FOOD INSECURITY IN AFRICA:
AGRICULTURAL DIVERSIFICATION AS A PANACEA

1st

Proceedings of

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{ICAAT 2019}

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School of Agriculture and Agricultural Technology

DATE: **23rd - 26th April, 2019**

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SCHOOL OF AGRICULTURE AND AGRICULTURE TECHNOLOGY

The School of Agriculture and Agriculture Technology was established in January 1986 with two Departments (Animal Production and Crop Production) and four pioneer academic staff (Dr. Z. Stecki, Dr. S. Plonka, Mr. E. K. Tsado and Mr S. L. Lamai). With subsequent development, four more departments (Soil Science and Land Management, Water Resources, Aquaculture and Fisheries Technology and Agricultural Economics and Farm Management and Agricultural Extension and Rural Development) were created.

The Department of Soil Science started as a Unit under the Department of Crop Production in1987 and attained full status as a Department in 1988 and name was changed to Department of Soil Science and Land Management. The Department of Fisheries Technology, now known as Department of Water Resources, Aquaculture and Fisheries Technology started in 1987 as a Unit in the department of Animal Production which transformed to the Department of Animal Production and Fisheries Technology in 1989 and was split into department of Animal Production and Department of Fisheries Technology in 1991. The Department was repackaged and renamed Department of Water Resources, Aquaculture and Fisheries Technology in 2006. A new Unit, Agricultural Economics and Extension Technology was created during the 1997/1998 section under the Department of Crop Production. The Unit was separated from the mother Department and upgraded to a full-fledge Department in 2002. Approval has also been given for creation of Department of Agricultural Extension and Rural Development while the mother

Department will henceforth bear Department of Agricultural Economics and Farm Management.

In 1997, the proposed Department of Food Science and Nutrition took off as a Unit in the Department of Animal Production and became a full-fledged Department of Food Science and Technology. Similarly, the Horticulture unit has emerged in the Department of Crop Production and it is hoped that, in due course, a separate Department of Horticulture will be created.

The student intake into the School at inception in 1986 stood at two (one student each for Department Of Animal Production and Department Of Crop Production), and these graduated in 1989. Since then, the school has witness tremendous progress in terms of staff recruitment and development, infrastructural development and student enrolment. Today, the staff and student population stand at 107 and 1,444 respectively.

Dr. Z. Stecki was the first Coordinator for the school (1986 September 1988). Dr. E.A. Salako took over as School Coordinator from October 1988 to 1990 and served later as Acting Dean until he became the only Professor in the School when he was made the Dean. After his tenure, the School reverted to the position of Acting Deanship since no Professor was on ground then. These were Dr. J.A. Oladiran (1995-1998) and Dr. S.L. Lamai (1998-2001). By September 2001, with more Professors on ground portraying the extent of development, the Board of School Of Agriculture And Agricultural Technology, in accordance with the University regulations, elected Prof.O.O.A. Fasanya as the Dean of the School for a two-year term. Since then, the Deanship position in the School has been filled by election. Prof. E.A. Salako took over from Prof O.O. A. Fasanya in 2003 and Prof. S.L. Lamai took over from Prof. E.A. Salako in 2005. In January 2008, following the appointment of Prof. S.L. Lami as the dean of postgraduate school, Prof. K.M. Baba assumed Deanship of the School. In February 2012, Prof. M.G.M. Kolo succeeded Prof. K.M. Baba who had completed his second two-year term. Professor Kolo was re-elected another term of two years from February, 2014. While servicing the second term, he was appointed Dean of Postgraduate School which necessitated another election leading to the emergence of Prof. R.J. Kolo the new Dean in March 2015. Following the completion of the second term of Prof. Kolo, elections were conducted and Prof. A. J. Odofin emerged as the Dean as from 9th of April, 2019.

INTERNATIONAL CONFERENCE OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY

The Committee of the 1st International Conference of Agriculture and Agricultural Technology (ICAAT 2018) is pleased to announce the conference. This conference is an avenue to disseminate innovative research results and latest development in technologies related to agriculture which are aimed at fighting food insecurity. The conference will bring together leading researchers and scientists in agriculture and allied fields, and even commoners in the domain of interest from around Africa and the world. This international conference brings together experts, intelligentsia and potential researchers from various fields of agriculture to cross-fertilize ideas and ponder on the recent innovations and techniques for the sustainable development aimed at fighting food insecurity in Africa. Therefore, during the three-day

conference, all participants will have plenty of opportunities for exchanging ideas, findings and the latest research results and exploring the rich culture of the Nupe and Gbagyi kingdoms in central Nigeria.

PROGRAMME OF ACTIVITIES

DAY 1: TUESDAY, APRIL 23			
Time	**Activity**		
7.00-6pm	Arrival		
DAY TWO: WEDNESDAY, APRIL 24			
8.00 am-	Registration of Participants		
8.00 -9.00	BREAKFAST		
9.00-11.00	**PLENARY SESSION** Paper 1 Seed yield and physiological seed quality of cowpea varieties sown at different planting dates in Minna, Southern Guinea Savanna of Nigeria by Mrs. O.A. Adediran Paper 2 Performance of soybean genotypes under *Rhizobia* inoculation across three Agro ecologies of Nigeria by Dr. K.D. Tolorunse		
11.00-1.00	**TECHNICAL SESSION 1**		
	Hall 1 Prof. A.S. Gana (Chairman) Dr. B. A. Alimi (Rapporteur) Abstract no.: 1,2,3,4,5,6,7,8,9,10	**Hall 2** Prof. E.K. Tsado (Chairman) Dr. E. Daniya (Rapporteur) Abstract no.: 11,12, 15,16,17,18,19,20,21,90	**Hall 3** Prof. K.M.Baba (Chairman) Dr. O. J. Alabi (Rapporteur) Abstract no.: 22,23, 25,26,27,28,29,31, 76, 103
1.00-2.00	**BREAK/LUNCH**		
2.00-3.30		**TECHNICAL SESSION 2**	
	Hall1 Prof. S.O.E. Sadiku (Chairman) Dr. S.S.A.Egena (Rapporteur) Abstract no: 32 ,35,36,37,38,39,40,41,42, 75	**Hall 2** Prof. A. Aremu (Chairman) Dr. C.O.Adebayo (Rapporteur) Abstract no: 43,44,45,47,48,49,50,51,52, 104	**Hall 3** Prof. B.A.Ayanwale (Chairman) Dr. M. Ibrahim (Rapporteur) Abstract no: 53,54,55,56,57,59,60,61,62, 102
DAY THREE: THURSDAY, APRIL 25			
8.00-9.00	BREAKFAST		
8.00-10.00	Arrival of Guests and Dignitaries		
10.00-10.15	National Anthem/Prayer		
10.15-10.30	Introduction of Guests		

10.30-10.45	Opening Address by Chairman of the Occasion		
10.45-11.15	Keynote Address		
11.15-12.00	Goodwill Messages		
12.00-1.30 Break/Lunch			
1.30-3.00		**TECHNICAL SESSION**	
	Hall 1 Prof. R.S. Olaleye(Chairman) Dr. E.Z. Jiya (Rapporteur) Abstract no: 30, 33 46, 65,66,67,68,69,70,71,72,73,74	**Hall 2** Prof. A.T. Ijaiya (Chairman) Dr. A.A.A. Coker (Rapporteur) Abstract no:77,78, 79,80,81,82, 83,84,85,86,87,88,89	**Hall 3** Prof. J.O.Oyero (Chairman) Dr. K.D. Tolorunse (Rapporteur) Abstract no: 24,91,92,93,94,95,96,97,98, 99,100,101
3.00-4.15	Communique and Formal closing		
4.30 – 6.00	Cocktail		

COMMUNIQUE ISSUED AT THE END OF THE 1ST INTERNATIONAL CONFERENCE OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY (ICAAT) HOSTED BY SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGER STATE, NIGERIA BETWEEN 23RD-26TH APRIL, 2019.

PREAMBLE

The conference with the theme: "Food Insecurity in Africa: Agricultural Diversification as Panacea" had over one hundred and seventy (170+) participants from all over the world. The conference had a total submission of one hundred and four (104) papers presented in two plenary and 12 technical sessions. The conference was declared open by the Vice Chancellor of the Federal University of Technology, Minna, Professor Abdullahi Bala. The lead paper on the theme of the conference was presented by Professor David Norris, Vice Chancellor of the University of Botswana.

The conference identified food insecurity as a major challenge to improved livelihood for the people of Africa. According to Food and Agriculture Organization (FAO), thirty nine (39) countries in the world were experiencing food emergencies in 2006, twenty five (25) of the countries were in Africa. The recent developments in the region such as climate change, insurgencies, and conflicts are further aggravating the situation. Hence, the conference had robust deliberations which identified key issues affecting food insecurity in the continent and brought forward practical solutions to address the challenges through agricultural diversification. The contributions of agriculture to food security, which could eventually transform to economic growth for the continent are summarized under five inter-sectorial linkages. Thus: Supply of food for both domestic consumption and export; provision of markets; increased domestic savings; foreign exchange earnings; and employment of labor.

The highlights of resolutions are listed as follows:

1. African governments are advised to invest in infrastructural development at the rural areas where the main agricultural activities take place.
2. The governments are encouraged to cut down on the huge amounts of money in foreign currency being spent on subsidizing food imports to encourage local food production.

3. It is the right time to diversify the economy from oil based to agricultural driven, which seems to be the most sustainable way forward.
4. There is need for agricultural transformation through mechanization and utilization of appropriate technologies
5. Small scale farmers should be encouraged to form cooperatives to enable them assess government and non-governmental assistance for increased productivity.
6. Governments are advised to comply with Maputo/Malabo Declaration of 10% national annual budget for agriculture
7. Academics are challenged to undertake comprehensive researches to provide fundamental solutions to lingering herders-farmers conflict which has led to great reduction in agricultural productivity and claimed several lives, especially in Nigeria.
8. African leaders are advised to deploy utmost political will, which is essential for achieving food security in the continent.

Conclusively, stakeholders are implored to focus more on agriculture because it is extremely important, highly sustainable, but under-explored.

Professor J. N. Nmadu
(Chairman, LOC)

Dr. O. J. Ajayi
(Secretary, LOC)

Communique Committee

Dr. J. H. Tsado
Chairman,

Dr. B. A. Alimi
Secretary

Dr. D. N. Tsado
Member

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NUTRIENT DIGESTIBILITY AND CARCASS CHARACTERISTICS OF WEANER RABBITS *(Oryctolagus cuniculus)* FED GRADED LEVELS OF BOILED PELLETED NEGRO COFFEE (*Senna occidentalis*) SEED MEAL.

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ABSTRACT

A 12 week feeding trial was conducted to determine the nutrient digestibility and carcass characteristics of weaner rabbits fed boiled pelleted senna occidentalis. A total of forty-five weaner rabbits of mixed sexes were randomly divided into five treatment groups in a completely randomized block design with three replicates of three rabbits each. Boiled senna occidentalis was included in the diets at the levels of 0%, 2.5%, 5%, 7.5% and 10% i respectively. Although a significant difference ($p<0.05$) observered in the result of feed intake and feed conversion ratio, they however decreased linearly with increasing levels of senna in the diet. Weekly weight gain was highest in Treatment 4(7.5% boiled pelleted senna) from the fourth week till the end of the experiment while Treatment 5(10% senna) recorded the lowest throughout the experiment. Treatment 1 had the highest digestibility values for crude protein and fat while Treatment 4 had the highest value for crude fibre, although significant variation ($p<0.05$) occurred among all the parameters taken (Nutrient Digestibility and Carcass Characteristics). Significant difference ($p<0.05$) occurred in the live weight, slaughter weight and dressed weight. The weight of the dressed external parts and the internal organs showed significant difference ($p<0.05$). Better performance parameters were obtained in Treatment 4 indicating that up to 7.5% boiled senna can be included in the diets of growing rabbits without any adverse effects.

KEYWORDS: Boiled Pelleted S*enna occidentalis* seeds, Digestibility, Carcass

INTRODUCTION

Rabbit production is becoming more attractive among the tropical farmers because of its numerous desirable traits which include: ability to convert plant feed materials into high quality protein, high growth rate (when compared to other livestock like goat, sheep, pig and cattle), high fecundity, short generation period, good source of organic manure for farmers and high adaptability to varying climatic extremes among others (Mailafia *et al*., 2010).

The cost of the conventional feed stuffs has continued to increase tremendously in recent times and as livestock production continues to increase to meet the growing population of the world, the availability of these conventional feed stuffs is often fickle. This challenge has been worsened by the rising competition between man and livestock for these conventional feedstuffs (Odunsi, 2003). Feed forms the most important component in livestock production and if not provided in the right quality and quantity, the amount and quality of livestock products will reduce and there will be limited supply of animal protein to meet the human needs. Non-conventional feedstuffs generally refer to those feed stuffs that are not traditionally used for feeding livestock and are not used commercially to produce animal feeds. Several known examples of these feedstuffs among others are negro coffee, palm leaf meals, palm press fibre, seeds and leaves of *gmelina arborea* (gmelina) and cassava foliage. The objective of this study is to determine the potentials of *Senna occidentalis* (Negro coffee) as feed material and the performance of rabbit fed on coffee. Abdullahi *et al.* (2003) reported that the use of negro coffee is limited due to poor information on its nutritional values and the presence of anti-nutritional factors such as phytates, cyanide, saponnins, trypsin inhibitor, tannins and anthroquinones coupled with its pungent smell.

MATERIALS AND METHODS

Forty-five mixed sexed rabbits were used for this study while the *senna occidentalis* seeds were harvested from the matured shrub stands in the wild along the roads. *Senna* pods collected were well dried and threshed to get the seeds which were then winnowed and cleaned to remove dirts. The cleaned seeds were then boiled using the method described by Omoikhoje *et al.* (2009) which was adopted by Yahaya (2014); the seeds were subjected to boiling at 100^0 C for 60 minutes and then removed and dried. The boiled dried seeds were milled using hammer mill to get a fine texture and was labelled boiled *senna occidentalis* seed meal (BSOSM) and then

stored. Anti-nutritional factors such as cyanide, tannin content, saponnin, phytic acid, trypsin inhibitor activity of both boiled and raw *senna* seeds were determined at the National Cereals Research Institute, Badegi using the methods of Onwuka (2005). Formulated feeds were pelleted using pelleting machine of 2mm screen size toprevent waste of feed during feeding and it was served *ad-libtum.* The proximate analysis of the feed and feacal samples was carried out using AOAC (2000) standard methods to determine the quality and nutrients in the feed such as the (Dry matter (dm), Crude protein (cp), Crude fiber (cf) Ether extract ,(ee), and Ash) and the nutrients voided out through the feaces to establish the nutrient intake.

RESULTS AND DISCUSSION

Table 1 shows the effects of boiling on the anti-nutritional factors present in the raw seeds. Tannins recorded the highest percentage reduction of 78.38% while saponnin recorded the lowest percentage reduction of 24.74%. Table 2 shows the feed composition of the experimental diets .The crude protein ranges from 17.99% in T2 to 18.09% in T4. The performance parameters are shown in Table 3.Average feed intake recorded significant differences ($p<0.05$) between treatments for all the weeks with the values decreasing with increasing levels of *senna* in the diet. The feed conversion ratio also followed similar trend with significant differences observed among all the treatments throughout the experiment except at weeks 4, 5 and 8. Midala *et al*. (2013) and Tasaka *et al*. (2000) also reported similar decrease in feed intake and feed conversion ratio (FCR) with higher levels of *senna* in the diets. This could be as a result of higher residual effects of anti-nutritional factors. The result for the nutrient digestibility is shown in Table 4.Rabbits on the control diet had the highest digestibility values for crude protein, crude fat and nitrogen free extract which are necessary for growth and energy respectively. Rabbits on Diet 4(7.5% boiled *senna occidentalis* seed meal) had the second highest digestibility values for crude protein and crude fibre.

Diet 5 had the highest value for dry matter. There was however a significant difference among all parameters taken. The carcass result shown in Table 5 indicates that rabbits on Diet 4(7.5 % boiled *senna occidentalis* seed meal) recorded the highest values for live weight, slaughter weight, empty body weight and dressed weight. This result is contrary to the results obtained by Midala *et al*. (2013) which revealed that performance variables and carcass weights decreased as the level of raw seeds increases in the diet from 2.5% to 10%. This could be attributed to the high amounts of anti-nutritional factors present in raw seeds. Ogunlade *et al*. (2011) reported that anti-nutritional factors like tannin can affect the availability of amino acids and the utilization of protein thereby depressing growth. The significant difference in the weight of internal organs and external parts is in accordance with the results obtained when raw seeds were fed to rabbit by Midala *et al*. (2013). Final weight gain was highest in rabbits from Treatment 4 fed (7.5%) inclusion level of (boiled *senna occidentalis* seed meal) from the fourth week of the experiment till the end of the experiment. This reveals that nutrients were not just digested but were also optimally absorbed and assimilated to aid body growth and weight gain. Amy (2010) had reported that rabbits if fed balanced ration are efficient converters of feed to meat, however, Midala *et al.* (2013) had reported that performance of rabbits fed raw *senna* seeds decreased linearly with increasing level of *senna* in the diet. This contradiction could be as a result of high amount of anti-nutritional factors in raw *senna.* However, at 10% inclusion of boiled *senna occidentalis* seed meal in the diet, rabbits recorded the lowest weight gain from the inception of the experiment till the end even though they had recorded the highest digestibility value for dry matter. This could be as a result of possible effect of residual anti-nutritional factors present in the diet. Shaahu *et al*. (2014b) had stated that although the digestion of a diet may be good but the utilization can be poor due to impaired absorption; which can be due to the presence of certain anti-nutritional factors like phytohaematogglutinins, which exert a non-selective adverse effect on the absorption of nutrients from the intestinal tract rather than a direct effect on the digestive process. However, poor digestion in this case may also be attributed to higher levels of saponnin content. Tannins reduce feed intake by decreasing palatability of diets because of its astringent effect on oral cavity. It also forms complex with certain enzymes of the digestive tract seriously affecting utilization of carbohydrates and proteins and resulting in decreased growth, feeding efficiency, metabolizable energy and availability of amino acids (Onyango *et al.*, 2005).

CONCLUSION

Based on the results of this study, it can be concluded that boiled *senna occidentalis* seed meal had no adverse effect on the carcass characteristics and nutrient digestibility of rabbits. This result shows also that boiled *senna occidentalis* seed meal can be included up to 7.5 % in the diets of growing rabbit without any adverse effect.

Table 1: Anti-nutritional factors of raw and boiled *Senna occidentalis* seeds

Anti-nutritional factors	Raw	Boiled	% Reduction
Cyanide (mg/100g)	18.30	7.06	61.42
Phytate (mg/100g)	518.25	332.18	35.90
Tannin (g/kg)	25.86	5.59	78.38
Saponin (mg/100g)	32.10	24.16	24.74
Trypsin inhibitor (g/kg)	35.72	15.41	56.86

Table 2: Feed composition and calculated nutrient values of experimental diets on dry matter basis

	DIETS				
Ingredients (%)	1	2	3	4	5
Maize	36.00	36.50	37.00	37.00	37.50
Soybean	27.00	25.00	24.00	24.00	20.00
Blood meal	2.45	2.45	2.45	2.5	2.0
BSOSM	0.00	2.50	5.00	7.50	10.00
Rice offal	18.00	17.00	18.00	16.45	17.95
Maize offal	13.00	13.00	10.00	9.00	9.00
Bone meal	2.50	2.50	2.50	2.50	2.50
*Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.40	0.40	0.40	0.40	0.40
Methionine	0.20	0.20	0.20	0.20	0.20
Lysine	0.20	0.20	0.20	0.20	0.20
Total	100	100	100	100	100
Calculated nutrients					
Crude protein (%)	18.05	17.99	18.08	18.09	18.00
Energy kcal/kg	2992.17	3000.05	3002.63	3002.78	3017.26
Crude fibre (%)	12.23	12.21	11.74	10.87	11.32
Calcium (%)	1.16	0.98	1.13	1.02	0.94
Phosphorus (%)	0.62	0.62	0.61	0.58	0.53

*To provide the following per 100kg of the diet :440mg riboflavin, 720mg calcium,2g pantothenate, 2g niacin, 2.2g chloride, 15mg folic acid, 1mg vitamin B12, 15mg retinol,165mg vitamin D2, 1000mg DL-tocopherol acetate, 1700mg copper, 200mg iodide, 3000mg manganese, 5000mg zinc, 10,000mg iron.
*BSOSM: Boiled *Senna occidentalis* seed meal

Table 3: Growth performance of weaner rabbits fed graded levels of pelleted boiled *Senna occidentalis* seed meal

	DIETS						
	1	2	3	4	5	SEM	LS
Parameters	0.00	2.50	5.00	7.50	10.00		
Init. body weight (g)	546.67^{a}	548.33^{a}	548.33^{a}	548.33^{a}	546.67^{a}	20.35	NS
Final body weight (g)	1175.00^{bc}	1200.00^{bc}	1410.00^{ab}	1550.00^{a}	1053.30^{c}	119.42	**
Av.d.body wt gain (g)	7.48^{bc}	7.66^{bc}	10.26^{ab}	11.94^{a}	6.03^{c}	1.40	**
Av.d. feed intake (g)	56.50^{a}	53.34^{b}	45.51^{c}	43.93^{c}	40.48^{d}	0.97	**
FCR	7.88^{c}	6.96^{bc}	4.47^{ab}	3.78^{a}	7.20^{c}	1.16	**

^{abc}Means with different superscripts showed significant differences ($p<0.05$)
Av.d =Average daily, FCR=Feed conversion ratio, Init= Initial weight.

Table 4: % Nutrient digestibility of rabbits fed graded levels of pelleted boiled *Senna occidentalis* seed meal (BSOM)

	DIETS						
Parameter	1	2	3	4	5	SEM	LOS
Dry matter	77.33^{ab}	73.85^{b}	79.80^{a}	77.84^{ab}	80.59^{a}	2.19	*
Crude Protein	82.74^{a}	78.13^{b}	78.67^{ab}	78.78^{ab}	76.88^{b}	1.99	*
Crude Fibre	69.09^{b}	73.22^{ab}	72.51^{ab}	78.66^{a}	76.13^{ab}	3.19	*
Ether extract	77.39^{a}	76.81^{ab}	73.98^{abc}	71.72^{c}	72.72^{bc}	2.06	*
Ash	63.68^{c}	74.42^{b}	75.48^{b}	82.13^{a}	84.22^{a}	2.74	*
NFE	89.38^{a}	84.14^{b}	85.93^{ab}	84.90^{ab}	83.49^{b}	2.13	*

^{abc}Means with different letters show significant difference($p<0.05$), NFE: Nitrogen Free Extract,
1 = 0 % BSOSM, 2 = 2.5 % BSOSM, 3 = 5.0 % BSOSM , 4 =7.5 % BSOSM, 5 =10.0 %
*= Significant difference, LOS=Level of significance, SEM= Standard error of mean.

Table 5: Carcass characteristics of rabbits fed boiled *Senna occidentalis* seed meal

Parameter	**T1**	**T2**	**T3**	**T4**	**T5**	**SEM**	**LOS**
LV weight(g)	1200.00^{b}	1216.70^{b}	1450.00^{a}	1600.00^{a}	1100.00^{b}	102.20	*
SL weight (g)	1150.00^{bc}	1116.70^{c}	1350.00^{ab}	1450.00^{a}	1050.00^{c}	102.20	*
EM weight(g)	1000.00^{ab}	850.00^{b}	1050.00^{ab}	1150.00^{a}	833.30^{b}	86.28	*
DR weight (g)	622.98^{dc}	651.99^{c}	758.03^{b}	912.84^{a}	538.61^{d}	40.28	*

^{abc}Means with different letters show significant difference ($p<0.05$).
SL weight=slaughter weight, *= Significant difference, LV weight = Live weight, EM weight = Empty weight, DR weight = Dressed weight.

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REFERENCES

Abdullahi, M., Mohammed, G., Abdulkadir, N.U. (2003). Medicinal and economic plant of Nupe. Bida, Niger State, Nigeria.: Jube Evans Books Publications.

Amy, H.E. (2010). M.Sc. Nutritional Requirements for Rabbits, October, 2010 – Monogastric nutritionist Shur-Gain, Nutreco Canada Inc.

AOAC (2000). Association of Official Analytical Chemists. Official methods of analysis, vol. 1, 17th edition. AOAC, Arlington, VA, USA.

Mailafia, S.1., Onakpa, M.M. and Owoleke O.E. (2010). Problems and prospects of rabbit production in Nigeria. *Bayero Journal of Pure and Applied Sciences*. Volume 3(2): 20-25.

Midala, D.B., Augustine, C., Moses, J.D., and Jimruna, E.Y. (2013). Response of growing rabbits to graded levels of *Senna occidntalis* seedmeal and Cost Benefit of using *Senna occidentalis* seedmeal as feedstuff for rabbits. *International Journal of IT, Engineering and Applied Sciences Research* (IJIEASR) Volume 2, No. 8, August 2013.

Odunsi A.A (2003). Assessment of lablab *(Lablab pruriens)* leaf meal as a feed ingredient and yolk colourings agent in the diet of layers. *International journal of poultry science,* 2(1):71-74.

Ogunlade, I., Ilugbiyin, A., and Osasona, A. I. (2011). A comparative study of proximate composition, anti- nutrient composition and functional properties of *Pachira glabra* and *Afzelia africana* seed flours. *African Journal of Food Science*, 5 (1), 32-35.

Omoikhoje,O.,Aruna, M.B., and Bambgbose, A.S.(2009).Effect of cooking on some anti-

nutrient component of Bambara roundnut seeds. *Journal of Animal Science* , 52-56.

Onwuka, G.I.(2013).Food analysis and instrumentation, theory and practice, printed by Napthali prints, A division of Hg support, Nigeria Limited, Surulere, Lagos, Nigeria.pg 140-153.

Onyango, C., Noetzold, H., Ziems, A., Hofmann, T., Bley,T., and Henle, T. (2005). Digestibility and anti-nutrient properties of acidified and extruded maize-finger millet blend in the production of Uji. LWT, Food Science and Technology 38: 697-707.

Shaahu, D.T., Carew S.N., and Dzungwe N.E. (2014b). Effect of using raw or processed Lablab seed as major protein source in diets on the economics of feeding and growth performance of rabbits. IOSR *Journal of agriculture and Veterinary Science* ((IOSR-JAVS) Vol.7, issues 5 ver. 1 (May, 2014) pp22-26.

Tasaka, A.C., Weg, R.,Calore, E.E., Sinhorini, I.l., Dagli, M.I.Z., Haraguchi, M. and Gorniak, S.I. (2000). Toxicity testing of *Senna occidentalis* seed in rabbits. Veterinary Research Communication 24(8)573-582.

Yahaya, S.K. (2014). Performance and biochemical profile of wild indigenous guinea fowl fed differently processed Negro coffee *(Senna occidentalis)* seed meal under intensive system management. Ph.D Thesis submitted to the Postgraduate School , Federal University of Technology, Minna.