

## Performance and Hematological Parameters of Rabbits Fed Graded Levels of Sorrel Seed (*Hibiscus Sabdariffa*) Meal as a Replacement for Groundnut-Cake

<sup>1</sup>M.B. Aruna, <sup>1</sup>C.E. Isidahormen, <sup>2</sup>Y.A. Gigiri and <sup>2</sup>A. Olawole

<sup>1</sup>Department of Animal Science, Ambrose Alli University, P.M.B 14, Ekpoma. Edo State, Nigeria

<sup>2</sup>Department of Animal Science, University of Maiduguri, Maiduguri, Bornu State, Nigeria

**Abstract:** A feeding trial was conducted with 16, 5-6 weeks old (Dutch and New Zealand white) rabbits to evaluate their response when fed graded levels of Sorrel Seed Meal (SSM). The rabbits were randomly assigned to four dietary treatments namely T<sub>1</sub> (0% ssm, control), T<sub>2</sub> (5% ssm), T<sub>3</sub> (10% ssm) and T<sub>4</sub> (15% ssm). Feed and water were provided ad libitum throughout the experimental period of nine weeks. The parameters measured were feed intake, body weight gain and Feed Conversion Ratio (FCR) and hematological parameters. No significant ( $p > 0.05$ ) differences were observed among the different treatments with respect to feed intake, body weight gain and feed conversion ratio. Similarly, no statistical ( $p > 0.05$ ) differences was also observed for treatment effects on Packed Cell Volume (PCV), Hemoglobin concentration (Hb), Red Blood Cell (RBC) counts, White Blood Cell (WBC) counts, Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC) and no deaths were recorded. It was therefore, concluded that, up to 15% of Sorrel seed meal could be included in the diets of growing rabbits without adverse effects on their performance, hematological parameters and health

**Key words:** Rabbits, sorrel seed, replacement, groundnut cake, MCHC, RBC

### INTRODUCTION

The development of alternative plant protein feed stuffs in monogastric Animal diets will continue to be a necessity in Nigeria as long as the conventional or primary protein feed stuffs like soybean meal, groundnut-cake and fish meal continue to be scarce and expensive. The primary feed stuffs are costly because they are competed for by humans and other industrial users who are always ready to pay higher prices than the feed millers. Sorrel seeds (*Hibiscus sabdariffa*) which have little industrial and human food value as of now could therefore be developed into a protein feed stuff, for monogastric Animals, especially for small scale and rural Animal producers.

The chemical composition of Sorrel seed (*Hibiscus sabdariffa*) with respect to crude protein vary from 18.90-21.40% (FAO, 1968; Kwari *et al.*, 2004). The seed contain anti-nutritional factors like tannin which also tends to limits their uses in animal feeds (Raddy, 1993). The anti-nutritional factors in plants are usually reduced by heat treatment. A process that can also increase the level of protein (Tewe and Ologhobo, 1986). However, Kwari *et al.* (2004) recommended the inclusion of 22%

levels of ssm in the diets of broiler chickens. This study was designed therefore to evaluate the productive performance and hematological parameter of growing rabbits fed graded levels of Sorrel Seed Meal (SSM) as a replacement for groundnut cake.

### MATERIALS AND METHODS

The study was conducted at the University of Maiduguri Teaching and Research, Livestock farm. Maiduguri is located at 11.05°North and 30.05°East and at an elevation of about 364 m above sea level in the North Eastern part of Nigeria. The ambient temperature ranges between 30°C and 40°C. The hottest period occurs from March to June. While it is cold between November and February.

Sixteen 5-6 weeks old (Dutch×New Zealand white) rabbits were used for the feeding trial, which lasted for 9 weeks. The rabbit were randomly assigned to four dietary treatments in-groups of 4 rabbits each. Each rabbit was housed in an all-wire cage, equipped with facilities for individual feeding and watering. Clean drinking water and the experimental diets were supplied ad libitum.

Table 1a: Composition of the experimental diets

Ingredients (%)	Treatments/diets			
	1	2	3	4
Maize	35.98	35.98	35.98	35.98
Maize ban	17.00	17.00	17.00	17.00
Ground nut cake	24.37	19.37	14.37	9.37
Sorrel seed meal	0	5.00	10.00	15.00
Ground nut haulms	15.00	15.00	15.00	15.00
Fish meal	5.00	5.00	5.00	5.00
Bone meal	2.00	2.00	2.00	2.00
Salt(NaCl)	0.50	0.50	0.50	0.50
Premix	0.15	0.15	0.15	0.15
Total	100.00	100.00	100.00	100.00

Table 1b: Composition of the vitamin premix

Vitamins	Composition
Vit A	12,000 IU
Vit E	1500 IU
Vit D <sub>3</sub>	2,500 IU
Vit C	30,000 mg
Folic acid	1000 mg
Pathogenic acid	15,000 mg
Iodine	1,750 mg
Fe	40,000 mg
Zn	50,000 mg
Mn	100 mg
Nicotinic acid	4,000 mg
Biotin	6,000 mg
Cu	1,500 mg
Co	200 mg
Si	100 mg

The four experimental diets were formulated with ingredients shown in the Table 1.

Sorrel Seed Meal (SSM) was incorporated at 0, 5, 10 and 15% levels in diet 1 (control), 2, 3 and 4, respectively. The ssm replaced the groundnut cake in the diet.

Sorrel seed were purchased, cleansed and sun dried for 3 days. it was then grounded to a meal using a milling machine and incorporated into the diets at the specified levels.

Parameters measured to evaluate performance of rabbits include, feed in take, body weight gain and Fed Conversion Ratio (FCR) and hematological indices. Feed intake was measured on daily basis. While the weight gain was measured weekly. FCR was computed as the ratio of food intake to weight gain. Blood samples were collected from two rabbits per treatment during the 8<sup>th</sup> week of the experiment for hematological studies. Samples of the experimental diets, Sorrel Seed Meal (SSM) were analyzed for nutrient composition using the procedure by A. O. A. C (1980). Data collected were subjected to analysis of variance (Steel and Torrie, 1980) and the means compared using Duncan's multiple range test (Duncan, 1955).

## RESULTS AND DISCUSSION

The chemical composition of the experimental diets and Sorrel Seed Meal (SSM) are shown in Table 2. The Crude Protein (CP) content of the control diet of 20.21%

Table 2: Analysed composition of the experimental diets and sorrel seed meal

Nutrients (%)	Treatments/diets				
	1	2	3	4	SSM
Dry matter	92.40	91.70	91.30	92.10	91.50
Crude protein	20.12	19.07	17.93	22.20	22.20
Crude fibre	16.00	21.00	25.00	29.00	15.00
Total ash	6.04	5.40	4.03	6.02	7.02
Ether extract	3.00	3.00	4.00	3.00	6.00
Nitrogen-free extract	54.75	51.53	49.04	45.21	49.78

\*SSM = Sorrel Seed Meal

Table 3: Performance of weaning Rabbits fed different levels of sorrel seed meal

Parameters	Treatments/diets				
	1	2	3	4	SEM
Initial weight(g)	450.05	450.02	451.03	45.01	-
Final live weight(g)	1133.33	1016.66	1075.00	966.66	16.72 <sup>NS</sup>
Av. Daily Wt. gain (g)	9.76	8.09	8.91	7.38	0.49 <sup>NS</sup>
Av. Daily Feed intake (g)	53.13	58.35	54.25	45.84	6.23 <sup>NS</sup>
Feed conversion ratio (F/WG)	5.44	7.21	6.09	6.21	0.43 <sup>NS</sup>

SEM = Standard Error of the Mean NS= Not Significant (p>0.05)

Table 4: Effect of feeding graded levels of Sorrel seed Meal (SSM) on blood parameters of growing rabbits

Parameters	Treatments/diets				
	1	2	3	4	SEM
Packed cell vol. Pcv (%)	36.00	36.50	37.50	38.00	2.66 <sup>NS</sup>
Hemoglobin concentration Hb (g dL <sup>-1</sup> )	10.05	12.50	11.50	11.50	0.82 <sup>NS</sup>
Red Blood Cell (RBC*10 <sup>6</sup> mm <sup>3</sup> )	6.32	5.28	5.01	5.03	3.46 <sup>NS</sup>
White Blood Cell (WBC*10 <sup>3</sup> mm <sup>3</sup> )	6.03	5.43	5.44	5.35	0.39 <sup>NS</sup>
MCH (picogram)	15.50	23.67	22.95	22.86	3.24 <sup>NS</sup>
MCHC (%)	27.91	34.25	30.67	30.26	4.43 <sup>NS</sup>
MCH(fernttolitre)	57.10	69.10	74.90	75.6	8.46 <sup>NS</sup>

SSM = Sorrel Seed Meal; SEM= Standard Error of Mean; NS= Not Significant (p>0.05); MCH= Mean Corpuscular Hemoglobin; MCHC = Mean Corpuscular Hemoglobin Concentration and MCV= Mean Corpuscular Volume

appeared to be higher than those in the diet containing SSM which were 19.07, 17.93 and 16.77 at 5, 10 and 15% inclusion levels, respectively. The Crude Fibre (CF) levels of the diets (16-29%) were higher than the 14% recommended by Anugwu *et al.* (1998) for growing rabbits. the reason for the higher CF observed is due to the fact that sorrel seed has a higher CF than groundnut cake. The fat levels (3-4%) of the diet were sufficient to meet the minimum of 3% desirable to provide the essential fatty acid and to maintain glossy sleek hair (Checke, 1979).

The body weight, mean daily feed intake, daily weight gain and Feed Conversion Ratio (FCR) are presented in Table 3. None of the parameter were significantly (p>0.05) different among the treatments. The final live- weight of 966.66-1133.33 g rabbit<sup>-1</sup> obtained at the end of the experiment were inferior to the range of 1515.00-1610.09 as reported by Onifade and Tewe (1993) for rabbits of comparable ages. The lower value obtained

may be attributed to low feed intake arising from higher ambient temperature. Fielding (1991) reported that high ambient temperature has adverse effect on feed intake in rabbits.

The blood parameters are presented in Table 4 and these include: Packed Cell Volume (PCV), Haemoglobin concentration (Hb) Red Blood Cell (RBC) counts and White Blood Cell (WBC) counts. Others are calculated indices, such as Mean Corpuscular Hemoglobin, (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC) and Mean Corpuscular Volume (MCV). The above hematological parameters were not significantly ( $p>0.05$ ) different among the treatments and they were within the ranges for healthy rabbits (Anon 1980). The normal value especially the PCV and Hb, are indication of adequate nourishment of the Animal (Church *et al.*, 1984). Diets are known to have strong influence on hematological traits (Hackbath *et al.*, 1983). Therefore, growing rabbits can tolerate 15% SSM in their diet without adverse effects on their performance. No deaths were recorded during the experiment.

### CONCLUSION

The result of this study showed that Sorrel Seed (*Hibiscus sabdariffa*) Meal (SSM) could be include up to 15% in the diet of growing rabbits without adverse effect on performance, hematological parameters and health.

### REFERENCES

- Anon, 1980. Guide to the care and use of experimental animals. Canadian council of animal care, Otta WA, Ontario, Canada, 1: 85-90
- Anugwa, F.O.I, M. Adesua and S.A. Ikurior, 1998. Effects of dietary crude fibre levels on performance Nutrient digestibility and carcass characteristics of weaning growing rabbits. Animal Agriculture in West Africa. The sustainability question.
- AOAC., 1980. Official methods of analysis of official analytical chemists (W. Witz, Ed). (13th Edn.), Association of official analytical chemists, Washington D.C. pp: 1018.
- Cheeke, P.R., 1979. Nutrition of the domestic rabbit. In livestock feeds and feeding. Church D.C. (Ed.). O and B. books Lnc, Corvallis, Oregon, USA., pp: 272-275.
- Church, J.P. J.T. Judd, C.W. Yongm, J.L. Kebay and W.W.K.M., 1984. Relationship among dietary constituents and specific serum clinical components of subjecting self selected diet. Amin J. Clin. Nutr., 40: 1338-1344.
- Duncan, D.B., 1955. Multiple range and multiple F-Test. Biometrics, 11:1-42.
- F.A.O., 1968. Food composition tables for use in Africa. Food and agricultural organization of the united nation Rome, Italy.
- Fielding, D., 1991. Rabbits. The Macmillan press ltd London and Basingstoke, pp: 106.
- Hackbath, H., K. Buron and G. Schimansley, 1983. Strain difference in inbred rat; influence of strain and diet on hematological traits. Lab. Amin., 17:1-12.
- Kawri, I.D., J.U. Igwebuik, N. Bello, S.T. Rabo and M. Birma, 2004. Replacement of groundnut cake with sorrel (*hibiscus sabdariffa*) seed Meal in Broiler finisher Diets. In: Self sufficiency for animal protein in Nigeria: A reality or amirage (J.O.Oguaji, I.I Osakwe, U. Ewa- Vivian, S.O.Alaku, M.O. Otuma and B.O. Nweze). Proc of 9th ASAN-annual conference, Ebonyi State University Abakaliki, Nigeria pp 5-7.
- Onifade, A.A. and O.O. Tewe, 1993. Alternative Tropical energy feed resources in rabbit diet, growth performance, diet digestibility and blood composition. World Rabbit Sci., 11:17-24.
- Reddy, C.V., 1993. Anti-nutritional factors of feedstuffs, Polut-S U., 68: 799-804.
- Steel, R.G.D. and J.A. Torrie, 1980. Principles and Procedures of Statistic: A biometrical approach. (2nd Edn.) McGraw-hill book co. Inc. New York, pp: 633.
- Tewe, O.O. and A.D. Ologhobo, 1986. An elevation of raw and cooked whole Soya beans for broiler. Nig. J. Anim. Prod., 13: 107-111.