



## **GROWTH PERFORMANCE AND CARCASS YIELD OF NEW ZEALAND WHITE AND DUTCH RABBITS FED TWO ENERGY SOURCES AS MEANS OF EMPLOYMENT FOR GRADUATE ANIMAL SCIENTISTS**

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### **ABSTRACT**

An experiment was conducted to evaluate the response of weaned mongrel breeds of rabbits to two dietary energy sources. Four diets were formulated in which two breeds and two energy sources were considered in a 2x2 factorial arrangement in a completely randomized design. Fourty weaned rabbits were allotted in to the four diets in five replicates with two rabbits each. Feed and water were given *adlibitum* and the feeding trial lasted for six weeks. At the end of the experiment, sixteen rabbits were slaughtered for carcass analysis. The main effects revealed that New Zealand White rabbits had higher ( $P<0.01$ ) final weight (2.16 kg) than Dutch (1.83 kg). Also, rabbits fed white sorghum diets have significantly ( $P<0.01$ ) higher total and daily weight gains as well as better feed conversion ratio than those fed diets containing maize. Result of the interactions showed that total and daily feed intake were significantly ( $P<0.01$ ) higher in diets 2 and 3 while feed conversion ratio was better ( $P<0.001$ ) in diets 1 and 4. The result further revealed that, breeds and energy had no significant ( $P<0.001$ ) influence on carcass yield of rabbits. The lowest feed cost per kg gain was obtained in Dutch rabbits fed white sorghum-based diet with a value of ₦ 2,402.28. Based on the result of this study, it was concluded that both New Zealand White and Dutch rabbits performed optimally on the two energy sources without negative effects on growth rate and carcass yield. However, sorghum containing diet was more economical.

**Keywords:** Rabbit, diets, performance, carcass, hematology

### **INTRODUCTION**

The introducing, motivating and encouraging graduate animal scientists and other Nigerian youth to the business of rabbit multiplication and fattening will surely contribute greatly in solving the problems of unemployment, poverty and that of animal protein malnutrition. Rabbit is one of the most prolific domestic animals. It's potential as a meat producing animal in the tropics is very high due to its characteristics small body size, short generation interval, rapid growth rate and ability to utilize forages, agricultural by-products and kitchen waste (Nuhu *et al.*, 2020). Igila *et al.* (2020) reported that rabbits have the ability to convert kitchen waste, such as yam peel to high quality animal protein. Rabbit business requires lower initial capital compared to other livestock enterprises. Rabbit meat is lean and is rich in protein with almost all the essential amino acids, low in sodium and cholesterol, which makes it the most heart friendly animal product. Unemployment, poverty and malnutrition especially with regards to animal protein is a worldwide problem that affects human and capital development. The problem is more pronounced in under developed and to some extent in developing countries like Nigeria. In Nigeria, the demand for protein of animal origin has by far outstripped its supply due to the rapid population growth. FAO (2021) reported that approximately 12.1 million people are expected to be in food insecurity crises or



worse by the end of 2021. Malnutrition is a global problem that affects national development. Low animal protein intake in underdeveloped and developing countries like Nigeria with low per capita income, needs to be addressed. Nigeria was ranked 137<sup>th</sup> out of 140 countries in term of infant and maternal mortality, this can be linked to the high poverty and malnutrition rates among the populace. It is globally the most important risk factor for illness and death, with hundreds of millions of pregnant women and young children particularly affected. Risikat (2021) claimed that 45% of the population, translating to almost half of the 206 million Nigerians do not consume protein daily as against recommended consumption. Unemployment among Nigerians is seriously alarming and on the other hand the demand for food of animal origin (flesh, egg and milk) has been on the increase worldwide, this is attributable to increase in population and changing life styles. Rabbit has a short gestation and maturity periods and require low capital to startup compared to other livestock enterprises. Consumers of today pay great attention to the health aspect of food. Rabbit meat is all white and poses all the qualities the consumers are looking for. Rabbit meat is generally acceptable, and has no religious, traditional or social taboos. Rabbit meat is one of the most nutritious meats available, it is highest in protein, lowest in fat, calories and cholesterol per pound (Salisu and Abdulrahman, 2020). Other by-products from the slaughter of rabbits include skin, fur and various other organs used for different purposes. The role played by rabbits as laboratory animals cannot be ignored. Rabbit manure can be fed to other livestock directly or in combination with other ingredients. The high concentration of the urine makes it a good source of organic fertilizer and pesticide for vegetable production.

## **MATERIALS AND METHODS**

### **Experimental Site**

The research was conducted at the monogastric Animals Teaching and Research Farm of Animal Production Department, Abubakar Tafawa Balewa University, Bauchi, Bauchi State, Nigeria. The state occupies a land area of about 66,000 square kilometers. Bauchi town is located within Southern Guinea Savannah on latitude 13<sup>o</sup> 30' N and longitude 11<sup>o</sup> 50' E at an altitude of 690.20 meters above sea level. The climate is characterized by two well defined rainy season (June-October) and dry season (November-May). The total mean rainfall in the state is 700-900 mm for the Northern zone, 690-1031 mm for Central zone and 900-1300 mm for the Western zone (BASDP, 2003). The mean temperature ranges between 19.15 °C and 40.50 °C. The highest temperature is observed in the months of March, April and May, while the lowest in the months of January and December every year. Highest relative humidity of 99% is observed in August and the lowest of 57% in February.

### **Experimental Diets**

The experimental feeds were formulated on the farm using two different energy sources (maize and white sorghum). There were two different feeds as indicated in Table 1.



**Table 1:** Percentage Compositions of Experimental Diets (kg/ton)

Ingredients	Diets			
	NZW		Dutch	
	Maize (T1)	Sorghum (T2)	Maize (T3)	Sorghum (T4)
Maize	300	300	-	-
White sorghum	-	-	300	300
Ground nut cake	150	150	150	150
Wheat offal	320	320	320	320
Ground nut hulms	200	200	200	200
Bone meal	25	25	25	25
Salt	2.5	2.5	2.5	2.5
Premix	2.5	2.5	2.5	2.5
<b>TOTAL</b>	<b>1000</b>	<b>1000</b>	<b>1000</b>	<b>1000</b>
ME (kcal/kg)	2700	2700	2600	2600
CP (%)	16	16	15.98	15.98
CF (%)	16	16	15.89	15.89

### Experimental Design and Rabbit Management

- The two breeds were housed separately on deep litter.
- Same ration and water were fed to them *ad libitum*
- Medications and other routine activities were carried out equally for the 4 treatment groups.
- They were allowed control breeding.
- The pregnant and lactating does were given extra attention.
- Forty (40) weaned rabbits from each group were tagged, weighed and move to separate fattening cages where they were fed fattening ration and fresh water *ad libitum*.
- The 40 rabbits in each group were divided in to five (5) sub groups (replicates).
- Fattening lasted 6 weeks.
- The does and bucks in the breeding pens continued to multiply.

### Data Collection

- i) Proximate compositions of feed and feed ingredients were determined
- ii) Daily feed consumptions and increase in body weights for each replicate were taken.
- iii) Final weights of the fattened rabbits were recorded against their initial weights before they are sold out and or slaughtered for carcass analysis
- iv) Sixteen fattened rabbits were selected and used for carcass analysis (carcass parameters)
- v) Cost analysis of rabbit production

Performance parameters were calculated using the following equations.

$$\text{Dressing \%} = \frac{\text{carcass weights}}{\text{live weights}} \times 100 \dots\dots\dots \text{eqn 1}$$

$$\text{Feed Conversion Ratio} = \frac{\text{DFI}}{\text{DWG}} \dots\dots\dots \text{eqn 2}$$

$$\text{Digestibility} = \frac{\text{Fi}-\text{Fo}}{\text{Fi}} \times 100 \dots\dots\dots \text{eqn 3}$$

## RESULTS AND DISCUSSION

The results of the main effects of breeds and energy (Table 2) on the performance parameters of rabbits revealed that the initial weight of New Zealand White was significantly ( $P<0.01$ ) higher than that of Dutch rabbits, whereas the two breeds fed maize and sorghum diets did not statistically differ in their final weights. The results also revealed that no significant differences were obtained on breeds differences on total and daily weight gains, total and daily feed intake as well as feed conversion ratio. However, total and daily weight gains as well as feed conversion ratio were statistically significant ( $P<0.01$ ) on rabbits fed maize diets and significant differences were obtained in total and daily feed intake on rabbits fed two energy different diets. This finding is contrary to the report of Abubakar *et al.*, (2023) who found no significance in all the performance parameters on rabbits fed maize milling residue but similar to the report of Bawa *et al.*, (2017) in weaner rabbits fed Mucuna shell meal-based diets.

**Table 2:** Main Effects of Breeds and Energy on the Performance Parameters

Parameters WS	Breeds			Energy	
	NZW	Dutch	LOS	Maize	
Initial weight (kg) 1.31 <sup>NS</sup>	1.48	1.24	NS	1.41	
Final weight (kg) 1.92 <sup>NS</sup>	2.16	1.83	**	2.07	
Total weight gain (g) 696 <sup>**</sup>	680	671	NS	655	
Daily weight gain (g) 16.58 <sup>**</sup>	16.19	15.95	NS	15.60	
Total feed intake (kg) 2.58 <sup>NS</sup>	2.58	2.54	NS	2.54	
Daily feed intake (g) 60.30 <sup>NS</sup>	61.50	60.40	NS	60.60	
Feed conversion ratio 3.70 <sup>**</sup>	3.80	3.80	NS	3.90	
Mortality (number)	0	0	-	0	-

**NB:** NZW=New Zealand White, WS= White Sorghum, LOS= Level of Significance

The results of interaction between energy and breeds (Table 3) indicated non significance on initial, final and total weight gains but significant ( $P<0.01$ ) on total and daily feed intake and better ( $P<0.001$ ) on feed conversion ratio. This agrees with the finding of Bamgbose *et al.*, (2002).

**Table 3:** Interaction of Breeds and Energy on Performance Parameters

Parameters	NZW		Dutch		SEM
	Maize (1)	WS (2)	Maize (3)	WS (4)	
Initial weight (kg) 0.04 <sup>NS</sup>	1.48	1.47	1.34	1.14	
Final weight (kg) 0.07 <sup>NS</sup>	2.15	2.16	1.18	1.68	
Total weight gain (g) 9.39 <sup>NS</sup>	670	690	640	702	
Daily weight gain (g) 0.22 <sup>NS</sup>	15.96	16.43	15.24	16.72	
Total feed intake (kg) 0.08 <sup>**</sup>	2.48 <sup>b</sup>	2.69 <sup>a</sup>	2.61 <sup>a</sup>	2.46 <sup>b</sup>	
Daily feed intake (g) 1.92 <sup>**</sup>	59.00 <sup>b</sup>	64.00 <sup>a</sup>	62.20 <sup>a</sup>	58.60 <sup>b</sup>	
Feed conversion ratio 0.17 <sup>***</sup>	3.70 <sup>a</sup>	3.89 <sup>b</sup>	4.09 <sup>b</sup>	3.59 <sup>a</sup>	
Mortality (numbers)	0	0	0	0	-

NZW= New Zealand White, WS= White Sorghum, SEM= Standard Error of the Means, LOS= Level of Significance

The results of main effects on breeds and energy (Table 4) on all the carcass parameters revealed no significant difference except in eviscerated weight with New Zealand White rabbits gaining high ( $P < 0.01$ ) significant difference over Dutch rabbits. This result agrees with that of Abubakar *et al.*, (2023) for rabbits fed maize milling residue.

**Table 4:** Main Effects of Breeds and Energy on the Carcass Parameters

Parameters	Breeds			Energy		
	NZW	Dutch	LOS	Maize	WS	LOS
Live weight (kg)	2.43	2.3	NS	2.61	2.13	NS
Eviscerated weight (kg)	2.16	1.83	**	2.07	1.92	NS
Carcass weight (kg)	1.30	1.25	NS	1.40	1.15	NS
Dressing percentage	53.44	54.20	NS	53.64	54.00	NS

NZW=New Zealand White, WS= White Sorghum, LOS= Level of Significance

The results obtained on interaction of breeds and energy (Table 5) on all carcass parameters revealed no significant difference which is in contrary with the report of Idowu *et al.*, (2022) who fed weaner rabbits with sorghum offal.

**Table 5:** Interaction of Breeds and Energy on Carcass Parameters

Parameters	NZW		Dutch		SEM	LOS
	Maize	WS	Maize	WS		
Live weight (kg)	2.60	2.25	2.63	2.00	0.14	NS
Eviscerated weight (kg)	1.65	1.50	1.70	1.35	0.10	NS
Carcass weight (kg)	1.40	1.20	1.40	1.10	0.09	NS
Dressing percentage	53.87	53.00	53.40	55.00	0.74	NS

SEM=Standard Error of the Means, LOS= Level of Significance, NS=Not Significant



The cost benefit (Table 6) of feeding two different breeds with two different energy sources is presented in Table 6. It was observed that feed cost/kg gain was lower (₦ 2,589.55) on NZW rabbits fed maize and higher (₦ 2,651.01) when same breed was fed WS based diets. On the other hand, Dutch rabbits fed maize had higher (₦ 2,854.69) feed cost/kg gain compared to those on WS based diets (₦ 2,402.28). This result did not agree with that of Abubakar *et al.*, (2023) and Idowu *et al.*, (2022).

**Table 6:** Cost benefits of feeding two breeds of weaner rabbits with two energy sources

Parameters	Diets			
	NZW Maize (T1)	WS (T2)	Dutch Maize (T3)	WS (T4)
Total feed intake (kg)	2.48	2.69	2.61	2.46
Feed cost (₦/kg)	700	680	700	680
Total feed cost (₦)	1,735.00	1,829.20	1,827.00	1,686.40
Total weight gain (g)	670	690	640	702
Feed cost/kg gain	2,589.55	2,651.01	2,854.69	2,402.28

NB: NZW= New Zealand White, WS=White Sorghum

## CONCLUSION AND RECOMMENDATIONS

From the results obtained in this study, it was concluded that both breeds of weaner rabbits (New Zealand White and Dutch) can perform optimally using any of the two energy sources-based diets (Maize and White Sorghum). No negative effect was found in using the two energy sources in feeding the two different breeds. Therefore, feeding New Zealand White and Dutch breeds of rabbits with maize or WS is recommended.

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