaned rabbits of about seven weeks of age with mean weight of 515.2±4.6 g were used for the trial, which lasted 12 weeks in a Completely Randomized Design. Ripe plantain peel (*Musa paradisiaca*) was collected from the people frying or roasted plantain at Apata in iddo local government of Oyo state, Nigeria. The collected riped plantain peel was sun dried and incorporated at 0 (T₁), 25 (T₂), 50 (T₃), 75 (T₄) and 100 (T₅) to replace maize fraction of the weaned rabbits' diets. Each diet was formulated to contain about 17% crude protein and energy of 2600 Kcal ME/kg. The rabbits were fed *ad libitum*. Feed intake was calculated by deducting the left over feed from a known quantity of feed given on a daily basis. Bodyweight gain was measured weekly with the use of weighing balance. Coccidiostat (Coccifor) was given to the rabbits, when coccidiosis was suspected at the third week of the trial. Record on mortality was also taken. Feed conversion ratio was calculated by dividing the feed intake by weight gain. Cost differential was calculated by deducting cost/kg weight gain of test diet from cost/kg weight gain of control diet while relative cost advantage was cost differential divided by the cost/kg weight gain of control diet in percentage [6].

For the digestibility trial, three rabbits from each treatment were randomly selected, the rabbit were housed individually.

Table 1: Gross composition of the experimental diets (%)

Ingredients	N/kg	T ₁	T ₂	T ₃	T ₄	T ₅
Maize	42.00	36.00	27.00	18.00	9.00	0.00
Plantain peel	5.72	0.00	9.00	18.00	27.00	36.00
Maize bran	21.00	11.00	11.00	11.00	11.00	11.00
Wheat bran	12.00	15.50	15.50	15.50	15.50	15.50
Palm kernel cake	7.50	18.50	18.50	18.50	18.50	18.50
Soybean meal	40.00	3.30	3.30	3.30	3.30	3.30
Fish meal	85.00	1.00	1.00	1.00	1.00	1.00
Bone meal	30.00	2.45	2.45	2.45	2.45	2.45
Oyster shell	7.00	3.75	3.75	3.75	3.75	3.75
Salt	20.00	0.25	0.25	0.25	0.25	0.25
Grower premix	26.00	0.25	0.25	0.25	0.25	0.25
Groundnut cake	39.00	8.00	8.00	8.00	8.00	8.00
Calculated chemical composition						
Crude protein		17.15	17.17	17.20	17.28	17.43
Energy Kcal ME/kg		2611.40	2591.20	2556.10	2530.10	2503.40

Table 2: Chemical composition of dry plantain peels and Maize (% Dry matter basis)

(%)	Plantain peel	Maize
Dry matter	92.42	93.45
Crude protein	11.03	9.97
Crude fibre	5.98	2.65
Ash	14.65	6.89
Ether extract	6.29	4.15
Nitrogen free extract	62.05	76.34

Table 3: Chemical composition of the experimental diets (g/100 g Dry matter)

	T ₁	T ₂	T ₃	T ₄	T ₅
Dry matter	92.50	91.15	91.01	92.15	92.03
Ash	6.80	7.10	7.56	7.98	8.11
Crude protein	16.25	16.23	16.43	16.48	16.51
Crude fibre	8.78	9.45	10.98	11.19	12.01
Ether extract	4.84	4.88	4.93	4.99	5.12
Nitrogen free extract	63.33	62.34	60.01	59.36	58.82

They were fed with the same diet fed during the feeding trial. Faeces were collected on a daily basis, oven dried at 105°C for 24 h and later stored in the refrigerator for proximate composition. Record on daily feed intake was also taken. The

digestibility trial lasted for 7 days. Proximate composition of the feed and faeces were carried out according to the method of AOAC [7]. All data were subjected to analysis of variance using SAS [8].

RESULTS AND DISCUSSION

The diets were isonitrogenous, isocaloric and the price of dry plantain peel was relatively low when compared to that of maize (Table 1). The proximate composition of ripe dried plantain peel and maize showed that their crude protein were relatively the same as shown in Table 2. The crude protein reported for plantain peel was in agreement with the observation of Tewe [3]. The ash content of ripe dried plantain peel was higher than that of maize though plantain peel had higher fibre content.

As shown in Table 3, the determined crude protein of the diets were relatively the same and fell within the recommended crude protein requirement of the rabbit [9]. The mean weekly feed intake was relatively the same in T₁, T₂ and T₃ (p>0.05), while the lowest feed intake was recorded in T₅ (100% plantain peel). The differences in feed intake could be attributed to taste and fiber content of the feed, as animals tend to eat less of fibrous diet [9].

Significant differences were observed in the mean weekly weight gain of the rabbits with control diet T₁ having the highest weight gain but significant similar to that of T₂ and T₃ as shown in Table 4. The lowest weight gain recorded at 100% plantain peel (T₅) could be as a result of lowest feed intake and lowest dry matter digestibility. The differences in the weight gain could also be due to the quality of the protein content of plantain peel and maize in terms of essential amino acids. The mean weight gain recorded in T₁, T₂, T₃ and T₄ compared favourably with the reports of Agunbiade *et al.* [5] and Schiere [10]

Table 4: Summary of performance characteristics of weaned rabbits fed experimental diets

Parameters	T ₁	T ₂	T ₃	T ₄	T ₅	± SEM
Mean weekly feed intake (g)	326.97 ^a	323.86 ^a	320.61 ^{ab}	295.97 ^b	269.15 ^c	15.31
Mean initial weight (g)	513.40 ^a	518.50 ^a	511.23 ^a	521.81 ^a	518.42 ^a	8.53
Mean final weight (g)	2539.72 ^a	2534.26 ^a	2522.43 ^a	2446.37 ^b	1773.38 ^c	41.84
Mean weekly weight gain (g)	168.86 ^a	167.98 ^a	167.60 ^{ab}	160.38 ^b	104.58 ^c	9.58
Feed conversion ratio	1.94 ^b	1.93 ^b	1.91 ^b	1.85 ^b	2.57 ^a	0.18
Mortality/rabbit	1.00	1.00	0.00	0.00	0.00	
Dry matter digestibility (%)	83.35 ^a	83.15 ^a	83.01 ^a	79.4 ^b	74.14 ^c	3.45
Crude fibre digestibility (%)	73.41 ^a	72.38 ^a	72.01 ^a	68.93 ^{ab}	65.31 ^b	4.60

Table 5: Summary of cost analysis of the weaned rabbits fed experimental diets

	T ₁	T ₂	T ₃	T ₄	T ₅	± SEM
Cost/kg (N)	27.67 ^a	24.40 ^b	21.14 ^c	17.87 ^d	14.64 ^e	2.56
Mean total feed intake (kg/12 wks)	3.92 ^a	3.89 ^a	3.85 ^{ab}	3.55 ^b	3.23 ^c	0.21
Mean total feed cost (N/kg)	108.47 ^a	94.92 ^b	81.39 ^c	64.44 ^d	47.28 ^e	8.30
Mean total weight gain (kg)	2.03 ^a	2.02 ^a	2.01 ^a	1.93 ^b	1.25 ^c	0.79
Cost/weight gain (N/kg)	53.57 ^a	46.99 ^b	40.49 ^c	33.39 ^c	37.82 ^d	3.51
Cost differential (N)	-	6.58	13.08	20.18	15.75	
Relative cost (%) advantage		12.28	24.42	37.67	29.40	

Means with different superscripts along the same row are significantly different (p<0.05)

and this could be due to proper management practices coupled with balanced nutrient composition of the diets.

As observed in Table 4 the efficiency of feed utilization was relatively the same in T₁, T₂, T₃ and T₄ (p>0.05), an indication that the rabbits could still convert the feed to edible meat effectively, when maize is substituted by 75% plantain peel in the diet.

The result on mortality showed that one rabbit each died in T₁ and T₂ as a result of coccidiosis and not because of the incorporation of plantain peel into the diets since no mortality was recorded in diets containing 50, 75 and 100% plantain peel replacement for maize. Again, there was no reported case of mortality after the administration of the coccidiostat (coccifor). Total feed cost reduced as the level of the plantain peel increased, while the lowest cost/weight gain was observed in T₄ (75% plantain peel replacement) as shown in Table 5. Moreover, T₄ had the highest cost differential and relative cost advantage compared to other treatments. The highest relative cost advantage observed in T₄ was as a result of lower cost of plantain peel compared to maize in the diets.

CONCLUSION

It could be concluded that dry plantain peels could be substituted for maize in weaned rabbit diet up to 75% without any adverse effects.

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