EFFECT OF VARYING LEVELS OF SOAKED ROSELLE CALYCES ON GROWTH PERFORMANCE AND NUTRIENT DIGESTIBILITY OF WEANER RABBITS

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ABSTRACT
This study was conducted to determine the effect of soaked roselle calyces on the performance and nutrient digestibility of weaner rabbits. Five (5) diets were formulated in which soaked roselle calyces (SRC) was included at varying levels of 0, 2, 4, 6, and 8% designated as T1, T2, T3, T4 and T5 respectively. Thirty (30) Mongrel weaner rabbits were randomly allotted to five treatments in a completely randomized design (CRD). Each treatment was replicated 3 times consisting of two male weaner rabbits per replicate. The experiment lasted 7 weeks. The performance parameters and nutrients digestibility were evaluated and data was subjected to analysis of variance. The results of the performance of rabbits showed that there were significant differences (P < 0.05) in the final body weight (1036.67-1721.68g), daily weight gain (13.19 -32.71g, and daily feed intake (96.42 - 130.12g). The highest value of the final body weight was recorded in T3 (4% SRC diet). The feed conversion ration and feed cost per kilogram gain were better for rabbits fed T3 (3.82 and ₦332.60 respectively) compared to rabbits fed other treatments. The results of the nutrient digestibility showed significant differences (P < 0.05) in the protein digestibility and fibre digestibility. The crude protein and fibre digestibility were higher in T4 (78.12% and 69.15% respectively) compared to others. The ash and nitrogen free extract digestibility were both significantly (P<0.05) affected by the dietary utilization of SRC in the diets. Based on this study, the soaked roselle calyces can be incorporated in the weaner rabbits diet up to 4% without any deleterious effects on the growth performance and nutrients digestibility with some reduction in the cost of production.
Keywords: Soaked Roselle calyces, Weaner rabbits, Performance, Nutrient digestibility

INTRODUCTION

The acute shortage of animal protein has been reported in many developing countries including Nigeria (FAO, 2006). Rabbit is an ideal animal in meeting the protein need of developing countries due its prolific nature, short generation interval and feed conversion efficiency (Tamburawa *et al.*. 2018). Rabbits are efficient converters of feed to meat and can utilize up to 30% crude fibre as against 10% by most poultry species (Egbo, 2001). However, feed constitutes 70-80% of the cost of livestock production (Ogundipe, 1987) This necessitated the need to search for alternative feed resources that are very low in human preference to reduce the cost of production such as Roselle (*Hibiscus Sabdariffa)* Calyces which are being discarded after extraction and sieving of watery liquid for making local soft drinks (Zobo in Hausa) .The objective of this study was to determine the growth performance and nutrients digestibility by weaner rabbits fed diets containing soaked roselle calyces.

MATERIAL AND METHODS

Experimental Site

This study was conducted at the Teaching and Research Farm of the Department of Animal Science, Aliko Dangote University of Science and Technology, Wudil. The Farm is located on latitude 11^0 37'N and longitude 8^0 58' E at an altitude of 403 m above sea level. The mean annual rainfall is 890 mm. The average relative humidity and temperature are 75% and 26^0C respectively (Olofin *et al*., 2008)

Experimental Diets,

Five (5) diets were formulated containing graded levels of Soaked Roselle Calyces (SRC) at 0, 4, 6, 8 and 10% designated as Treatments 1, 2, 3, 4 and 5 respectively (Table 1) The soaked Roselle calyces was subjected to proximate analysis according to AOAC (1990). The SRC contained 7.88% crude protein and 13.20% crude fibre, Roselle Calyces (SRC) are readily available in Northern part of Nigeria. Roselle plant is being cultivated in arid, Semi-Arid, Sudan and Savannah zones of Nigeria and the its calyces are being discarded after extraction and sieving of watery liquid for making local soft drinks called Zobo in Hausa language.

Animals, Design and Their Management

A total of thirty (30) mongrels weaner rabbits were allotted to diets in a completely randomized design (CRD) and each treatment was replicated 3 times consisting of two male rabbits per replicate. The weaner rabbits averagely of equal weight were reared in cages which was placed in a well-ventilated room with enough windows and covered with wire mesh. It was fully protected against predators and against any possible environmental hazard

such as rain and wind storm. The rabbits were carefully treated with anti-coccidia (Amprolium) against protozoal diseases. They were daily fed, monitored and regularly examined for good condition of health. The experiment lasted 6 weeks.

Table 1: Composition of weaner Rabbits diets containing Soaked Roselle Calyces

	Treatments				
Ingredients	**T1 (0%)**	**T2 (2%)**	**T3 (4%)**	**T4 (6%)**	**T5 (8%)**
Maize	53.50	52.50	51.50	51.00	50.50
Soya beans meal	13.45	12.95	12.45	12.45	12.45
Soaked Roselle calyces	0.00	2.00	4.00	6.00	8.00
Fish meal	3.50	3.50	3.50	3.50	3.50
Wheat offal	25.00	24.50	24.00	22.50	21.00
Bone meal	3.50	3.50	3.50	3.50	3.50
Salt	0.30	0.30	0.30	0.30	0.30
Lysine	0.20	2.00	0.20	0.20	0.20
Methionine	0.30	0.30	0.30	0.30	0.30
Vitamin premix	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Calculated Analysis					
Crude protein (%)	18.00	18.01	18.00	18.03	18.02
M. Energy (Kcal/kg)	2552	2567	2560	2567	2578
Ether extract	1.35	1.22	1.24	1.35	1.42
Fibre (%)	10.12	11.45	12.10	11.78	12.23
Ash (%)	1.34	1.35	1.45	1.52	1.67

Data Collection

Data was collected on the performance of rabbits by weekly weighing the rabbits to determine body weight gain. The daily feed intake was determined by weighing the known quantity of feed offered and subtracting left over from the amount of feed offered to rabbits. The feed conversion ratio was calculated as ratio of the daily feed intake to daily weight gained by rabbits. The mortality rate was recorded as its occurred**.** The digestibility trail was carried out for two weeks where faecal droppings from each replication were collected, bulked, and weighed. The feeds and faecal samples were oven dried and analysed for proximate composition according to the analytical method of A.O.A.C (1990). The digestibility of nutrients was calculated by subtracting the nutrients in the faeces from nutrients in the feed. The values obtained was then divided by the nutrients in the feed and the resultant was multiplied by hundred which is expressed in percentage (%).

RESULTS AND DISCUSSION

The result on performance of weaner rabbits is presented in Table 2. The results showed that there were significant differences ($P < 0.05$) in the final body weight, Daily weight gain, daily feed intake, feed conversion ratio and feed cost per kilogram gain. The highest value of the final body weight was recorded in rabbits T3 (1721.67 g) and the lowest value was obtained in rabbits fed T1 (1036.67g). This agrees with report of Omoikoje (2006) who reported that rabbit has greater ability to utilize fibrous feedstuffs and agro-industrial by- product than other micro livestock.

Table 2: Performance of weaner Rabbits fed diets containing soaked Roselle Calyces

	Treatments					
Parameters	**T1**	**T2**	**T3**	**T4**	**T5**	**SEM**
Initial body weight (g)	550.00	582.00	576.67	583.33	580.00	32.59
Final body weight (g)	1036.67^{c}	1339.67^{C}	1721.68^{a}	1500.67^{b}	1501.33^{b}	36.49
Daily weight gain (g)	13.91^{d}	21.65^{c}	32.71^{a}	26.210^{b}	26.32^{b}	1.28
Daily feed intake (g)	96.42^{c}	117.88^{b}	130.12^{a}	122.99^{a}	127.59^{a}	2.08
Feed conversion ratio	6.98^{a}	5.59^{b}	3.82^{c}	4.72^{b}	4.85^{b}	0.36
Feed cost/kg gain (~~₦~~)	473.80^{a}	374.21^{b}	332.60^{c}	407.04^{b}	443.54^{b}	9.20
Mortality (%)	0.33	0.00	0.00	0.00	0.00	0.21

^{abc}=means with different superscript are significantly different ($p<0.05$)

The results of nutrients digestibility are presented in Table 3. The results showed there were significant differences ($P < 0.05$) in the crude protein, crude fibre, ether extracts, ash and nitrogen free extract digestibility. The values obtained showed that the digestibility of crude protein and fibre were higher 78.12% and 69.15 % respectively in

T3 (4% SRC Diet). This agreed with Cheeke *et al*. (1983) who reported that good protein and fibre digestibility are required for good performance of rabbits. Ether extract and nitrogen free extract digestibility were also significantly ($P < 0.05$) affected by the dietary inclusion of SRC in the experiment. The ash and nitrogen free extract digestibility were both significantly ($P<0.05$) higher in rabbits fed T3 (77.18 and 79.35% respectively) compared to others across the treatments.

Table 3: Nutrients digestibility by weaner Rabbis fed diets containing soaked Roselle Calyces

	Treatments					
Parameters	**T1**	**T2**	**T3**	**T4**	**T5**	**SEM**
Dry matter (%)	75,66	77.29	80.70	77.06	76.88	5.64
Crude protein (%)	63.00^{c}	67.67^{b}	78.12^{a}	63.14^{b}	58.89^{c}	2.19
Crude fibre (%)	68.18^{b}	68.54^{a}	69.15^{a}	64.59^{b}	59.81^{c}	3.87
Ether extract (%)	72.93^{a}	67.92^{a}	71.30^{a}	67.35^{ab}	59.43^{b}	2.52
Ash (%)	74.29^{b}	70.34^{b}	77.18^{a}	74.74^{b}	67.38^{b}	2.79
Nitrogen free Extract (%)	75.33^{b}	75.88^{b}	79.35^{a}	67.24^{c}	66.49^{c}	2.79

^{abc}=Means with different superscripts on the same row are significantly different ($P<0.05$)

CONCLUSION

Based on the results in this study, it was concluded that roselle meal could be incorporated in to rabbit diet up to 4% without any deleterious effects on the growth performance and nutrient digestibility with some reduction in the cost of production.

RECOMMENDATION

It is therefore recommended that Soaked Roselle Calyces which are being discarded as a waste in most part of northern Nigeria can be incorporated in the diet of weaner rabbits at 4% for better performance and nutrient digestibility with some reduction in the cost of rabbits' production in Nigeria

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