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Influence of Treated and Untreated Neem (*Azadirachta indica*) Rind Meal on Haematological and Biochemical Parameters of Weaner Rabbits

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Abstract— **Forty mixed breed pre – pubertal male rabbits were used to determine the effect of treated (24 hours soaked and 48 hours soaked in water) and untreated neem rind as inclusion at 10% in rabbits diet on performance (final weight gain, average daily weight gain, average daily feed intake and feed to gain ratio), hematology and serum biochemistry profile. Data were analyzed using descriptive statistics and analysis of variance. There were significant differences (p<0.05) in all parameters examined under growth performance. Final weight gain, average daily feed intake, and feed to gain ratio were all in favour of animals on the control diet. There were also significant differences (p<0.05) in the haematological parameters, packed cell volume and haemoglobin concentration were significantly in favour of animals on the control diet. RBC, WBC, MCV and MCH had values within normal physiologic range across the treatments. Albumin and glucose showed significant difference across the treatments and all the values were within the physiologic range. Soaked and unsoaked neem rind were found out to depress feed intake, daily weight gain, final weight gain and feed conversion ratio of pre – pubertal rabbits.**

Index Terms— **Rabbits, neem rind, growth performance, haematological indices.**

I. INTRODUCTION

Poultry, pig and rabbit production represent the fastest means of correcting the shortage of animal protein intake. This is because apart from their high rate of reproduction, these species are characterized by the best efficiency of nutrient transformation into high quality animal protein (Adeyemi, *et al*., 2010). Rabbits have the ability to thrive on agricultural and agro- industrial by- products and they convert forages into meat more efficiently than ruminant animals. Rabbit is an animal with considerable potential for integration into the livestock farming system. Interest in rabbit production has been on the increase in recent years. Rabbit occupies a unique niche in that it is, mini livestock that is easy to manage, highly prolific and has a short generation interval. The cost of feeding rabbits is however very high, a condition that also prevail for other Nigerian livestock species (Adeyemi *et al*., 2010). The resulting unprecedented increase in the cost of feed necessitated the investigation into the use of agricultural by-products. One of such by-products is neem rind. The products of neem plant such as leaves, fruits, seeds, kernels, oil and cake have been used to feed poultry, pigs, cattle and sheep with varied results. Sokunbi and Egbunnike, (2002) found no toxicity and satisfactory growth rate from rabbits fed neem leaf up to 10% inclusion in their diet. However, neem rind (epicarp of neem fruit) has received no consideration as a source of animal feed. Neem rind is gotten from ripe neem fruit after birds and bats have eaten up the pulp and the neem seed. This material is lying waste year after year, there is no doubt, it may have beneficial potentials in animal nutrition.

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II. MATERIALS AND METHODS

A. *Preparation of experiment diets*

Neem rinds were collected from under matured trees during the late rainy season (July - September). The neem rinds were spread out in the shade for 12 hours before sun drying. A portion of the sun dried neem rind was not treated (UNR). Second portion was soaked in water for 24hours and subsequently sun dried (TNR24).Third portion was soaked in water for 48 hours and subsequently sun dried (TNR48). Each portion was milled separately and stored in airtight container. Samples were taken for proximate composition determination using the analytical methods of A.O.A.C. (1990). Table 1 shows the proximate composition of untreated, 24 hrs and 48 hrs treated neem rind.

B. *Experimental Animals and management*

A total of 40 mixed breed pre- pubertal male rabbits aged 12 weeks and weighing between 1000 – 1006g were randomly allotted to four diets (Table 2) in a completely randomized design. The rabbits were fed commercial rabbit grower's diet for two weeks to stabilize them and they were latter placed on experimental diets for eight weeks. The animals were individually housed in washed and disinfected hutches, raised 90 cm above the floor, measuring 40 x 25 x25 cm and provided with wire screened floor which permit faeces and urine to drop. Each animal was provided with water trough and feeder. All were injected with ivomec^R 2 weeks before experimental feeding. The experimental diets were offered *ad- libitum.* Records of feed intake and body weight changes were kept while feed conversion was calculated (Feed: weigh gain).

C. *Blood collection and evaluation*

At the end of the experimental period, blood was sampled from the ear vein of each animal for hematology and serum protein analysis. Blood samples for hematology were collected into sterile tubes containing EDTA (ethylene-diamine tetra-acetic acid) while that for serum biochemistry was without EDTA. Packed cell volume (PCV) and erythrocyte counts were determined as described by Ewuola and Egbunnike (2008). Total leukocyte counts were determined using Neubauer haemocytometer after appropriate dilution. Blood constants (Mean corpuscular volume (MCV), Mean corpuscular haemoglobin (MCH) and Mean corpuscular Haemoglobin Concentration (MCHC)) were determined using appropriate formulae as described by Jain (1986). Serum total protein was determined using Biuret method. Albumin was determined using Bromoscresol Green (BCG) method as described by Peter *et al* (1982). The globulin concentration was obtained by subtracting albumin from total protein.

D. Data analysis

Data obtained were statistically analyzed using a one-way analysis of variance (CRD) and the significant means at ($P<0.05$) separated using Duncan New Multiple Range Test (SAS, 2000).

Table 1: Proximate composition (%) of untreated and treated neem rind

Parameters	UNR	TNR24	TNR48
Dry matter	93.43	98.00	96.00
Crude protein	5.37	4.12	3.24
Crude fibre	9.66	12.46	12.97
Ether extract	2.26	1.52	0.94
Nitrogen free extract	74.23	72.02	72.52
Ash	8.66	9.88	10.33

Table 2: Composition of Experimental Diets (%)

Ingredients	Control	UNR	TNR24	TNR48
Maize	19.0	16.0	16.0	16.0
Groundnut Cake	10.0	14.0	14.0	14.0
Wheat Offal	20.0	10.0	10.0	10.0
Neem Rind Meal	-	10.0	10.0	10.0
Brewery Dried Grain	34.0	34.0	34.0	34.0
Palm Kernel Cake	6.0	6.0	6.0	6.0
Fish Meal	2.5	2.5	2.5	2.5
Palm Oil	4.0	3.0	3.0	3.0
Bone Meal	2.0	2.0	2.0	2.0
Oyster Shell	1.0	1.0	1.0	1.0
Salt	0.4	0.4	0.4	0.4
Premix	0.5	0.5	0.5	0.5
Lysine	0.2	0.2	0.2	0.2
Methionine	0.4	0.4	0.4	0.4
Nutrient composition (calculated)				
Energy (Kcal/ME/Kg)	2509.06	2539.09	2539.09	2539.09
Crude protein (%)	18.63	18.97	18.97	18.97
Crude fibre (%)	10.13	10.38	10.38	10.38

Micro mix grower: 2.5kg of premix contains vitamin A (10, 000,000 iu) vitamin D3 (2,000,000 iu) vitamin E (20,000mg)vitamin K3 (2,000 mg) vitamin B1 (3,000mg) vitamin B2 (5,000mg) Niacin (45,000mg) Calcium Panthothenate (10,000mg) vitamin B6 (4,000mg) vitamin B12 (20,000mg) Folic Acid (1,000mg) Biotin (50mg) Choline Chloride (3,000,000mg) Manganese (120,000mg) Iron (100,000mg) Zinc (80,000) Copper (8,500mg), Iodine (1,500mg), Cobalt (300mg), Selenium (120mg) Antioxidant (120,000mg).

III. Result and Discussion

Table 2: Growth performance of rabbit fed neem rind meal

Parameters	Control	UNR	TNR24	TNR48	SEM
Initial weight (g)	1000	1005	1002	1006	0.01
Final weight (g)	1880.25[a]	1303.00[b]	1237.50[b]	1161.75[c]	6.40
Average feed intake (g/day)	104.04[a]	50.50[b]	50.58[b]	48.93[c]	0.22
Average daily weight gain (g/day)	12.97[a]	3.09[b]	2.11[b]	1.85[b]	1.08
Feed to gain ratio	9.91[d]	16.54[c]	29.16[a]	23.70[b]	0.37

SEM = Standard error of the mean. Within a row, values with different superscripts differs significantly ($p < 0.05$)

Table 3: Hematological Indices of Rabbits fed neem rind meal

Parameters	Control	UNR	TNR24	TNR48	SEM
Packed Cell Volume (%)	43.45[a]	34.56[b]	31.87[bc]	30.60[c]	1.15
Haemoglobin (g/dl)	13.29[a]	11.42[b]	10.31[bc]	9.69[c]	0.41
Red Blood Cell ($10^6/mm^3$)	7.88[c]	9.59[b]	10.97[a]	10.66[a]	0.27
White Blood Cell ($10^3/mm^3$)	5.91[c]	5.82[c]	7.42[b]	10.23[a]	0.19
Mean Corpusclar Volume (μ^3)	53.09[a]	36.73[b]	30.65[c]	29.76[c]	0.71
Mean Coruscular Haemolobin (µg)	18.13[a]	12.70[b]	6.89[d]	9.93[c]	0.37
Mean corpuscular Haemoglobin Concentration (%)	33.08	33.18	32.31	33.20	0.78

SEM = Standard error of the mean. Within a row, values with different superscripts differs significantly ($p < 0.05$)

Table 4: Serum Biochemistry of rabbit fed neem rind meal

Parameters	Control	UNR	TRN24	TNR48	SEM
Total Protein (g/dl)	3.79	3.95	4.15	4.10	0.14
Albumin (g/dl)	2.96[a]	2.16[ab]	1.97[b]	1.88[b]	0.26
Globulin (g/dl)	1.69	1.90	1.58	2.00	0.12
Glucose (mg/dl)	89.58[ab]	95.80[a]	71.35[b]	76.26[b]	5.66
Alanine Transaminase (iu/l)	54.35	50.38	47.50	47.50	2.17

SEM = Standard error of the mean. Within a row, values with different superscripts differs significantly ($p < 0.05$)

A. Discussion

Table 2: shows the growth performance of male rabbits fed neem rind. There was significant difference ($p< 0.05$) for all the parameters considered. Animals on control diet had the highest final weight (1880.25g) that was significantly different ($P<0.05$) from other treatment means. UNR and TNR24 values were ($p>0.05$) similar (1303.00 and 1237.50) but were significantly higher than TNR48 (1161.75g). The final weight and the daily weight followed the same pattern. Average daily feed intake was significantly higher (104.04) ($p<0.05$) in the control diet. UNR and TNR24 shows similar values (50.50 and 50.58) which is significantly higher ($P<0.05$) than the mean value for TNR48. The reduced feed intake in UNR, TNR24 and TNR48 implies that neem rind possesses antinutritional factors such as nimbin, azadirachtin and salanin as reported by Singh *et al*., (1980). These antinutritional factors pose bitter taste on neem rind which may be responsible for the unpalatability of the material to the animals. Feed to gain ratio showed significant difference across the treatments. Control diet had the feed conversion ratio (9.91) that was significantly lower to others. This implies better utilization of the feed (Akinmutimi, 2006) since the lower the feed conversion ratio the better the diet (Ogbonna *et al*., 2000). Table 3: shows the hematological indices of male rabbits fed neem rind. There was significant ($p<0.05$) difference for all the parameters considered except for the mean corpuscular hemoglobin concentration. Packed cell volume was highest ($p<0.05$) in animals on control diet. Animals on UNR and TNR24 had similar values ($p>0.05$) while animals on TNR48 hours had the least value. All the values falls within the normal range (25.0 – 54.0%) as established by Mitruka and Rawnsley (1977). This implies that the animals were not anemic. Hemoglobin followed the same trend as packed cell volume. This also indicates that oxygen and carbon (IV) oxide exchange was not impaired in the animals. Mean value for red blood cell was higher in TNR24 and TNR48 (10.97 and 10.66) followed by UNR and animals on control diet respectively. The values were within the physiologic range (5.2 – 10.3) as reported by Mitruka and Rawnsley (1977). This result shows that the animals do not suffer from either polycythemia or anaemia. White blood cell was highest ($p<0.05$) in TNR48 (10.23) followed by TNR24 (7.42) while the value was similar ($p<0.05$) in animals on control diet and UNR (5.91 and 5.82). The values were within the normal range (1.60 – 45.10) as reported by Mitruka and Rawnsley (1977). These could be adjudged to be of good immune status since white blood cell count indicates the level of foreign bodies in an animal. Mean corpuscular volume (MCV) was significantly higher ($p<0.05$) in animals placed on the control diet (53.09), followed by animals on UNR (36.73). Mean values for animals on TNR24 and TNR48 had similar ($p>0.05$) values. All values were within the normal range (32.1 – 69.2) according to Mitruka and Rawnsley (1977). The red blood cells of the animals across the treatments could be classified as normocytes. Mean corpuscular haemoglobin was significantly higher in the animals on control diet ($p<0.05$) followed by animals on UNR, TNR48 and TNR24 (18.13, 12.70, 9.93 and 6.89) all the values were within the normal range (10.4 – 19.8) according to Mitruka and Rawnsley (1977).

Table 4: showed the serum biochemistry of rabbits fed neem rind meal. There were significant differences in albumin and glucose mean values. Animals on control and UNR had similar and significantly ($p<0.05$) higher values (2.96 and 2.16) than animals on TNR24 andTNR48 (1.97 and 1.88). Except for animals on control diet, others shows lower values compared with the normal range of (2.42 - 4.05) and this implies poor nutrient utilization of the feeds. Glucose showed similar ($p>0.05$) values (89.58 and 95.80) in the control animals and animals on UNR. Animals on TNR24 and TNR48 had similar ($p>0.05$) values (71.35 and 76.26) but significantly lower values than animals on UNR. This may be attributed to poor nutrient utilization.

IV. Conclusion

This study suggests that neem rind (untreated, 24 hours soaked and 48 hours soaked in water) is not a good alternative in rabbit production, since it pose a depressed response on daily feed intake, daily weight gain, feed conversion ratio and final body weight gain. Other ways of treating neem rind for rabbit use such as fermentation, ensiling and alkaline treatment should be investigated.

References

[1] A.O.A.C (1990). Official methods of analysis. (Association of Official Analytical Chemist). Washington D.C.

[2] Adeyemi, O.A., Ajado, A.O. and Okubanjo, A.O. (2009) Response of growing Rabbits to Graded levels of fermented and unfermented Pineapple peel. Proc. Of 34th Ann. Conf. of NSAP. March 15th – 18th, 2009, Univ. of Uyo, Uyo akwa Ibom State. Pp210 – 213

[3] Akinmutimi, A.H. (2006) Utilization of Raw Sword Bean (*Canavalia gladiata*) in grower rabbits diets; effect on Haematological Parameters and blood chemistry. Proceedings of the 11th Annual conference of Animal Science Association of Nigeria Held at Ibadan 18th – 21st September, 2006.Pp 108 – 110

[4] Ewuola, E. O. and Egbunike G. N. (2008): Haematological and Serum biochemical response of growing rabbits bucks fed different levels of dietary fumosin B, *African Journal of Biotechnology, Dec. 8, Vol. 7(23):4304 – 4309*

[5] Jain, N.C. (1986) Schalm's veterinary hematology 4th edn.Lea and Febiger Philadelphia Pp81 – 88

[6] Mitruka B. M. and Rawnsely H. M. (1977) clinical biochemical and haematological reference values in normal experimental animals. *Masson Publishing, USA, Inc*.

[7] Ogbonna, I.U., Oredien, A.O. and Adesehinwa A.O.K. (2000) Effects of replacing Groundnut cake with raw soybean Residue in diets on performance and nutrient digestibility of cockerel chicks. A periliminary study. Nigerian Poultry science journal 1; 23 – 31

[8] Peters, T., Biamonte, G. T. and Doumas, B. T. (1982). Protein (total protein) in serum, urine and cerebrospinal fluid; albumin in serum. *Selected methods of clinical chemistry. 9: 1 – 7.*
[9] SAS (1999) SAS Guide for Personal Computers version 6th Edition, cary, N.C. SAS Institute, USA
[10] Singh, U. P., Singh, H.B. and Singh R.B.(1980) the Fungicidal effect of neem (*Azadirachta indica)* extracts on some soil – borne pathogens of gram (*Cicer arietium*) . Mycologia. 72: 1077 - 1093
[11] Sokunbi, O.A. and Egbunike, G.N. (2002) Physiological response of Growing Rabbits to neem (*Azadirachta indica*) leaf meal – based diets: Haematological and Serum Biochemistry. Tropical Animal Production Investigation 3: 81 – 87