



## PERFORMANCE OF WEANER RABBITS FED VARYING LEVELS OF SWEET POTATO MEAL AS DIETARY ENERGY SOURCE

Ibrahim, Z., Bello, K. M, Egbo, M. L. and Garba, S. A.

Department of Animal Production, Abubakar Tafawa Balewa University,  
P.M.B, 0248, Bauchi, Nigeria.

Corresponding Author's Email: [ibrahimzubairu307@gmail.com](mailto:ibrahimzubairu307@gmail.com), GSM: 08034110837

### ABSTRACT

This experiment was conducted at the Teaching and Research farm, College of Agriculture, Bauchi to study the performance, carcass and cost benefit of using 0, 20, 40 and 60% replacement levels of sweet potato meal for maize as energy sources in weaner rabbits diet. A total of twenty four (24) Mongrel rabbit weighing between 921.66 – 938.17g were randomly allocated to the four dietary treatments in replicates of three containing two rabbits each in Completely Randomized Design (CRD). Each replicate was served 100g of the diet and 500ml of water daily. The result of the performance indicated that Daily Feed Intake (DFI) showed a significant treatment effect and ranged from 40.31 to 44.43g on diets 3 and 1 respectively. The daily weight gain was between 4.35g in (diet 1) and 3.68 in (diet 2) and non-significantly different. Feed conversion ratio which was also not significantly affected, was between 9.67 in (diet 3) and 11.33 in (diet 2). All the carcass and organs characteristics of rabbits, shows a non significant treatment effect except the caecal weight. Feed cost/kg gain was lowest on diet 3 (₦5167.74) and highest in diet 2 (₦6123.75), while diet 3 (₦412.74) had the highest cost saving. It can be concluded that sweet potato meal as dietary energy source can best replace maize at 40% level in the diets of weaner rabbits with compare the performance, carcass, organ characteristics and cost benefit. Diet containing 40% also had the highest cost benefit (₦4127.74) and therefore recommended for rabbit production.

**Keywords:** Mongrel Rabbit, Performance, Carcass, Dietary, Treatments, Cost

### INTRODUCTION

The state of nutrition in Nigerian population is grossly marked by inadequate intake of protein both in quality and quantity. Animal protein consumption is very essential for meeting protein requirement of man. The average daily protein intake is still far less than the 35g per adult per day recommended by FAO (2007). This shortage has given rise to high prices of animal protein. Therefore, efforts are being directed towards exploring all reasonable options to meet the recommended level at an affordable price (Ojebiyi *et al.*, 2008). In order to maximize food production and meet protein requirements in Nigeria, viable options need to be explored and evaluated (Owen *et al.*, 2008). Among such alternatives is the use of livestock species that are yet to play a major role in animal production in the country. Rabbit production is a veritable way of alleviating animal protein deficiency in Nigeria (Ajala and Balogun, 2004).

This problem has been the prime stimulants for the continuous search for alternative feedstuffs that can meet the nutritional requirements of micro-livestock, reduce the cost of feed and animal production (Oloredo *et al.*, 2002). Such a feedstuff should be one that has very low human food preference and of low industrial usage (Oloredo *et al.*, 2002).

Rabbits are unique animals. They serve as a flexible financial reserve for rural population and as well play other socio-cultural roles in the customs and traditions of many Nigerian Societies. The prolific nature of rabbits coupled with its short gestation period and generation interval, makes it the animal of choice for multiplication and a short way of increasing animal protein intake (Akinmutimi *et al.*, 2006).

Both forage and tuber have been used widely as an alternative feed for livestock in tropical countries. The roots have low protein, fat and fibre content, but high nitrogen-free extract, which thus indicates their potential value, mainly as an energy source. The vines have low carbohydrate content but are higher in fibre and protein, and their principal value is as a source of vitamins and protein. The



chemical composition of the leaves, stems and tubers varies depending on the time of harvesting as well as on genotypic differences. The leaves have superior contents of Dry matter (DM) and Crude Protein (CP) compared with the stems (An, 2003).

## MATERIALS AND METHODS

### Experimental Site

The experiment was conducted at the Teaching and Research Farm, College of Agriculture, Bauchi. The area is located within the Southern Guinea Savannah on latitude 10°18'37.2N and longitude 9°50'38.0E, characterized by two well-defined seasons; Rainy season (May – October) and dry season (November – April). The average annual rainfall of Bauchi is about 1009mm, highest relative humidity 94% (August) and the lowest 35% (February). Temperatures are between 13 – 17°C (December – February) and 36 – 37°C (March – April) (World Atlas, 2015).

### Experimental Diets

Four experimental diets designated as T1, T2, T3 and T4 were formulated. Diet 1 had maize as the sole energy source while diet 2 had 20 percent replacement level of sweet potato and diet 3 and 4 had 40 and 60% respectively. The percentage composition of the experimental diets are as shown in table 1.

**Table 1:** Composition of the Experimental Diets

Ingredient	Diets Replacement Level of SPM			
	T1 (0%)	T2 (20%)	T3 (40%)	T4 (60%)
Maize	38.0	30.41	22.81	15.20
Sweet Potato	0	7.60	15.20	22.81
Soybean	17.99	17.99	17.99	17.99
Fish meal	2.00	2.00	2.00	2.00
Maize Offal	20.00	20.00	20.00	20.00
G/haulms	18.00	18.00	18.00	18.00
Bone meal	3.00	3.00	3.00	3.00
Premix	0.25	0.25	0.25	0.25
Salt	0.125	0.125	0.125	0.125
Lysine	0.25	0.25	0.25	0.25
Methionine	0.125	0.125	0.125	0.125
<b>Total</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
<b>Calculated Analysis</b>				
Crude Protein (CP)	16.92	16.81	16.69	16.58
Metabolizable Energy (Kcal/Kg)	2711	2711	2711	2711
Crude Fiber (CF)	9.81	10.30	11.08	11.29

### Experimental Animals and Housing

A total of twenty (24) clinically healthy weaner rabbits (6-8 weeks old) were sourced from a reputable farm. The rabbits were housed in well-ventilated cages equipped with feeders and drinkers. Standard husbandry practices, including routine vaccination and deworming, were observed throughout the study.

### Data Collection

At the commencement of the study, initial weight of rabbits was taken using a 20kg scale. Thereafter body weight was measured at an interval of 7 days. Weight gain was determined by difference between two consecutive weighing. Daily feed intake was obtained from the difference between feed offered and the left-over collected the following morning. Feed conversion ratio (FCR) was calculated using the relationship; daily feed intake/daily weight gain.

Also all the organs such as liver, kidney, intestines, heart, lungs, and other parts such as legs, tails, pelts, heads were measured and calculated as percentages of live weight and used to calculate the dressing percentage using the relationship  $\frac{\text{Carcass weight}}{\text{Live weight}} \times 100$



### Data Analysis

Data collected were subjected to one-way Analysis of Variance (ANOVA) using SPSS version 25.0. Differences among treatment means were separated using Duncan's Multiple Range Test (Duncan, 1955) at a 5% level of significance ( $P < 0.05$ ).

## RESULTS AND DISCUSSION

### Performance of Rabbits Fed Sweet Potato Meal as Dietary Energy Source

Performance of weaner rabbits fed sweet potato meal as dietary energy source was presented in table 2. The parameters measured were; initial weight (921.66 to 938.17g), final weight (1348.66 to 1409.34g), total weight gain (206.17 to 247.00g), total feed intake (2.26 to 2.49kg), daily feed intake (40.31 to 44.43g), daily weight gain (3.68 to 4.35g), feed conversion ratio (9.67 to 11.33g) and feed efficiency (0.09 to 0.10). The result shows a non-significant ( $P > 0.05$ ) treatment effect on most of the performance parameter except the total and daily feed intake. The feed intakes show progression decline up to 50% replacement level, then rises again. The result obtained is in agreement with the finding of Ekwe *et al.* (2019) on the growth performance of growing rabbits fed different levels of composite boiled sweet potato.

The performance of rabbits fed on sweet potato as a dietary energy source at 20, 40 and 60 percent replacement levels for maize were as shown in table 2.

**Table 2:** Performance of Rabbits Fed Sweet Potato as Dietary Energy Sources

Parameter	Treatment				SEM	LS
	Replacement Level of Sweet Potato Meal					
	Diet 1 (0%)	Diet 2 (20%)	Diet 3 (40%)	Diet 4 (60%)		
Initial Weight (g)	922.34	938.17	921.66	932.34	0.72	NS
Final Weight (g)	1409.34	1350.66	1388.34	1348.66	0.90	NS
Total Weight Gain (g)	243.50	206.17	233.60	247.00	0.19	NS
Total Feed Intake (kg)	2.49 <sup>a</sup>	2.34 <sup>ab</sup>	2.26 <sup>b</sup>	2.31 <sup>ab</sup>	0.08	*
Daily Feed Intake (g)	44.43 <sup>a</sup>	41.68 <sup>ab</sup>	40.31 <sup>b</sup>	41.23 <sup>ab</sup>	0.07	*
Daily Weight Gain (g)	4.35	3.68	4.17	4.07	0.18	NS
Feed Conversion Ratio	10.21	11.33	9.67	10.13	0.60	NS
Feed Efficiency	0.10	0.09	0.10	0.10	0.48	NS

<sup>ab</sup> means in the same row with different superscripts differ significantly ( $P < 0.05$ ) SPM sweet potato meal, NS means Not Significant ( $P > 0.05$ ).

The carcass and organ characteristics of weaner rabbits fed sweet potato meal as dietary energy sources is presented in table 3. The parameters measured include live weight (704.67 to 890.00g), carcass weight (290.00 to 395.00g), dressing percentage (39.40 to 44.23%), pelt (4.53 to 6.10g), head (10.13 to 11.73g), legs (2.73 to 3.18g), tail (0.63 to 0.80g), heart (0.67 to 0.77g), liver (2.70 to 3.93g), lung (0.63 to 0.90g), kidney (0.80 to 0.97g), caecal weight (0.97 to 2.83g), large intestine weight (9.03 to 11.30g), small intestine weight (5.67 to 7.47g), large intestine length (4.97 to 6.08cm), small intestine length (17.80 to 21.87cm) and caecal length (3.70 to 4.53cm).

The result showed no significant ( $P > 0.05$ ) difference in all the carcass and organs parameters measured across the dietary treatments except for caecal weight which has significant ( $P < 0.05$ ) difference. The highest mean value of caecal weight was observed in diet 4 (2.83g), followed by diets 2 and 3 having 1.90 and 1.30g respectively.

The least was found in diet 1 (0.97g). This could be attributed to the levels of fibrous materials in the diets fed to the rabbits. This agrees with the finding of Ibitoye *et al.* (2020) who reported no significant ( $P > 0.05$ ) difference on the carcass and organs characteristics of experimental rabbits fed maize, sorghum and millet based diets. This result is in contrast with the finding of Akinmutimi and Osuagwu (2008) who reported significant ( $P < 0.05$ ) differences in all the carcass and organs parameters considered when the rabbits were fed graded levels of sweet potato meal in place of maize based diet.

**Table 3:** Carcass and Organs Characteristics of Weaner Rabbits Fed Varying Levels of Sweet Potato Meal as Dietary Energy Source

Parameter	Diets				SEM
	1(0%)	2 (20%)	3 (40%)	4 (60%)	
Live weight (g)	704.67	846.67	890.00	733.33	0.40 <sup>NS</sup>
Carcass weight (g)	311.67	373.33	395.00	290.00	0.42 <sup>NS</sup>
Dressing Percentage (%)	43.50	42.67	44.23	39.40	0.55 <sup>NS</sup>
Pelt (g)	6.10	4.53	5.83	5.90	0.27 <sup>NS</sup>
Head (g)	11.73	10.13	10.13	10.13	0.14 <sup>NS</sup>
Legs (g)	3.10	2.90	2.73	3.18	0.37 <sup>NS</sup>
Tail	0.73	0.77	0.67	0.67	0.41 <sup>NS</sup>
Heart (%)	0.73	0.77	0.67	0.67	0.57 <sup>NS</sup>
Liver (%)	3.33	3.93	2.70	2.80	0.21 <sup>NS</sup>
Lung (%)	0.73	0.90	0.63	0.83	0.30 <sup>NS</sup>
Kidney (%)	0.97	0.90	0.83	0.80	0.42 <sup>NS</sup>
Caecal weight (g)	0.97 <sup>b</sup>	1.90 <sup>ab</sup>	1.30 <sup>ab</sup>	2.83 <sup>a</sup>	0.52 <sup>*</sup>
Large intestine weight (g)	10.10	10.27	9.03	11.30	0.33 <sup>NS</sup>
Small intestine weight (g)	5.67	7.33	5.83	7.47	0.90 <sup>NS</sup>
Large intestine length (cm)	5.97	6.08	4.97	5.80	0.36 <sup>NS</sup>
Small intestine length (cm)	21.57	20.87	17.80	21.87	0.42 <sup>NS</sup>
Caecal length (cm)	3.70	4.37	4.37	4.53	0.56 <sup>NS</sup>

NS: Non Significant

The cost benefit of weaner rabbits fed sweet potato meal as dietary energy source is presented in table 4. The result obtained include; feed cost (₦528.33/kg to ₦546.57/kg), total feed cost (₦1207.77 to ₦1360.96), feed cost/kg gain (₦5167.74 to ₦6123.75) and cost saving (-₦543.27 to ₦412.74). Feed cost (₦/kg) decreases as the level of sweet potato meal in the diet increases. Diet containing 60% sweet potato meal had the lowest feed cost (₦/kg) while the highest was observed in diet 1 (control). The total feed cost (₦) decreases continuously up to 40% and then decreased at 60%. The lowest mean value was observed in diet 3 (40%) while the highest was in diet 1 (control). The highest value of feed cost/kg gain was obtained in diet 2 (₦6123.75) while the lowest was found in diet 3 (₦5167.74). Diet 3 also had the highest cost saving (₦412.74), followed by diet 4 (₦228.50). This is attributed to the cost price of sweet potato meal which is lower compared to maize as an energy source. This finding is in agreement with Akinmutimi and Osuagwu (2008) on the response of weaner rabbits fed graded levels of sweet potato meal in place of maize-based diet.

**Table 4:** Cost Benefit Analysis of Rabbits Fed Base on Sweet Potato Meal as Dietary Energy Source

Parameters	Diet 1	Diet 2	Diet 3	Diet 4
Total Feed Intake (kg)	2.49	2.34	2.26	2.31
Feed Cost (₦/kg)	546.57	540.49	534.41	528.33
Total Feed Cost (₦)	1360.96	1264.75	1207.77	1220.44
Feed Conversion Ratio	10.21	11.33	9.67	10.13
Total Weight Gain (kg)	2.43	2.06	2.36	2.46
Feed Cost/kg gain (₦)	5580.48	6123.75	5167.74	5351.98
Cost Saving (₦)	-	-543.27	412.74	228.50

## CONCLUSION AND RECOMMENDATIONS

From this study, it can be concluded that sweet potato meal as dietary energy source can best replace maize at 40% level in the diets of weaner rabbits with compare the performance, carcass, organ characteristics and cost benefit. Diet containing 40% also had the highest cost benefit (₦4127.74) and therefore recommended for rabbit production.



## REFERENCES

- Abubakar, A., Doma, U.D., Egbo, M.L. and Muhammed A.S. (2023). Performance, digestibility and cost benefit of weaner rabbits fed dietary levels of maize milking residue. *Nigerian Journal of Agriculture and Agricultural Technology*, **3**(1): 131-135.
- Ajala, A.A., & Balogun E. R. (2004) Intake and Digestibility of potato peelyeast slurg diet by West African Dwarf Goat. Unpublished undergraduate project. Micheal okpara university of Agriculture Umudike. P. 22-23.
- Akinmutimi, A.H. (2004), Evaluation of sword bean (*Canavalia gladiata*) as an alternative feed resource for broiler chickens. PhD Thesis Micheal Okpara University of Agriculture Umudike, pp: 10-26.
- Akinmutimi, A.H. (2006), Determination of Optimal Dietary Level of Inclusion of Cooked Sword Bean Meal in Broiler Starter Diet, Micheal Okpara University of Agriculture Umudike. Pp: 54 – 57.
- Akinmutimi, A.H. and Osuagwu, C.C. (2008). Response of weaner Rabbits fed graded levels of sweet potato meal in place of maize based diet. *Pakistan Journal of Nutrition*, **7**(5): 705 – 709.
- Amaza, I.B., Kwari, I.D., and Yashim, S.M. (2020), Haematological and serum biochemical indices of growing rabbits fed graded levels of yam peel meal as replacement for maize. *Nigerian Journal of Animal Production*, **47**(1): 1-7.
- An L.V., Frankow-Lindberg B. E and Lindberg J. E (2003), Effect of harvesting interval and defoliation on yield and chemical composition of leaves, stems and tubers of sweet potato (*Ipomoea batatas* (L) Lam.) cultivars. *Field Crops Research*, **82**(1): 49-58.
- Carabano, R., Nicodemus, N., Garcia, J., and de Blas, J.C. (2009), Effect of inclusion of sunflower hulls in the diet on performance, disaccharides activity in the small intestine and caecal traits of growing rabbits. *Animal Science Penicuik*, **75**: 237 - 243.
- Chamorro, K.A and Maurice, D.V. (2007), Research Review on Response of Early Weaned Rabbits to Source and Level of Dietary fibre. *Journal of Applied. Rabbit Research*, **6**(2): 64-67.
- Duncan, D. B. (1955), Multiple Range and F test. *Biometrics*, **11**: 1 – 42
- Ekine, O.A., George, O.S., & Oruwari, B.M. (2018), Hematological profile of weaner rabbits fed graded levels of sweet potato. *Nigerian Journal of Animal Science*, **20**(2): 123-130.
- Ekwe, C.C., Nwabueze, I.N., and Odoemelum, V.U. (2019). Effects of different levels of composite boiled sweet potato meal on performance and nutrient digestibility of growing rabbits. *Nigerian Journal of Animal Science*, **21**(3): 370-376.
- F.A.O (2007), Compositional analysis methods. In: *Food and Agricultural Organisation of the United Nations* (Ed.) Manuals of food quality control, foodanalysis. General techniques, additive, contaminants and composition. Rome Food and Agriculture Organization, Pp:203-232.
- Gomez-Conde, M.S. Perez de Rozas, A., Badiola, I., Perez-Alba, L, de Blas. C. Carabano, R. and Garcia, J. I. (2009), Effect of Neutral detergent soluble fiber on digestion, intestinal microbiota and Performance in twenty-five-day old weaned rabbits. *Livestock science*, **125**: 192-198.
- Hassan, M. R., Sultana, S., Sultana, N., & Islam, M. N. (2012). Growth and reproductive performance of rabbit under semi-scavenging system in Bangladesh. *Livestock Research for Rural Development*, **24**(1): 345-352. <http://www.lrrd.org/lrrd24/1/hass24012.htm>
- Ibitoye, E.B., Jimoh, A.A., Hussaini, A. and Sami, B.S. (2020). Comparative Evaluation of three different energy sources on performance, carcass characteristic hematology and serumbiochemistry of rabbits. *Nigerian Journal of Animal Science*. **22**(3): 139-146.
- Mohammed, A., Ibrahim, M., and Musa, A. (2025), Effect of graded levels of sweet potato leaves on haematological and serum biochemical parameters of rabbits. *Journal of Veterinary Health Science*, **6**(1): 1-6.
- Ojebiyi O.O., Farinu, I.H. and Olumuyiwa, R.M. (2008). Nutrition and rabbits prolificacy. *Journal of Reproductive Fertility*, **33**: 169-183.
- Oloredo, B.R., Sadu, Y., Abdurahim, I., Ajagbonna O. P. and Akinloye, O.A. (2002) Blood chemistry and histopathology of cockerel fed cassava flour. *Proceeding of Annual Conference of Animal Science Association of Nigeria*, pp: 38-40.



***Nigerian Journal of Agriculture and Agricultural Technology (NJAAT)***  
**Volume 5, Number 4B, December, 2025**  
**ISSN (Print): 2811-1885; ISSN (Online): 2811-1893**



- Owen, O. J., Amakiri, A. O., and Ngodigha, E. M. (2008) Alternative feed resources for livestock production in Nigeria: A review. *Research Journal of Animal Sciences*, **2**(2): 50–55.
- World Atlas (2015): Where is Bauchi. Retrieved 14 February, 2023 from <https://www.worldatlas.com/af/ng/ba/where-is-bauchi>.
- Yusuf, Y., Bello, K.M. and Muhammad, A.S. (2024). Performance and cost benefit of weaner rabbits fed four different dietary energy sources. *Nigerian Journal of Agriculture and Agricultural Technology*, **4**(2): 214 – 218.