EFFECT OF FLUTED PUMPKIN (*TELFAIRIA OCCIDENTALIS*) LEAF EXTRACT ON SERUM BIOCHEMISTRY OF RABBIT BUCKS

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ABSTRACT
A 12- week study involving 20 grower rabbit bucks was carried out in a completely randomized design to evaluate the serum biochemistry of rabbit bucks fed fluted pumpkin (Telfairia occidentalis) leaf extract (FPLE). The rabbit bucks were allotted to 4 Treatments containing 0mL of FPLE/L of drinking water (Treatment 1), 50mL of FPLE/litre of drinking water (Treatment 2), 100mL of FPLE/L of drinking water (Treatment 3) and 150mL of FPLE/L of drinking water (Treatment 4). Each treatment was replicated 5 times. The same concentrate diet was fed to the rabbits in all the treatment groups. At the end of the feeding trial, 3 rabbits per Treatment were slaughtered in the most humane way and blood was collected at slaughter for serum biochemical analysis. The serum biochemical parameters measured were, blood urea nitrogen (BUN), creatinine, alanine amino transferase (ALT), aspartate amino transferase (AST), total bilirubin, direct bilirubin, glucose, total protein, albumin, globulin, cholesterol, triglycerides, high density lipoprotein (HDL) and low-density lipoprotein (LDL). Data derived from the study was subjected to analysis of variance (ANOVA) for completely randomized design (CRD) and where significant differences occurred, means were separated using the Duncan Multiple Range Test. The result showed that, urea, creatinine, ALT, glucose, total protein, globulin, albumin, cholesterol, triglycerides, HDL and LDL were not affected (P>0.05) by FPLE while AST, total bilirubin and direct bilirubin were influenced (P<0.05) by FPLE.
Keywords: Fluted pumpkin; Serum biochemistry; Rabbit bucks, Leaf extract

INTRODUCTION

The Food and Agriculture Organization (FAO, 1982) has estimated increases of about five to seven percent annually in meat consumption but such increases cannot be met easily by large animals because of their slow production cycles. They may however be met by short-cycle animals like rabbits, poultry and pigs. Poultry and pigs require food sources which are in serious competition with man but rabbits can be produced on forage alone although, production can be improved by the addition of other food by-products (Aduku and Olukosi, 1990). With consumers increasingly interested in a healthy lifestyle like energy and nutritional values of foods which are rich in protein and low in cholesterol and lipid contents, then from a nutritional point of view, rabbit meat is the ideal meat as it is flavorful, easily digested, has high nutritional and dietetic properties, has a high protein content of 20-21 percent, unsaturated fatty acids and low in concentrations of fat, cholesterol and sodium (Bielanski *et al*., 2000; Dalle Zotte, 2002; Hermida *et al*., 2006). The advantages of using the rabbit as the animal of choice for providing sufficient protein for man abound in literature (Aduku and Olukosi, 1990; Fielding, 1991). For centuries, plant and plant-based products have been used as a valuable and safe natural source of medicines for treating various ailments and the therapeutic potential of most of these plants could be ascribed to their anti-cancer, anti-diabetic, hepatoprotective, cardio-protective, anti-plasmodic, analgesic and various other pharmacological properties (D'Cruz *et al*., 2010). The utilization of plant and leaf extracts in animal production has found wide spread scientific and commercial acceptance as a strategy to improve the health status and performance of the animals (Okereke, 2003; Tsai *et al*., 2005; Machebe *et al*., 2010). Fluted Pumpkin *(Telfairia occidentalis*) is a tropical vine grown in West Africa as a leaf vegetable and for its edible seeds. The plant is usually grown trellised and it is dioecious, perennial and drought resistant (Akoroda, 1990b). It is a creeping vegetable shrub that spreads low across the ground with large lobed leaves and long twisting tendrils.

The objective of the study was to assess the effect of fluted pumpkin (*Telfairia occidentalis*) leaf extract on the health status of rabbit bucks.

MATERIALS AND METHODS

The completely randomized design (CRD) was used to assign all twenty animals to the treatments. There were four treatments with five replicates per treatment with each animal serving as a replicate.

Fluted pumpkin leaves for this study were washed free from sand and other contaminants and drained such that, the water from the washing was negligible. A clean chopping board and a clean knife were then used to chop the leaves into small pieces. Only tender leaves and stalks or vines were used. Chopped leaves and tender vines and stalks were then pounded in a mortar with pestle with no water added. After pounding, the extract was obtained by squeezing in a muslin cloth. The extract was then served to the animals at levels of 0.00ml of FPLE/liter of drinking water to Treatment 1, 50ml of FPLE/L of drinking water to Treatment 2, 100mL of FPLE/L of drinking water to Treatment 3 and 150mL of FPLE/L of drinking water to Treatment 4.

All the experimental animals irrespective of their treatment group were fed a single basal diet. The experiment lasted a period of 12 weeks. The animals were sacrificed at the end of the experimental period and blood was collected at slaughter for serum analysis. Rabbits in Treatment 1 which served as the control were given cool drinking water without fluted pumpkin leaf extract (FPLE). Treatment 2 was given 50mL of FPLE/L of drinking water, Treatment 3 was given 100mL of FPLE per liter of drinking water and Treatment 4 was given 150mL of FPLE per liter of water drinking.

Blood was collected from the animals during slaughter into clean test tubes for serum biochemical analysis.

RESULTS AND DISCUSSION

Table 1: Serum Biochemistry of Rabbit Bucks Fed Graded Levels of fluted pumpkin Leaf Extract

Parameter	T1(0)	T2(50)	T3(100)	T4(150)
Urea (mmol/L)	6.13 ± 0.66	8.07 ± 2.97	9.73 ± 1.47	6.80 ± 0.71
Creatinine (µmol/L)	53.35±1.21	67.41 ±0.85	69.90±0.20	55.83 ±0.62
Alanine amino transferase (ALT)	38.47±5.76	44.70 ±7.64	59.20±17.38	37.60 ± 3.93
(IU/L)	39.37±6.52[a]	33.40±6.04[a]	27.47±5.47[a]	19.93 ±1.89[b]
Aspartate amino transferase (AST)	16.35±0.70[a]	13.12±1.02[a]	14.97±2.48[a]	10.73 ±0.29[b]
(IU/L)	3.71±0.41[a]	3.83 ± 0.61[a]	4.87 ± 0.47[a]	2.55 ± 0.41[b]
Total bilirubin (µmol/L)	3.59 ± 0.53	3.93 ± 0.28	4.21 ± 0.05	4.10 ± 0.45
Direct bilirubin (µmol/L)	7.44 ± 0.27	9.19 ± 2.26	10.44 ± 2.51	6.84 ± 0.08
Glucose (mmol/L)	0.40 ± 0.20	0.66 ± 0.62	0.97 ± 2.15	0.28 ± 0.04
Total protein (g/dL)	7.03±0.07	8.53 ± 1.63	9.47 ± 2.15	6.67 ± 0.33
Globulin (g/dL)	0.94±0.26	1.75 ± 0.84	1.46 ± 0.31	0.78 ± 0.23
Albumin (g/dL)	0.85±0.07	0.99 ± 0.28	1.33 ± 0.21	0.92 ± 0.18
Cholesterol (mmol/L)	0.90±0.25	1.68 ± 0.81	1.03 ± 0.29	0.63 ± 0.26
Triglycerides (mmol/L)	0.00±0.00	0.67 ± 0.67	0.33 ± 0.33	0.00 ± 0.00
High density lipoprotein(mmol/L)				
Low density lipoprotein(mmol/L)				

a,b = Means on the same row with similar superscripts or without superscripts do not differ significantly (P > 0.05)

SEM = standard error of mean

0, 50, 100, 150 = Levels of inclusion of FPLE in milliliters

The result of various serum biochemistry parameters studied is as shown in Table 1. The serum parameters investigated were urea, creatinine, alanine amino transferase (ALT), aspartate amino transferase (AST), total bilirubin, direct bilirubin, glucose, total protein, globulin, albumin, cholesterol, triglycerides, high density lipoprotein and low-density lipoprotein. AST, total bilirubin and direct bilirubin were influenced significantly (P<0.05) by FPLE and in the three parameters that were influenced (P<0.05) by FPLE, Treatment 4 was significantly lower (P<0.05) than all other Treatments.

Blood urea concentration (mmol/L) in the present study did not differ significantly (P>0.05) among dietary treatments and values were similar to the range of 6.10 to 6.90 mmol/L reported by Igwebuike

et al., (2008); 5.4 to 8.61 mmol/L reported by Amao *et al.* (2012) and 5.90 to 7.22 mmol/L reported by Ewuola *et al.* (2012). The range obtained in the present study was however higher than the value of 5.4 mmol/L reported by Ovuru *et al.* (2004) and the range of 2.50 to 5.80 mmol/L obtained by Njidda and Isiduhomen (2009). The high serum urea levels obtained in the present study as compared to those of other workers may be due to the high protein intake from both Fluted Pumpkin Leaf Extract and the experimental diet. This is in agreement with the findings of Bassily *et al.* (1982) that the serum urea concentration is increased as the protein content of the diet increases. Also, Anyaechie and Madubuike (2007) reported that, the serum urea content depends on both the quantity and quality of protein supplied in the diet.

Serum creatinine values in the present study were similar to the range of 52.80 µmol/L to 66.88 µmol/L reported by Ahamefule *et al.* (2006) and within the reference range of 52.60 to 70.40 µmol/L reported by Mitruka and Rawnsley (1977). ALT and AST in the present study are within the safe limits of 48.50 to 78.90 IU/L and 42.50 to 98.0 IU/L respectively, given by Mitruka and Rawnsley, (1977). Serum concentrations of total bilirubin (µmol/L) and direct bilirubin were affected ($P<0.05$) by the dietary treatments. In both parameters, Treatment 1, Treatment 2 and Treatment 3 were similar ($P>0.05$) but all differed significantly ($P<0.05$) from Treatment 4 which was lower to the other Treatments. The mean values obtained for total bilirubin in the present study were similar to the range of 7.87 to 18.13 µmol/L obtained by Ahamefule *et al*., (2006) and within the reference range of 6.84 to 51.30 µmol/L reported by Mitruka and Rawnsley (1977).

Blood sugar level (glucose) of animals in the present study ranged from 3.59 ± 0.53 to 4.21 ± 0.05 mmol/L (64.62 to 75.78 mg/dl) and there was no significant difference ($P>0.05$) between treatments

The range of 3.59 ± 0.53 to 4.21 ± 0.05 mmol/L (64.62 to 75.78 mg/dL) obtained in the present study was similar to the range of 68.25 to 77.75 mg/dL reported by Ahamefule *et al.*, (2006). The values obtained in the present study were however lower than the values reported by Igwebuike *et al*. (2008) and Ewuola *et al.* (2012), but within the normal stipulated range of 65.30 to 74.80 mg/dL reported by Mitruka and Rawnsley (1977).

The range of values for serum total protein obtained in the present study was similar to the range of 6.50 ± 2.04 to 8.0 ± 4.08 g/dL reported by Gbore and Olatunbosun, (2010) and 6.61 to 8.00 g/dl reported by Ewuola *et al.*, (2012). Ahamefule *et al.*, (2008) and Etim and Oguike, (2011) however, reported values of 2.90 to 5.30 g/dL and 4.97 to 5.47g/dL. respectively which were lower than the range obtained in the present study. High serum proteins recorded in the present study were as a result of the high protein consumed from both the experimental diet and Fluted Pumpkin Leaf Extract.

Serum cholesterol values were similar to the range of 38.74 to 50.50 obtained by Igwebuike *et al.* (2008) and within the reference range of 20 to 83 mg/dl obtained by Anon, (1980).

HDL and LDL values in the present study were in harmony with the values reported by Maqsood *et al.* (2009).

Serum triglycerides (mmol/L) in the present study showed no significant difference ($P>0.05$) between dietary treatments. Values obtained in the present study ranged from 0.85 ± 0.07 to 1.33 ± 0.21 mmol/L (75.65 ± 0.07 to 118.37 ± 0.21 mg/dL) and were similar to the value of 53.60 ± 2.80 mg/dL obtained by Maqsood *et al.* (2009) while Sher *et al*. (2012) obtained a range of 44.00 ± 0.90 to 86.50 ± 1.10 mg/dL.

CONCLUSION.

In conclusion, the inclusion of Fluted Pumpkin Leaf Extract in the drinking water of rabbit bucks had no adverse effect on serum biochemical parameters studied.

REFERENCES

Aduku, A.O. and Olukosi, J. O. (1990). Rabbit Management in the Tropics. Production, Processing, Utilization, Marketing, Economics, Practical Training, Research and Future Prospects. Living books Series, GU Publications Abuja, FCT.

Ahamefule, F.O., Edouk, G.A., Usman, A., Amaefule, K.U., Oguike, S.A. (2006). Blood Biochemistry and Haematology of Weaner Rabbits Fed Sun-Dried, Ensiled and Fermented Cassava Peel Based Diets. *Pakistan Journal of Nutrition, **5**(3):248-253.*

Akoroda, M.O. (1990). Seed Production and Breeding Potential of the Fluted Pumpkin (Telfairia occidentalis). *Euphytical, **49**:25-32.*

Amao, E.A., Adejumo, D.O., Togun, V.A and Oseni, B.S.A. (2012). Physiological Response of Rabbit Bucks to Prolonged Feeding of Cotton Seed Cake Based Diets Supplemented with Vitamin E. *African Journal of Biotechnology, **11**(22):6197-6206.*

Anon, (1980). Guide to care and use of experimental animal. Vol. 1. Canadian Council of Animal Care. Ottowa Ontario, Canada, p. 185-90.

Anyaechie, A.A. and Madubuike, F.N. (2007). Effect of Enzyme Supplementation of Light-fibre Soybean Based Diets on Serum Biochemistry and Internal Egg Quality of Laying Hens. *Proceedings of 32 Annual Conference of Nigerian Soceity For Animal Production (NSAP), 18-21 March, Calabar:4-5*.

Bassily, N.S., Michael, K.G. and Said, A.K. (1982). Blood Urea Content for Elevating Dietary Protein Quality. GmbH and Co. KGaA, Weinheim.

Bielanski, P., Zajac, J. and Fijal, J. (2000). Effects of Genetic Variation of Growth Rate and Meat Quality in Rabbits. In: Proceedings of the 7th world Rabbit Congress, July 4-7, Valencia, Spain p. 561-566.

Dalle Zotte A. (2002). Perception of Rabbit Meat Quality and Major Factors Influencing the Rabbit Carcass and Meat Quality. *Livestock Production Science, **75**:11-32*.

D'cruz, S.C. and Mathur, P.P. (2005). Effect of Piperine on the Epididymis of Adult Male Rats. *Asian Journal of Andrology, 7(4):363-368.*

Ewuola, E.O., Jimoh, O.A., Atuma, O.V. and Soipe, O.D. (2012). Haematological and Serum Biochemical Response of Growing Rabbits Fed Graded Levels of Moringa oleifera leaf meal. *Proceedings of 10th World Rabbit Congress Egypt p. 679-683.*

Fielding, D. (1991). The Tropical Agriculturalist Rabbits. The Macmillan Press Ltd. London.

Food and Agriculture Organisation and World Health Organisation, united Nations University (1985). Energy and Protein Requirements. WHO Teachnical Report, Series 724. Geneva, Switzerland. (http://www.afpafitness.com)

Gbore, F.A. and Olatunbosun, A. (2010). Growth, Performance, Haematology and Serum Biochemistry of Female Rabbits (Oryctolagus cuniculus) fed Dietary Fumonisin. *Veterinarski Arhiv **80**(3):431-443*.

Hermida, M., Gonzales, M., Miranda, M. and Rodriques-Otero, J.L. (2006). Mineral Analysis in Rabbit Meat from Galicia (NW spain). *Journal of Meat Science, **73**:635-639*.

Igwebuike, J.U., Anugwa, F.O.I., Ragi, A.O., Ehiobu, N.G. and Ikuior, S.A. (2008). Nutrient Digestibility, Haematological and Serum Biochemical Indices of Rabbits Fed Graded Levels of Acacia albida pods. ARPN *Journal of Agricultural and Biological Science **3**(4).*

Machebe, N.S., Agbo, C.U. and Onuaguluchi, C.C (2010). Performance of Finisher Broilers Served Gongronemalatifolia (Benth) Leaf Extracts as Supplementary Source of Vitamins and Minerals: *Proceedings of the 15th Annual Conference of Animal Science Association of Nigeria.*

Maqsood, A., Alamgeer, T.S., Zabta, M. and Akbar, A. (2009). Effect of Berberis Lycium Royle on Lipid Profile in Alloxan Induced Diabetic Rabbits. *Ethnobotanical Leaflets **13**:702-708*.

Mitruka, B.M. and Rawnsley, H.M. (1977). Clinical Biochemical and Haematology Reference Values in Normal and Experimental Animals. Masson Publishing USA, Inc. pp 83, 134-135.

Njidda, A.A. and Isidahomen, C.E. (2009). Haematology, Blood Chemistry and Carcass Characteristics of Growing Rabbits Fed Grasshopper Meal as a Substitute for Fish Meal. *Pakistan Veterinary Journal, **30**(1):7-12.*

Okereke, C. (2003). Pesticidal Properties of Neem (Azadirachta indica). *Journal of Plant Science, **41**:97-99.*

Ovuru, S.S., Beropubo, N.A. and Modu, M.B. (2004). Biochemical Blood Parameters in Semi-adult Rabbits Experimentally Fed Crude Oil Contaminated Diets. *African Journal of Biotechnology, 11(22):6197-6206*.

Sher, A., Fakhar-Ul-Mahmood, M., Hussain-Shah, S.N., Bukhsh, S. and Murtaza, G. (2012). Effect of Garlic Extract on Blood Glucose Level and Lipid Profile in Normal and Alloxan Diabetic Rabbits. *Advances in Clinical and Experimental Medicine, **21**(6)705-711.*

Tsai, T.H., Tsai, P.J. and HO, S.C. (2005). Antioxidant and Anti-inflammatory Activities of Several Commonly Used Spices. *Journal of Food Science, **70**(1): 93-97*.