



## RESPONSE OF WEANER RABBITS TO DIETARY LEVELS OF MAIZE MILLING WASTE

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### ABSTRACT

The study was conducted to evaluate the growth performance, carcass characteristics, nutrient digestibility and economic benefit of weaner rabbits fed dietary levels of maize milling waste (MMW). Four diets were formulated in which Maize milling waste (MMW) replaced maize at 0, 30, 35 and 40% coded as diets A, B, C, and D respectively. Thirty two (32) weaner rabbits were randomly allotted into four diets with eight rabbits per treatment replicated four times. Feed and water were supplied *ad-libitum* and the experiment lasted for fifty six days. The results showed that most of the growth performance parameters were not affected ( $P>0.05$ ) except total feed intake and daily feed intake with highest values on diet D (Put the value here). All the carcass characteristics measured were not affected by the dietary treatments. Similarly, most of the nutrient digestibility parameters were not affected except ether extract digestibility with the highest ( $P<0.05$ ) values observed on MMW based diets and the lowest (68.39%) on the control (diet A). The feed cost per kg body gain was highest on diet A (₦1504.10) with positive cost saving on the MMW diets. It can be concluded that MMW can replace Maize at 40% level in the diet of weaner rabbits without compromising growth performance carcass yield, nutrient digestibility and reduction in feed cost.

**Keywords:** Rabbits, Performance, Digestibility, Carcass, Milling, Waste.

### INTRODUCTION

Maize is a major energy feed ingredient, like other cereals, it is in short supply, leading to very high prices at certain periods of the year (Gboshe *et al.*, 2019). The potential of rabbit meat as a quality or nutritious food stemmed from its higher protein content, lower fat, lower sodium and cholesterol contents compared with other meat sources such as beef, pork, mutton, chevon and chicken Ajayi *et al.* (2017). Rabbit has been identified as cheap source of high-quality protein that can substantially improve the level of animal protein consumption in developing countries (Wafar *et al.*, 2018). Rabbits are efficient converters of fibrous feed materials and agro industrial by-products to meat than do other livestock species. However, in order to achieve this, feeding and nutrition need to be adequate. Conventionally, maize has been the ingredient of choice as energy source in non-ruminant and pseudo-ruminant diets. Now that cost and availability of maize have become an issue, the need to explore the use of alternative energy ingredients that are cheaper and readily available becomes necessary. A number of studies have shown that maize milling waste can partially or completely replace maize in poultry diets (Yusuf *et al.*, 2020 and Doma, 2020). However, available literature on the use of same in rabbits feeding is limited. Against this backdrop, the current study was designed to evaluate the growth performance, digestibility and cost benefit of weaner rabbits fed dietary levels of maize milling residue as energy source.

### MATERIALS AND METHODS

#### Study Area

The experiment was conducted at the Teaching and Research Farm, Abubakar. Tafawa Balewa University, ATBU, Bauchi. The area is located within the Southern Guinea Savannah on latitude 10°18'37.2 N and longitude 9°50'38.0 E, characterized by two well-defined seasons; Rainy season (May - October) and dry season (November - April). The average annual rainfall of Bauchi is about 1009 mm, 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 and Management of research rabbits

Four diets were formulated in which maize milling waste was included to replace maize at 0, 30, 35 and 40% levels coded as diets A, B, C and D respectively as presented in Table 1. Thirty-two (32) male and female weaner rabbits were randomly allotted into four dietary treatments, each replicated four times with two rabbits per replicate and eight per treatment in a completely randomized design. At the 8<sup>th</sup> week, faecal samples were collected for the determination of nutrient digestibility. Faeces were weighed and dried for 24 hrs and stored in an air tight polythene bag for chemical analysis.

**Table 1:** Ingredients and Percent Composition of Experimental Diets Fed to Weaner Rabbits

Ingredients	A (0%)	B (30%)	C (35%)	D (40%)
Maize	45.17	31.62	29.36	27.10
Soya bean	11.33	11.33	11.33	11.33
Maize milling waste	0.00	13.55	15.81	18.07
Wheat offal	25.00	25.00	25.00	25.00
G/nut haulms	12.00	12.00	12.00	12.00
Rice offal	3.00	3.00	3.00	3.00
Bone meal	2.50	2.50	2.50	2.50
Salt	0.50	0.50	0.50	0.50
Premix	0.50	0.50	0.50	0.50
<b>Total</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
Calculated Analysis (%)				
Crude protein	16.00	16.00	16.00	16.00
ME (kcal/kg)	2645.15	2624.22	2650.05	2660.16
Crude fibre	10.00	10.06	10.08	10.50
Ether extract	3.76	3.65	3.80	3.77

### Data Collection

Data was collected for initial weight, final weight, daily feed intake (DFI) daily weight gain (DWG), feed conversion ratio (FCR) and mortality. The daily feed intake was obtained by difference between quantity of feed offered and the left-over retrieved the following morning. Weight gain was determined by difference between two consecutive weighing carried out on weekly basis while feed conversion ratio was computed using the relationship between daily feed intake and daily weight gain

### Chemical and Data Analysis

Proximate composition of diets and faecal samples were determined according to standard AOAC (2000) methods. Digestibility coefficients were calculated. Data collected were subjected to analysis of variance using SAS software (SAS, 2008) while significant means were separated with Duncan multiple range test at 5% level of significance.

## RESULTS AND DISCUSSION

### Performance of Weaner Rabbits Fed Maize Milling Waste Diets

The performance of weaner rabbits fed maize milling waste (MMW) is presented in Table 2. The initial weight (869.50 – 960.00g), final weight (1472.50 – 1541.25g) and total weight gain (581.25 – 637.50g) were not affected by the dietary levels of maize milling waste. These observations



were in conformity with the report of Abubakar *et al.* (2023), who found no significant difference in performance parameters of weaner rabbits fed maize milling residue based diets.

The total feed intake (3667.50g) and daily feed intake (74.85g) obtained on diet A (control) were significantly ( $P<0.05$ ) higher than those values observed on MMW based diets but the daily weight gain (11.87 – 13.01g) and feed conversion ratio (5.47 – 6.29) were not affected by the dietary levels of MMW. The values found in this study were similar to the findings of Bawa *et al.* (2017) and Abubakar *et al.* (2023). Also, the performance results were in agreement with the reports of Mohammed *et al.* (2020) in weaner rabbits.

**Table 2:** Performance of Weaner Rabbits Fed Maize Milling Waste Based Diets

Parameters	A (0%)	B (30%)	C (35%)	D (40%)	SEM
Initial weight (g)	878.75	869.50	890.00	960.00	176.15 <sup>NS</sup>
Final weight (g)	1484.25	1472.50	1520.00	1541.25	93.96 <sup>NS</sup>
Total weight gain (g)	605.50	603.00	637.50	581.25	99.80 <sup>NS</sup>
Total feed intake (g)	3667.50 <sup>a</sup>	3450.00 <sup>b</sup>	3365.00 <sup>b</sup>	3362.50 <sup>b</sup>	152.00*
Daily feed intake (g)	74.85 <sup>a</sup>	70.41 <sup>b</sup>	68.68 <sup>b</sup>	68.63 <sup>b</sup>	5.85*
Daily weight gain (g)	12.36	12.68	13.01	11.87	2.06 <sup>NS</sup>
Feed conversion ratio	6.29	5.65	5.47	5.89	1.16 <sup>NS</sup>
Mortality (Number)	0	0	1	1	-

ab=means in the same row with different -superscripts differs ( $*=P<0.05$ ), SEM= Standard error of Mean, NS= not significant.

**Nutrient Digestibility of Weaner Rabbits Fed Maize Milling Waste Diets**

The nutrient digestibility of weaner rabbits fed MMW diets is shown in Table 3. The result of nutrient digestibility revealed that dry matter (85.72 – 87.92%), crude protein (78.18 – 82.41%) crude fibre (52.05 – 54.60%) and ash (78.11 – 80.72%) were not affected by the dietary levels of maize milling waste except ether extract digestibility with the highest ( $P<0.05$ ) value on diet B (78.67%) which was similar to the values of 76.66 and 76.18% observed on diets D and C respectively. The lowest value of 68.39% was obtained on diet A (control). The result obtained in this study were comparable to the findings of Bamgbose *et al.* (2002), Mohammed *et al.* (2020) and Abubakar *et al.* (2023) in weaner rabbits fed agro-industrial by-products.

**Table 3:** Nutrient Digestibility of Weaner Rabbits Fed Maize Waste Based diets

Parameters	A (0%)	B (30%)	C (35%)	D (40%)	SEM
Dry matter	87.46	86.86	87.92	85.72	1.25 <sup>NS</sup>
Crude protein	82.41	78.18	79.50	78.36	5.05 <sup>NS</sup>
Crude fibre	52.05	54.60	53.87	53.69	1.24 <sup>NS</sup>
Ether extract	68.39 <sup>b</sup>	78.67 <sup>a</sup>	76.18 <sup>a</sup>	76.66 <sup>a</sup>	1.05*
Ash	80.72	78.72	78.11	79.31	1.39 <sup>NS</sup>

ab=means in the same row with different -superscripts differs ( $*=P<0.05$ ), SEM= Standard error of Mean, NS= not significant

### Carcass Characteristics of Rabbits Fed Maize Milling Waste Diets

The carcass characteristics of rabbits fed dietary levels of maize milling waste is presented in Table 4. The result of carcass characteristics measured which include liveweight, carcass weight, dressing percentage, the weights of head, feet, liver stomach, large and small intestine, pelt, caecum, heart, kidney and lungs did not differ among the dietary treatments. The dressing percentage (50.18 – 53.48%) obtained in this study were slightly lower than the values of 54.05 – 61.21% reported by Gboshe *et al.* (2019) in rabbits fed maize cob meal (0 – 20% levels) based diets. This observation could be attributed to the method of processing rabbit meat (skinning, scalding and roasting). The weight of organs such as heart, liver, lungs, kidney and caecum were comparable to the findings of Gboshe *et al.* (2019).

**Table 4:** Carcass Characteristics of Weaner Rabbits Fed Maize Milling Waste Based Diets

Parameters	A (0%)	B (30%)	C (35%)	D (40%)	SEM
Live weight (g)	1480.50	1475.00	1435.00	1515.00	55.71 <sup>NS</sup>
Carcass (g)	765.00	755.00	767.50	760.00	30.47 <sup>NS</sup>
Dressing (%)	51.39	51.20	53.48	50.18	1.05 <sup>NS</sup>
Head (%)	7.50	6.91	7.17	7.26	0.49 <sup>NS</sup>
Feet (%)	1.38	1.44	1.23	1.30	0.28 <sup>NS</sup>
Liver (%)	2.89	2.86	2.77	2.73	0.11 <sup>NS</sup>
Stomach (%)	5.37	5.38	5.67	5.82	0.29 <sup>NS</sup>
Large intestine (%)	3.60	3.65	3.63	3.80	0.47 <sup>NS</sup>
Small intestine (%)	4.03	3.70	4.27	3.41	0.36 <sup>NS</sup>
Pelt (%)	4.58	3.74	4.40	4.55	0.74 <sup>NS</sup>
Caecum (%)	1.64	1.58	1.55	1.48	0.60 <sup>NS</sup>
Heart (%)	0.26	0.23	0.32	0.41	0.16 <sup>NS</sup>
Kidney (%)	0.54	0.52	0.47	0.53	0.12 <sup>NS</sup>
Lungs (%)	0.26	0.34	0.42	0.44	0.20 <sup>NS</sup>

SEM= Standard error of Mean, NS= not significant.

### Cost Benefits of Feeding Maize Milling Waste Diets to Rabbits

The financial benefit of feeding MMW diet to rabbit is shown in Table 5. The cost benefit of feeding dietary levels of maize milling waste (MMW) to weaner rabbits showed that feed cost per kg decreased with increasing levels of MMW. The total feed cost followed the same trend with the highest value of ₦917.50 on diet A while the lowest value (₦631.68) was obtained on diet D. The feed cost per kilogram body gain observed were lower on the MMW diets (diets B, C and D) which was reflected in the positive cost saving. The percent cost saving were 15.89, 29.98 and 27.59% on diets B, C and D respectively. The results obtained in this study were in conformity with the reports of Idowu *et al.* (2022) and Abubakar *et al.* (2023). Mohammed *et al.* (2020) reported similar, findings in weaner rabbits.



**Table 5:** Cost Benefit Analysis of Feeding Varying Levels of Maize Milling Residue to Weaner Rabbits

Parameters	A (0%)	B (30%)	C (35%)	D (40%)
Total feed intake (kg)	3.67	3.45	3.37	3.36
Feed cost/kg (₦)	250	220	200	188
Total Feed cost (₦)	917.50	759	674	631.68
Total weight gain (₦)	0.61	0.60	0.64	0.58
Feed cost/kg gain (₦)	1504.10	1265	1053.13	1089.10
Cost saving (₦)	-	239.10	450.97	415.00
Cost saving (%)	-	15.89	29.98	27.59

### CONCLUSION AND RECOMMENDATION

The results revealed that maize milling waste can replace maize at 40% level in the diets of weaner rabbits without compromising growth performance and carcass yield as well as concomitant reduction in feed cost. It is recommended that maize milling waste can economically replace conventional maize in rabbit diets.

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