Growth Performance and Carcass Characteristics of Rabbits Fed Differently Processed Soybean

[1]Maidala, A., [2]Dahuwa, T.N. [2]BAKOJI, S. [2]Bello, I.B. and [2]Ajighjigh, D.T.
[1]Department of Vocational and Technology Education,
Abubakar Tafawa Balewa University,
P.M.B.248, Bauchi State
[2]School of Undergraduate Studies,
College of Education Azare Bauchi State
Corresponding author: aminumaidala@yahoo.com

Abstract

Different processed soybean seeds were used to evaluate performance of weaner rabbits, thirty two rabbits of mixed breeds and sexes were randomly allotted to four treatments and there are eight rabbits per treatment replicated four times in a completely randomized design. Result showed that the different processing methods affect daily feed intake (88.63-95.75g), daily weight gain (30.72-43.65g), live weight (1420-1780g), skinned weight (1400-1750g), eviscerated weight (800-927g), dressed weight (52.65-65.78%) and liver (1.20-2.97). The different processing methods were satisfactory in enhancing the performance characteristics; however cooked soybean is more effective.

Keywords: Rabbits, Performance characteristics, Carcass characteristics, processed soybean

Introduction

The gross inadequacy of animal protein in the diets of most Nigerians is clearly recognized by animal nutritionists (Lowrie, 1985). The bulk of proteins consumed in most developing countries like Nigeria are of plant origin and these sources lack certain essential amino acids, proteins of animal origins are more balanced and complete in amino acids (Aduku, 2004). The high cost of animal protein has put it out of the reach of the average Nigerian. This could be attributed to low level of animal protein production. There is therefore, an urgent need to increase livestock production in the country especially those that are highly prolific with rapid turnover rate at very low cost. The production of animals like rabbits, with very short gestation periods and production cycles, can be a solution to the problem of protein shortage in Nigeria. Rabbits can be produced on forages alone, although production can improve by adding other feed supplements. The need to explore other less common, but potential, sources of animal protein such as rabbits has been supported (Bamgbose *et al.*, 2004: Maidala and Istifanus,2012). Nutritionally, rabbit has a higher protein (20-21%), low fat content (10-11%), when compared with meat from other species. Rabbit meat has the cholesterol value of 169mg/100g (dry matter basis) when compared with beef (200mg), chicken (220mg), and low sodium content (Janieri, 2003).

Soybean (Glycine max (L.) Merrill) is a principal vegetable protein source in animal feed industry in Nigeria. The use of soybeans without oil extraction that is full fat soybean has great nutritional properties. It is high in protein with unique biological value, its fat content contribute to the energy required for protein synthesis. Full fat soybean contain between 38-40%CP, 18%

fat and 5% crude fibre (Smith, 2001). Soybean can be used as a source of sole source of protein in poultry and swine diets. The quality of protein of soybean can be comparable to that of animal protein sources such as meat and milk (Fabiyi and Hamidu, 2011). Metabolisable energy of 2800 – 3200k/cal/kg was reported in soybean. The use of full fat soyabean would eliminate the cost of oil extraction in monogastric diets (Lesson et al., 1987). Soybean is limiting in sulphur containing amino acids such as methionine and cystein but contain sufficient lysine to overcome the lysine deficiency of cereal (Potter and Hotchkiss, 1995). Full fat soybean contain anti nutritional factors that reduce the digestibility, bioavailability of nutrients and utilization of amino acids in monogastric and immature ruminants (Anderson Heffernan et al., 1992; Maidala et al., 2013a). Increasing the nutritional quality of soybean and other legumes can be accomplished by several processing methods such as toasting, cooking, extruding, salt treatment, fermentation, germination pressure cooking, cooking, soaking, urea treatment (Akande and Fabiyi, 2010). The methods of processing the seeds to eliminate antinutritional factors have been a major challenge to most farmers (Okagbare and Akpodiete, 2006). It is against this background that the research work attempted to evaluate the different processing methods of soybean seeds on growth performance and carcass characteristics of rabbits.

Materials and Methods

Experimental site

Katagum local government is situated on the northern part of Bauchi state, Nigeria. It is located between latitudes $11^0 42'$ and $11^0 40^0$ and longitude $10^0 31'$ and $10^0 11'$ east (Anonymous, 2009). It shares common boundary with Itas/Gadau local government in north west, Jama'are to the west, Dambam to the east, Misau to the south west, Giade to the south and Shira to the southwest(Azare, 2013). It has a landmass of 1,120 square kilometers (NPC, 2009). The climate of the study area is controlled by the inter tropical convergent zone (ITCZ) which is marked by the rainy and dry season. The major climate elements that influence the climate of the study area and affecting the farming system are temperature and precipitation (rainfall), the annual temperature ranged between 22-33^0 C from April to May (Bashir et al.,2001). The mean annual rainfall ranged between 615.6-985mm with peak between July- Augusts. The study area is in the Sudan savanna, the vegetation is greatly determined by the nature of the soil. The soil in the study area is aerosol with sandy and loamy sand texture and a high percolation rate

Sources and processing of feed ingredients

Soybean and other feed ingredients were procured at Azare main market. The seeds were sorted and processed as follows: sprouted soybean were sprouted by soaking the seeds in water for twenty four hours and spreading the seeds on jute bags and covered by the same material and spread water at regular intervals until the seeds begins to sprout, the seeds were sundried for four days, ground and stored in bags. Cooking of soybean were achieved by bringing the water to boiling water to point in half drum and the seeds were poured and cook for thirty minutes (Fanimo, 1996). The seeds are dried for four days and stored in bags. Roasting of soybean seeds were done with sand in pots for thirty minutes until the seeds change colour to brown and ground and stored (Cheveisrakul and Tantawewepat, 1996). Salt treated soybean was achieved by soaking the seeds in 3% of brine solution (Ayanwale, 2006) the seeds were sun-dried for three to five days. Raw soybean was grounded and used as a control diet.

Experimental rabbits and their management

A total of thirty two rabbits were randomly allotted to the four dietary treatments, there were eight rabbits per treatment replicated four times (two rabbits per replication) in a completely randomized design (CRD). Each cage was equipped with feeder and drinker. Rabbits were dewormed with ivomectine and given Tridox long acting antibiotics before the commencement of the research work. The differently processed soybean was used to formulate the experimental diets and fed to the rabbits for twenty eight days and the parameters determined include daily feed intake and daily weight gain. The data generated were used to compute feed conversion ratio and feed efficiency ratio, economics of production and carcass characteristics. The data generated were subjected to analysis of variance technique (Steel and Torrie, 1980) and Duncan's multiple ranged tests (DMRT) were used to separate the means (Duncan's, 1955). The differently processed soybean was analyzed for proximate composition according to procedure of A.O.A.C. (1990).

Results and Discussion

The experimental diets are shown tin Table 2, and it contains 16% crude protein which is adequate for growing rabbits in the tropics (Aduku, 2004). The proximate composition of the differently processed soybeans are shown in Table 1.There is slight increase in crude protein of cooked and salt-treated soybean, the highest crude protein is obtained in salt-treated soybean and this can be attributed to activity of brine solution on the seed coat of legumes (Maidala, 2013a). Brine solution destroys the seed coat of legumes seeds thereby increasing the crude protein content. The processing methods reduced the ash content of soybean except in salt-treated soybean which increases it (6.55%). The daily feed intake was affected by different processing methods ($P<0.05$) with higher values in raw soybean (95.75g) and lower values in cooked soyabean (88.63g) this suggest efficient utilization, rabbits eat more to satisfied their nutrient requirement when feed materials low in nutrient density, this concurred with the earlier reports of Abeke *et al*., 2011and Maidala *et al*., 2013b.The daily weight gain was affected by different processing methods ($P<0.05$). Rabbits on cooked soyabean (43.65g) significantly gained more weight and this can be attributed to efficient utilization of the cooked soyabean. The feed conversion ratio was not affected by the different processing methods ($P>0.05$). The carcass characteristics of rabbits fed differently processed soyabean are shown in Table 4. The different processing methods affected the live weight, slaughter weight and eviscerated weight ($P<0.05$). Rabbits fed differently processed soyabean were better than the control diet, with cooked soybean having the higher values (Table 4); values reported are slightly higher than the values reported by Fatufe *et al*., 2010 on broilers fed bacterial protein. The dressing percentage was affected by different processing methods ($P<0.05$) with cooked soyabean having higher values (65.78) and the control diet (raw soyabean) having the least values (52.65) (Table 4). The differently processed soybean have an effect on the liver ($P<0.05$). Raw soybean has significantly higher liver (2.97%) compared to differently processed soybean and this can be attributed to different antinutritional factor in raw soybean (Liener, 1980: Ari *et al*., 2012: Maidala *et al*., 2013b). The gut characteristic of rabbits fed differently processed soybean were statistically significant ($P>0.05$). Result of this study showed that all the processing methods of soyabean gave satisfactory performance of rabbits; however cooking was better in enhancing the performance characteristics and carcass yield.

Table 1: Proximate composition of differently processed soybean

Parameters	Differently processed soybean			
	Raw	Roasted	Salt-treated	Cooked

Dry matter	88.63	88.89	88.28	87.25
Crude protein (%)	38.25	37.18	39.40	39.25
Ash (%)	5.74	4.70	6.55	5.73
Ether extract (%)	18.12	17.45	18.55	18.12
Crude fibre (%)	5.30	5.27	5.13	5.30
Nitrogen free extract	32.59	35.40	30.37	32.59

Table 2: Percentage composition of differently processed soybean fed to rabbits

	Differently processed soybean			
Ingredients	Raw	Roasted	Salt-treated	Cooked
Maize	57.63	57.63	57.63	57.63
Full fat soybean	29.62	29.62	29.62	29.62
Wheat offal	10.00	10.00	10.00	10.00
Bone meal	2.00	2.00	2.00	2.00
Sodium chloride	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Total	**100**	**100**	**100**	**100**
Calculated analysis				
Crude protein	16.86	16.86	16.86	16.86
Crude fibre	6.78	6.78	6.78	6.78
Ether extract	8.15	8.15	8.15	8.15
Metabolisable energy (kcal/kg)				

Table 3: Growth performance of rabbits fed differently processed soybean

	Differently processed soybean				
Parameters	Raw	Roasted	Salt-treated	Cooked	SEM
Number of rabbits	8	8	8	8	-
Feeding periods (days)	28	28	28	28	-
Initial mean weight (g)	560	561	560	558	-
Final weight (g)	1420^d	1610^b	1480^c	1780^a	46.25*
Daily feed intake (g)	95.75^a	91.13^a	92.86^a	88.63^b	6.25
Daily weight gain (g)	30.72^b	37.47^a	32.86^b	43.65^a	13.11*
Feed conversion ratio	3.12	2.44	2.83	2.03	NS
Mortality	2	0	0	0	-

Table 4: Carcass characteristics of rabbits fed differently processed soybean

	Differently processed soybean				
Parameters	Raw	Roasted	Salt-treated	Cooked	SEM
Live weight (g)	1420^b	1610^a	1480^b	1780^a	*280
Skinned weight (g)	1400^b	1580^a	1450^b	1750^a	*260
Eviscerated weight (g)	800^b	835^a	810^b	927^a	*125
Dressed weight (%)	52.65^b	62.11^a	54.63^b	65.78^a	*12.78
Liver (%)	2.97^a	1.42^b	2.10^a	1.20^b	*1.23
Lungs (%)	0.41	0.40	0.42	0.41	NS
Heart (%)	0.11	0.10	0.11	0.21	NS

Small intestine (%)	0.32	0.31	0.32	0.31	NS
Large intestine (%)	3.21	2.85	2.87	2.52	NS
Ceacum (%)	4.00	3.25	3.87	3.12	NS

References

Abeke, F.O., Amodu, J.T., Ogundipe, S.O., Sekoni, A.A. and Adeyinka, I.A. (2011). Effect of processing methods on the proximate composition of Lablab purpureus (Rongai) beans. In: In: Adeniji, A.A., Olatunji, E.A. and Gana, E.S. (Eds) **Value Re-orientation in Animal Production: A Key to National Food Security and Sustainable Economy.** Pp 734-736. *Proceedings of 36th Annual Conference of Nigerian Society of Animal Production.* Abuja, Nigeria

Aduku, A. O. (2004). **Animal Nutrition in the Tropics.** Davcon Computers and Business Bureau, Samaru, Zaria, Nigeria

Akande, K.E. and Fabiyi, E.F. (2010a). Effect of processing methods on some Antinutritional factors in Legumes seeds for poultry feeding. *International Journal of Poultry Science* **9** (10):996-1001

Anderson, Hafermann, J.C., Zhong, T. and Parsons (1992). Effect of heating on nutritional quality of conventional and kunitz trypsin inhibitor-free soybeans. *Poultry Science.* **71**:1700-1709

AOAC (1990). Association of Official Analytical Chemist. Official Methods of analysis 15th Edition. Washington DC

Ari, M.M., Ayanwale, B.A., Adama, T.Z. and Olatunji, E.A. (2012). Effects of different Fermentation methods on the proximate composition, amino acids profile and Some antinutritional factors in soybean (Glycine max). *Fermentation Technology And Bioengineering.* **2**: 6-13

Anonymous (2009). Mapsofworld. Com. Available at http://www.mapsofworld.com /Nigeria/cities/azare/html mapXL inc. 10s third street Suite 310 San Jose.

Ayanwale, B.A. (2006). Growth and carcass characteristeristics of broilers fed alkali processed Soya bean. *Nigerian Journal of Animal Production*, **33** (1):40-44

Azare, I.M. (2013).Evaluation of farmer's response strategies to climate change in Katagum local government area of Bauchi state. *Journal of Environment Technology and Sustainable Agriculture* **2** (10):26-33

Bamgbose, A. M., Akinlabi, H., Oboh, S. O.,Aruna, M. B., Ikhimioya, Oteku, I. T., Igene, F. U. and Otoikhain, C. S. O. (2004). Replacement Value of Copra Meal for Soybean Meal in weaner rabbit diets. *Proc. 9th Annual conc. Anim. Sci. Ass. of Nig.* (ASAN) 2004: 26-27.

Bashir, M.M., Bala, A., Mohammed, I.T., Isa, H.J., Adamu, M.B., Hamisu, M.S., and Abdullahi, A.(2001).Request for the creation of Katagum state out of the present Bauchi state of Nigeria. A memorandum submitted to the speakers, house of representatives, national assembly, Abuja, Nigeria pp 1-28.

Cheva- Israkul, B. and Tangtaweewipat, S.(1995).Utilization of fullfat soyabean in poultry diets-Broilers. *AJAS*, **8**(7)89-95

Duncan, D.B., (1955). Multiple range and multiple F-tests. Biometrics, **11**: 1-42.

Fabiyi, E.F. and Hamidu, B.M. (2011). Adoption of improved technologies in soybean processing utilization in Tafawa Balewa Local Government Area of Bauchi State,

Nigeria. *African Journal of Food Agriculture, Nutrition and Development* **11** (1):4527-4537.

Fanimo, A.O. (1996). Nutritional evaluation of full fat soyabean boiled for three times   periods. *Pertanica Journal of Tropical Agriculture.* **19**(2/3):175-182.

Fatufe, A.A., Matanmi, I.O. and A.O. Alalade (2010). Performance and carcass   characteristics of growing rabbits fed bacterial protein meal. *African Journal of Food, Agriculture, Nutrition and Development 1(2010)*

Janieri, A.(2003). Nutritional quality of rabbit meat. Italian R.V. Agriculture, **24**: 275.

Liener, I.E. (1980). Heat labile anti-nutritional factors in: *Advances and legume Science.* Summer field, R.J. and Bounding, A. H. (Eds). Kew London, Royal Botanic Gardens. Pp. 157-170

Lesson, S. J., Atteh, J. O and summers, J.D (1987). Effect of increasing dietary levels of Commercially   heated soybeans on performance nutrient retentions and carcass Quality of broiler chickens. *Canadian Journal of Animal Science.* *67*:821-828

Lowrie, R. A. (1985). Meat science. 4th Edition, Pergamon Press, Oxford. pp 36

Maidala, A. and Istifanus, J.A. (2012). The role of micro livestock in alleviating protein deficiency and poverty reduction in Nigeria. Proceedings of 2nd National conference of school of vocational and technical education, College of Education Azare. Bauchi state   (Eds) Dantata, I.J., Maidala, A. and Garba, A.R.

Maidala, A., Doma, U.D. and Egbo, L.M. (2013a). Effect of different processing methods on the chemical composition and antinutritional factors of soybean (Glycine max (L) Merrill). *Pakistan Journal of Nutrition* **12** (12) 2013

Maidala, A., Doma, U.D. and Egbo. M.L. (2013b). Nutritional evaluation of local processing methods of African locust bean seeds (*Parkia biglobosa*) on proximate composition and growth performance of broiler chickens. Journal of environment technology and sustainable agriculture. Journal of environment technology and sustainable Agriculture 2(1):1-9

National Population Commission (2009).National Population Commission Bulletin.

Okagbare, G. O. and Akpodiete, O. J. (2006). Soybean in pre ruminant nutrition: A review. *Nigeria Journal of Animal Production.* **33** (1) 83-86.

Potter, W. N. and Hotchkiss, J. H. (1995). **Food sciences** 5th Edition. Chapman and Hall book International. Thompson publishing pp.28-30.

Smith (2001). **The tropical Agriculturalist**. Revised Edition. Published by Macmillan Education Ltd. London and Oxford.

Steel, R. G.D. and Torrie, J.H. (1980). **Principles and Procedures of Statistics**, 2nd Edition published by McGraw Hill books Co. New York, USA.