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Effects of Water Leaf (*Talinum triangulare*) Shoot Meal on the Performance of Weaner New Zealand White Rabbits

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ABSTRACT

Thirty (30) weaner New Zealand white rabbits of both sexes, made up of fifteen (15) males and fifteen (15) females were used for the experiment to investigate, the performance characteristics and carcass characteristics of weaner rabbits fed five (5) dietary levels of *Talinum triangulare* shoot meal (TTSM). Treatments 1, 2, 3, 4 and 5 received 0, 10, 15, 20 and 25% TTSM, respectively. Results obtained showed that rabbits on T_2 diet achieved the corresponding weight gain (1876.00) while T_1, T_3, T_4 and T_5 recorded weight gains of (1925.00, 1799, 1743 and 1655), respectively. Rabbits on T_2 diets also recorded a corresponding daily weight gain (74g) than those on T_3, T_4 and T_5 (73g, 68g and 55g), respectively. There was also significant difference ($P< 0.05$) on the feed cost per kg gain as T_2 feed was cheaper (N191.20), than T_3, T_4 and T_5 whose feed costs were N176.20, N151.10 and N119.70 respectively. Feed intake and initial live weight had no significant difference ($P > 0.05$) across the treatments. Results of organ weights showed a significant difference ($P < 0.05$) on the weight of intestine (g), heart weight (g), liver weight (g) and kidney weight (g) respectively. This investigation therefore suggests that New Zealand white rabbits can tolerate *Talinum triangulare* shoot meal (TTSM) up to 20% level for optimal performance. Higher levels of incorporation resulted in decreased performance and should be discouraged.

Keywords: *Talinum triangulare* shoot meal, New Zealand White Rabbits, Performance Characteristics, Organ Weight.

INTRODUCTION

In Nigeria where the daily diet is dominated by starchy staples, Nigerian indigenous leafy vegetables are the cheapest and most readily available sources of important proteins, vitamins, especially the pro vitamin A (Mbaegbu, 2012) and essential amino acids. Vegetables are the most widely grown crops in Nigeria. They provide vital food security for many subsistence farmers in the country. Vegetables rank higher in production than all other crops. They are known to provide 80% of the vitamin A in diet (Lussier, 2010). Indigenous vegetables are reported to play a very important role in income generation and subsistence (Orech *et al.,* 2010).

Nigerian leafy vegetables have long been and continue to be reported to significantly contribute to the dietary vitamin and mineral intakes of local populations (Smith and Eyzaguirre, 2007). Water leaf is reported to be grown for its leaves which are rich in beta-carotene, calcium, iron and vitamin C (Nordeide *et al*., 1996).

One of the solutions to the present animal protein intake deficit in developing economies lies in the intensive utilization of livestock with short generation interval (Ahaotu *et al.,* 2017). Rabbit is an example of micro-livestock and short-cycle animal whose meat is widely accepted. The rabbit has elicited much interest because it is easy to manage, highly prolific breeder, efficient converter of plant products, and requires little capital outlay. Rabbit meat is white, fine grained, low in fat and caloric value, rich in protein and some minerals and vitamins (Ahaotu *et al.,* 2008). The recent high costs of feed ingredients in particular have brought about the need to look inwards for alternative to the conventional feed resources. It is therefore imperative to explore other feed materials that are not useful to human (Oyen and Lemmens, 2002). The limited supplies of raw materials for the feed industry have resulted in a continuous increase in the cost of production, causing a phenomenal rise in the unit cost of products. The increase in the cost of grains in Nigeria has been related to its scarcity as a result of competing for these feed ingredients. To depend on alternative sources of ingredients, especially when it encouraged a shift to ingredients, for which there is less competition, may help if the latter is sufficiently available (Onu *et al*., 2008).

Feed cost is always the largest item of expenditure in livestock production and protein sources are the most expensive among the ingredients used for livestock feeds. In the face of increasing challenges to produce cheap and good quality animals and animal products, there is need to intensively explore the use of agricultural and agro-based industrial by-products as replacers, substitutes and complements for the more expensive conventional ones and *Talinum triangulare* shoot meal (TTSM) is one of such by-products (Duperiez and De Leener, 2009).

Rabbits are not rodents, but are included in a family called *Lagomorphs*. They are strict herbivores and have continually growing incisors and molars that are designed to tear and macerate very tough leafy foods. The teeth rub against each other and are worn down by the action of eating. Rabbits require a large percentage of fiber in their diet to maintain normal gastrointestinal motility. Rabbits are monogastric animals with enlarged caeca. They are medium sized hopping mammals with long legs, long ears and short tails. Rabbits are mainly reared for their meat and fur. Rabbits also have tremendous capacity for sustainable production of animal protein for human consumption (Ahaotu and Adeyeye, 2014) and could be promoted as a healthful natural meat (Onyeocha and Onyinyechi, 2011).

Alawa and Oyarole (2004) suggested that the best logical solution to Nigeria's national meat scarcity is to increase rabbit production. In an effort to reduce the cost of rabbit production, rabbit nutritionists have tried to harness and utilize by-products and wastes that are not directly utilized by man. The use of *Talinum triangulare* shoot meal (TTSM) in rabbit production will improve the mineral profile thus encouraging fecundity rates (Onyekwere *et al.,* 2011).

MATERIALS AND METHODS

This study was carried out at the Rabbit Unit of Imo State Polytechnic Teaching and Research Farm, Umuagwo, Nigeria. The site is situated between longitudes 7^{o} 0^{1} 06^{11}E and 7^{o} 03^{1} 00^{11} and latitudes 5^{o} 28^{1} 00^{11}N and 5^{o} 30^{1} 00^{11}N in the humid tropical West Africa (IMLS, 2015). *Talinum triangulare* shoot used for this study was collected from the Botanical garden, Imo State Polytechnic Umuagwo, Nigeria. The shoots were spread on mat and concrete floor to be dried by solar radiation. On drying, the samples were milled. The *Talinum triangulare* shoot meal was subjected to proximate analysis (Table 1) at the Science Technology Laboratory, Imo State Polytechnic Umuagwo, Nigeria, using standard methods (AOAC, 2001). The mineral analysis was carried out using the methods of Grueling (2000) while gross energy was determined with a Gallen Pump Oxygen Adiabatic Bomb Calorimeter. The samples were also weighed, evaporated in rotary evaporator and then loaded into the Technicon sequential multi sample Analyzer for amino acid determination as described by Spackman et al., (1958).

Table 1: Chemical composition of TTSH (*Talinum triangulare* shoot meal)

	Percentage
Dry Matter Content	9.65
Crude Protein	21.02
Crude Fiber	10.32
Ether Extract	1.45
Ash	34.50
Nitrogen Free Extract	32.52
Metabolisable Energy	1810kg/kcal
Mineral Composition	**PPM**
Calcium	0.4300
Potassium	0.7122
Iron	0.3700
Zinc	0.0500
Lead	Trace
Magnesium	105.12

Chemical composition and Nutrition value

The proximate composition of *Talinum triangulare* shoot meal (TTSH) is shown in Table 1.

Procurement of experimental Birds and Brooding

A total of thirty (30) weaner New Zealand white rabbits were used for this study. The weaner rabbits were raised in experimental hutches with compounded weaner rabbit feed for one week to stabilize the rabbits before the feeding trials. Out of thirty rabbits, twenty five were selected based on good health, apparent viability and good conformation assigned to five dietary treatments.

Table 2: Ingredient Composition of Experimental New Zealand White Weaner Rabbit Diets

Ingredients	T_1	T_2	T_3	T_4	T_5
Water Leaf Shoot Meal	0.00	10	15	20	25
Wheat Offal	25	15	10	5	0.00
Maize grain	32	32	32	32	32
Groundnut Cake	3.93	3.93	3.93	3.93	3.93
Soya-bean Meal	8.0	8.0	8.0	8.0	8.0
Fish Meal	12.0	12.0	12.0	12.0	12.0
Palm Kernel Cake	8.0	8.0	8.0	8.0	8.0
Bone Meal	2.15	2.15	2.15	2.15	2.15
Dl-Methionine	0.2	0.2	0.2	0.2	0.2
Premix (Grower)	0.4	0.4	0.4	0.4	0.4
Common Salt	0.32	0.32	0.32	0.32	0.32
Total	100	100	100	100	100
Chemical Composition					
Nutrients					
Crude Protein	19.53	19.77	19.84	19.92	19.99
Crude Fiber	3.58	3.59	3.60	3.61	3.63
Ether Extract	4.06	4.01	3.95	3.91	3.86
ME Kcal /kg)	2869.50	2863.10	2856.50	2850.10	2843.60

Vitamin - mineral Premix (mg/kg diet): Vitamin A, 1200 IU; Vitamin D_3, 1500 IU; Vitamin B_{12}, 0.03, Vitamin K_3 5; Vitamin B_2, Vitamin B_6, Nicotine amide, Calcium D-Pantothenate, Folic acid, 0.75; D-Biotin, 0.075; Choline – Chloride, 375mg; Antioxidant, 10mg, Mn, 80mg; Fe, 80mg; Zn, 60mg; Cu, 8mg; I, 0.5mg; Co. 0.2mg, Se, 0.15mg.

Formulation of the experimental diets

Five experimental diets were formulated containing 0%, 10%, 15 %, 20% and 25% TTSM representing treatments 1, 2, 3, 4 and 5 respectively in which 0% TTSM was the control (Table 2). The feed was fortified with vitamin premix. The ingredients were thoroughly mixed to ensure homogeneity before grinding in a hammer mill. Experimental rabbits were randomly allocated to the five dietary groups containing 0%, 10%, 15 %, 20% and 25% TTSM for treatments 1, 2, 3, 4 and 5 and were replicated thrice in a completely randomized design. Six weeks old weaner rabbits were reared on the experimental hutches. Each hutch was equipped with feeding troughs and drinkers.. Treatment diets and water were administered *ad libitum.* Routine management practices such as vaccination, drug administration and scrupulous cleanliness of the hutches and equipment were carefully applied.

Data collection

Initial weights were determined at the start of the experiment with the aid of salter weighing balance and thereafter at weekly intervals. The final weight was also taken by weighing the rabbits in each replicate on the last day of the experiment using the same weighing balance. The weight gains were calculated by subtracting the initial weight from the final weight. In addition, the feed intake was calculated by subtracting the feed remaining from the total feed supplied each day before serving fresh one. The feed conversion ratio was also calculated by dividing feed intake by weight gain. The feed cost was determined as the sum of the cost of all ingredients included in the diet.

Data analysis

All data generated were subjected to one way analysis of variance (Steel and Torrie, 1980), while significant differences in means were determined using Duncan's Multiple Range Test (Gordon and Gordon, 2004).

RESULTS AND DISCUSSION

There was significant interaction between dietary levels of water leaf shoot meal and wheat offal on daily feed intake, daily weight gain, feed cost per kilogram, initial and final live weights respectively. The parameter response of rabbits to dietary *Talinum triangulare* shoot meal depends on the presence of supplementary wheat offal. The energy content of the diets does not seem to be the factor that determine feed intake in this trial as shown in Table 3. Thus feed intake reduced with increase in the levels of *Talinum triangulare* shoot meal. Addition of 15.0% wheat offal and 10.0% water leaf shoot meal improve feed intake suggesting that energy was not the reason for the trend in feed intake observed. The reduced trend in feed intake observed is thought to be related to a combination of palatability and bulkiness of *Talinum triangulare* shoot meal, which affects gut-fill (Onakpa *et al*., 2011). The improvement in weight gain of the rabbit fed diets with supplement wheat offal relative to those without wheat offal could be attributed to the extra caloric effect accompanied with a reduced feed passage time in the gastro – intestinal tract (GIT). This would allow increased utilization of other constituents of the diets similar to that reported by (Ocheja *et al.,*2011).

Rabbits fed diets 20% *Talinum triangulare* shoot meal and 5% wheat offal had almost similar feed utilization with those fed diet T_3. Rabbits on the supplemented diet consumed more feed relative to other rabbits in an attempt to satisfy their nutrient requirements.

The significantly ($P<0.05$) depressed weight gain and feed conversion ratio in rabbits fed 25% *Talinum triangulare* shoot meal in diet T_5 could therefore be attributed to the anti-nutritional effect of tannins, oxalate, phytate and crude fiber in this diet (Orech *et al.,*2010). Oxalate binds calcium to form calcium oxalate crystals. This prevents the absorption and utilization of calcium by the body thereby causing diseases such as ricket and osteomalacia (Berepubo, *et al.,* 1995). The calcium crystals may also precipitate around renal tubules to cause renal stones while phytic acid combines with some essential elements such as iron, calcium, zinc and phosphrus to form insoluble salts called the phytates which are not absorbed by the body thus making the minerals unavailable (Bruinenberg *et al.,* 2001). Tannins are water soluble phenolic compounds with a molecular weight greater than 500 and with the ability to precipitate proteins from aqueous solution. They also occur in all vascular plants. They combine with digestive enzymes thereby making them unavailable for digestion (Rosen.,2006).

Table 3 showed that final weight of the experimental birds varied significantly ($p<0.05$) between treatments. Birds on 0% TTSM were significantly ($p<0.05$) heavier than those on 10% and 15%, which were also significantly heavier than birds on 20% and 25% TTSM. Daily weight gain followed the same trend. However feed conversion ratio for rabbits on the control diet T_1 and T_2 were most efficient and were significantly ($p<0.05$) different from T_3, T_4 and T_5. Initial weights of the birds were similar ($p>0.05$) between treatments. Though TTSM is highly nutritious, the high levels of *phytates* (Bruinenberg *et al.*2001) caused the reduction in weight gain as higher levels of Wheat offals were included in the diets.

The observation that increasing levels of TTSM made birds consume more feed is explained by their quest to eat enough to meet their body nutritional requirement (Mbaegbu, 2012). The fact that TTSM replacing wheat offal diets in this study were cheaper than the control T_1 indicates that TTSM replacing wheat offal reduces the cost of production.

Table 3: Performance Characteristics of Weaner Rabbits fed Graded levels of *Talinum triangulare* shoot meal for wheat offal (2-4 weeks)

	Inclusion Levels					
Parameters	T_1	T_2	T_3	T_4	T_5	SEM
Initial live weight (g)	200	195	197	194	191	0.15^{ns}
Final live weight (g)	1925^{e}	1876^{d}	1799^{c}	1743^{b}	1655^{a}	11.56*
Daily weight gain (g)	82^{d}	74^{c}	73^{c}	68^{b}	55^{a}	0.12*
Daily feed intake (g)	33	30	27	23	21	0.03^{ns}
Feed conversion ratio	2.16	2.58	2.79	2.93	3.55	-
Feed cost/kg	211.1^{e}	191.2^{d}	176.2^{c}	155.1^{b}	119.7^{a}	0.12*

A,b,c,d,e mean within the same row with different superscripts are significantly different (P<0.05).
*: = Significant (P<0.05)
ns: = Not Significant

The liver weight increased with 20% (T_4) inclusion levels of TTSM for wheat offal in the diets. Akande *et al*. (2010) reported that increasing the levels of TTSM at 20% improved liver and kidney weights in New Zealand rabbits. The significantly (P<0.05) larger weights of the heart of rabbits on diets T_2, T_3, T_4 and T_5 are in agreement with Amaefula *et al.* (2004).

Proximate compositions of *Talinum triangulare* were carried out in both dry and wet samples. Its softening principle was equally investigated in the wet sample. Carotenoids, protein, carbohydrates, steroids, crude fibre and among others were revealed to be present in T. Triangulare .This shows high level of its possible dietary value (Carabano *et al.,* 2008). Generally the dry sample showed higher level of these nutrients than the wet sample except for protein and carbohydrates. The reason may be that the nutrients are not volatile compounds and hence have high dried weight. These results are in line with the findings of (Deblas and Mateos, 2010). He further showed that the vegetable is good for the management of cardiovascular diseases and oxidative stress, since carotenoids are biologic antioxidants.

Table 4: Organ Weights Of New Zealand White Rabbits Fed Varying Replacement Levels of *Talinum Triangulare* Shoot Meal for Wheat Offal

Parameters	**T_1**	**T_2**	**T_3**	**T_4**	**T_5**	**SEM**
Weight of intestine (gm)	180^{a}	165^{b}	150^{c}	135^{d}	90^{e}	2.96^{*}
Heart weight (gm)	6.10^{a}	7.35^{b}	8.33^{c}	9.11^{d}	11.1^{e}	0.43^{*}
Liver weight (gm)	20.3^{a}	28.9^{b}	30.1^{b}	31.3^{b}	35.4^{c}	0.39^{*}
Kidney weight (gm)	12.9^{a}	15.2^{b}	19.6^{c}	20.5^{c}	25.3	1.68^{*}

CONCLUSION

Results obtained from the experiment showed that the best result in final weight was obtained for rabbits fed 0% TTSM followed by 10% TTSM while the poorest result was obtained for rabbits fed 25% TTSM. It was observed that rabbits could tolerate TTSM up to 20% in their diet without negatively affecting weight gain, carcass characteristics, feed conversion ratio and feed cost per kg gain. Higher inclusion levels of TTSM beyond 20% resulted in a decline in performance with regard to carcass and organ weights. The decline in performance with increasing levels of TTSM was attributed to the indigestible fibre content of the TTSM compared to wheat offal. The treatment that gave the poorest result in the experiment (25% TTSM) has no wheat offal. Results obtained showed that all treatments supplemented with wheat offal gave a better result in performance, carcass and organ weight evaluations compared

to the control (0.00% TTSM). Rabbits fed diets supplemented with 15% wheat offal gave a better the result while performance declined with increasing levels of TTSM supplementation .The decline in performance with increasing levels of TTSM was attributed to the rapid impact of the supplemented TTSM on caecal fermentation which resulted in higher digestive activities that was not beneficial to the rabbits. It was therefore concluded that rabbits can tolerate up to 20% inclusion level of TTSM in their diet without negative effects on performance. This inclusion level could be increased to 20% if wheat offal is supplemented at 5% thus, improving performance in productive parameters and evaluation of carcass and organ weight characteristics.

REFERENCES

Ahaotu, E.O, B.U. Ekenyem and E. Aggrey (2017). Sustainability of sweet orange (*Citrus sinensis*) peel meal on the performance of finisher Broilers. Journal of Agricultural Science and Practice. J. Agric. Sci. Pract. Volume 2. Page 27-32.

Ahaotu, E.O and S.A. Adeyeye (2014). Rodents and their Control: Taxonomy and Characteristics. In: Micro Livestock Production in the Tropics. Emmanuel Obioha Ahaotu, Josiah Chidiebere Okonkwo and Uzoma Chima Darlington (editors). Jeolas Press, Owerri, Nigeria. Pp 138-151.

Ahaotu, E.O, Onuwka, C. F. and Ayo-Enwerem C. M. (2008). Commercial Rabbit Production. Jeolas Press, Owerri, Nigeria. 87 pp.

Akande, K.E., Doma, U.D., Agu, H.O. and Adamu, H.M. (2010). Major anti-nutrients found in plant protein sources: Their effect on nutrition. *Pakistan Journal of Nutrition*, 9(8): 837-832.

Alawa, J.P. and F.T. Oyarole, (2004). The effect of varying the roughage to concentrate ratio on the performance of growing rabbits. Bulletin of Animal Health and Production in Africa, 52: 263-265

Amaefule, K. U., Nwaokworo, C. C., and UheuKumone, R.C., (2004). The effects of feeding graded levels of raw pigean pea (*Cajanus cajon*) seed meal on performance, nutrients retention and carcass characteristics of weaned rabbits *Nigeria Journal of Animal Production.* 31: 194-1991.

AOAC (2001).Official Methods of Analysis.Revised Edition.Association of Official Analytical Chemists, Washington DC.

Berepubo, N.A., O.J., Owen, E.C. Chukuigwe, A. and U.I. Oji, (1995). Evaluation of “Sudden Death” syndrome in Rabbit colonies reared under different management systems in Port Harcourt, Rivers State. J. Innovation Life Sci., 2: 42-47.

Bruinenberg, M.H., Valk, H., Korevaar H. and Struik P.C (2001). Factors Affecting Digestibility of Temperate Forage from Semi Natural Glassland. Netherland : Academic Press Pp. 540 – 545

Carabaño, R., Badiola, I., Chamorro, S., García, J., García-Ruiz, A. I., García-Rebollar, P., Gómez-Conde, M. S., Gutiérrez, I., Nicodemus,N., Villamide, M. J. and De Blas, J. C. (2008a). Review: New trends in rabbit feeding: influence of nutrition on intestinal health.*Spanish Journal of Agricultural Research,* 6: 15-25.

Deblas, C and Mateos, G.G. (2010). Feed formulation. In: Nutrition of the rabbit-2nd edition. de Blas, C.; Wiseman, J.(Eds). International, UK.pp.234-356

Duperiez, H and De Leener, P.H (2009). Africa Gardens and Orchards: Growing Vegetables.

Revised Edition. Macmillan Press, London. Pp 45-98.

Gordon, S. P and Gordon, F. S. (2004). Contemporary Statistics: A Computer Approach. McGraw – Hill Publishers, U.S.A.

Grueling, H. I. (2000).The Chemical analysis of tissues. Revised edition: Cornell University Press, U. S. A.

IMLS (2015). Imo State Ministry of lands and survey – Detailed Atlas of the State.

Lussier, N. (2010). Nutritional value of leafy green vegetables. http://www.helium.com/items/766413- Nutritious - value - of - leafy- green- vs- root vegetables Accessed on December 16, 2010

Mbaegbu, I (2012). Effects of Water Leaf (*Talinum triangulare*) Shoot Meal on the Performance of Weaner New Zealand White Rabbits. HND Research Project, Department of Health Technology, Imo State Polytechnic Umuagwo, Nigeria. 87pp.

Nordeide MB, Hatloy A, Folling M, Lied E and A Oshaug, (1996). Nutrient composition and nutritional importance of green leaves and wild food resources in an agricultural district, Koutiala, in Southern Mali. Intern. J. Food Sci.. Nutr. 45: 455-468

Ocheja, J. O., Ebiloma, S. O., Ukwuteno, S. O., Oguche, H. G. E., Lalabe, B. C. and Akuboh, C. A. (2011). Performance and Heamatological Parameters of Grower Rabbits Fed With Some Browse Supplemented With A Mixture of Bambara Nut Waste and Rice Offal. *Production Agriculture and Technology*,7 (2): 37-47.

Onakpa, M. M., Onuh, F.and Gode, D. S. (2011). Effects of graded levels of maize bran on the growth and carcass characteristics of weaned rabbits. *Journal of Agricultural and Biological Science* 6(5): 45-48.

Onu. P.N; Otuma, M.O; Nwapu, P.E. and Ahaotu, E.O (2008). Enzyme and Probiotic Supplementation of Maize Processing Waste Based Diets for Weaned Rabbits. Proc. Anim. Conf; Agric Soc. of Nig. 42:644-648

Onyekwere, M.U., S.O Okechukwu, B.N Akakemo and E.O Ahaotu (2011). Performance and nutrient evaluation of toasted velvet beans (*Mucuna utilis*) meal fed weaner rabbits. Proc. 36th conf., Nig. Soc. For Anim. Prod. 13 – 16 March, 2011, Abuja, Nigeria. Pp 744-746.

Orech F.O, Akenga T, Ochora J, Friis H and J Aagaard-Hansen (2010). Potential toxicity of some traditional leafy vegetables consumed in Nyang'oma Division, Western Kenya. African. J. of Food Agriculture Nutrition.12: 34-46

Oyen, L.P and Lemmens, R. (2002). Precursor: Plant Resources of Tropical Africa. Prota Press, Netherlands. Pp 465- 642.

Rosen, G. (2006). Exogenous enzymes as pro-nutrients in broiler diets. *In* J.Wiseman and P.C. Garnsworthy, eds, Recent developments in non-ruminant nutrition, Nottingham, UK, Nottingham University Press, pp.163-191.

Smith, I. F. and Eyzaguirre, P., (2007). African Leafy Vegetables: Their Role in the WHO's Global Fruit and Vegetable Initiative. African Journal of Food Agriculture Nutrition and Development. Vol.7(3):1-17.

Spackman, D. H. Stein, E. H and Moore, S. C. (1958). Automatic recording apparatus for use in the chromatography of amino acids. *Analytical chemistry,* 30, 1191.

Steel, R. G., and Torrie, J. H. (1980). Principles and Procedures of Statistics: A biometrical approach. 3rd Edition.McGraw – Hill Book Coy, N.Y. U.S.A.

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