Journal on Banking Financial Services & Insurance Research
Vol. 6, Issue 8, August 2016 ISSN: (2231-4288)
www.skirec.org Email Id: skirec.org@gmail.com

PERFORMANCE EVALUATION OF JAPANESE QUAILS FED DIFFERENTLY PROCESSED SOYBEAN (*Glycine max* L. Merrill)

BY

[1]MAIDALA, A., [2]BELLO, I.B., [2]ALI, M., and [2]SAGIR, B.

[1]Vocational and Technology Education, Abubakar Tafawa Balewa University, P.M.B. 248, Bauchi state, Nigeria

[2]School of Undergraduate Studies, College of Education Azare, Bauchi State, Nigeria

Abstract

An experiment was conducted to assess the performance of Japanese quails fed differently processed soybean which include sprouting, cooking, roasting, dehulling and raw soybean which served as control. Sixty Japanese quails were randomly allotted to five treatments, replicated four times in a completely randomized design (CRD). Results showed that there were significant difference in daily feed intake (16.55-17.67g), daily weight gain (2.50-2.99g), feed conversion ratio (5.57-6.63) and mortality (0-2%) (P<0.05). Carcass yield showed that live weight (129.00-160.00g), slaughter weight (92.00-95.64g) dressed weight (60.00-70.00%), liver weight (1.08-2.86%) and pancrease (0.73-1.83%) were affected by the different processing methods (P<0.05).The prime cuts affected carcass weight (80.83-87.97%), neck (3.93-4.80%) and thigh (21.26-21.82%) (P<0.05). Feed cost was lowest in the control diet (₦ 82.00) and highest in the roasted soyabean. The total feed cost was lowest on quails fed raw soyabean (₦356.00) and highest in quails fed roasted soyabean (₦390.00). The feed cost ₦/kg gains were highest in quails fed dehulled soyabean and lowest in quails fed cooked soyabean. All the different processing methods of soybean are satisfactory in the performance of Japanese quails, however cooked soybean was more effective in increasing the performance of Japanese quails with reduction in price of production

Keywords: Quails, soybean, processing, performance, carcass parameters

Introduction

The acute shortage of animal proteins in the diets of Nigerians demands diversification into production of livestock with short generation interval as a means of ameliorating the animal protein shortages among the populace (Maidala and Istifanus, 2012). Quail production is the best option in that regard to solve this problem. Quail is the smallest avian specie farmed for meat and eggs production (Panda and Singh, 1990). Distinct characteristics of quails include high growth rate enabling them to be marketed for consumption at 5-6 weeks of age), early maturity, short generation interval and short incubation period (Saraameet *et al*., 2008). Because of their small body

size, it can easily handle and large number of birds can be kept in a limited space (Sezai *et al*., 2010). Other features of quails include less feed requirements and resistance to notorious poultry diseases and high rate of egg production (a quail can produce 250-280 eggs per year) (Musa *et al*., 2008). 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 wound 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, 1992; Maidala *et al.,* 2011). 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 (Okogbare and Akpodiete, 2006). It is against this background that the research work attempted to evaluate the different processing methods of soybean seeds on performance of Japanese quails.

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 (Anon, 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; Cheveisrakul and Tantawewepat, 1996). The seeds are dried for four days and stored in bags. Roasting of soybean seeds were done with sand in pots until the seed begins to change colour to brown and ground and stored. Dehulling of soybean was achieved by grinding the seeds the soybean and removing the hulls and stored in bags. Raw soybean was grounded and used as a control diet.

Experimental birds and their management

A total of sixty Japanese quails were obtained from national veterinary research institute vom and used in the experiment. They were brooded with kerosene stove and battery lamp. They were divided in to five groups of the experimental diets and replicated four times in a completely randomized design. They were housed in a local battery cages. Each cage was equipped with feed and drinker. The birds were offered formulated broiler starter mash using the differently processed full fat soybean Table 1. The parameters determined include daily feed intake, daily weight gain, feed conversion and economics of production. Carcass parameters include; live weight, carcass weight dressed weight, organs weight and cuts part of different segments of Japanese quails. 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. The diets were isocaloric and isonitrogenous and meet the requirements of the quails.

Results and Discussion

The differently processed soybean had higher crude protein content than the control diet (38%CP) with sprouted soybean (42.00%) having the highest value, this reaffirmed the earlier reports of Maidala *et al*.(2013) that sprouted soybean have higher crude protein compared to other processed soybean. The value of crude protein reported in this study are within the range of crude protein reported in literature Iheukwumere *et al*. (2008) and Ari *et al*. (2012) in differently processed soybean. The Japanese quails fed differently processed soybean consumed significantly (P<0.05) more feed than the control diet (19.50g) (Table 3) and this can be attributed to the presence of antinutritional factors in the raw soybean as reported by Liener (1980) and Akande and Fabiyi (2010). Raw soyabean tend to reduced feed intake as a result of chemicals present, this reaffirm the findings of Ayanwale *et al*. (2004) on broilers fed differently processed soybean and Maidala *et al*. (2011) on rabbits fed differently processed soybean. The daily weight gain followed the same trend being relatively higher (P<0.05) in differently processed soybean than the raw soybean. The daily weight gain was lower than (44.42g) reported by Olugbemi and Ayeni (2004) and higher than 3.51g reported by Ijaiya *et al*. (2012). The feed conversion ratio was better in cooked soybean (5.57)(Table 3) and is an indication of adequate processing. The feed cost was lower in raw soybean (₦ 4.34) this can be attributed to lack of addition of value in the raw soybean. The feed cost ₦/kg gain was lower in cooked and dehulled soybean (127.00)(Table 3) and can be considered as a low cost ration. The carcass yield and gut characteristics were shown in Table 4. Results showed the live weight varied between 129.50 to 160.50g in sprouted soybean and the differences between the values were statistically significant (P<0.05)(Table 4), the values reported in this work are within the range reported in literature (150-220g) in Nigeria Umar *et al*. (2008). Quails fed sprouted soybean had the highest live weight (P<0.05) followed by other differently processed soybean and control diet had the least live weight values (131.00g) and this findings reaffirmed the earlier reports of Liener, (1975); Ari *et al*. (2013); Maidala *et al*., 2013 that raw soybean contain antinutritional factors that affect the intake and utilization of nutrients in monogastric animals. Slaughter weight and dressed weight followed the same trend (P<0.05) being relatively higher in differently processed soybean than the control diet. Bone *et al*. (1979) reported that if there is any toxic elements in the feed, above threshold level, abnormalities in weights of liver and kidney would be observed. The abnormalities will arise because of increased metabolic rate of the organs in an attempt to reduce these toxic elements or antinutritional factors to non toxic metabolites, the liver and the pancrease were relatively higher (P<0.05) in the raw soybean than in the differently processed soybean, this can be attributed to hyperactivity of the liver and the pancrease which causes their enlargement and this partly agreed with the previous report of Ari *et al*. (2013) that antinutrients activities causes the

enlargement of these organs as a result of hyperactivity. The abdominal fat was relatively higher (P<0.05) in the control diet which is an indication of poor carcass quality Medugu *et al*. (2012). The gut content were also affected by the differently processed soybean (P<0.05) than the control diets. The values of the gut contents are slightly higher than those reported by Ijaiya *et al*. (2012), this can be attributed by superior values of soybean compared to other plant protein sources. The cuts parts of Japanese quails fed differently processed soybean is presented in Table 5. Results showed that most of the values were affected by the differently processed soybean than the raw soybean, with sprouted soybean having higher values (P<0.05). The differently processed soybean were satisfactory in the performance of Japanese quails, however cooked soybean was more effective in increasing the performance of Japanese quails , dressed weight with concomitant reduction in price.

References

Akande, K.E. and Fabiyi, E.F. (2010). 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

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

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

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., 1989. 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.

Ijaiya, A.T., Egena, S.S.A., Umah, J.H., Agbi, F.,Bamigbode, B.A., Dikko, A.H. and ijaiya,E.Z.(2012). Growth response and carcass characteristics of Japanese quails fed diets contain ing graded yam peel meal. Proceedings of Animal science association of Nigeria. Pp 373-376

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

Maidala, A. Doma, U.D. and Ajighjigh, D.T. (2011) .Growth performance of weaner rabbits fed diets containing different processed soybean (Glycine max (L) Merrill) product. Proceedings of 36th of Nigerian society of Animal production 13-16th March 2011 University Abuja.

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. (2013). Effect of different processing methods on the chemical composition and antinutritional factors of soybean (*Glycine max* (L) Merrill).

*Pakistan Journal of Nutrition***12**(12):1057-1060

Medugu, C.I., Kwari, I.D., Igwebuike, J. U., Nkama,, I., Mohammed, I.D. and Hamaker,B. (2010).Carcass and blood components of broiler chickens fed sorghum or millet as replacement for maize. Agriculture and Biology Journal of North America,1(3):326-329.

Musa, U., Haruna, E.S. and Lombim, I.H., (2008). Quail production in the tropics. National veterinary research institute

National population commission (2009). Federal republic of Nigeria. Gazette No. 2:96. Printed and published by federal government printers, Abuja. FGP

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

Olugbemi, T.S. and Ayeni, T.O.(2014).Effect of stocking density on the performance of Japanese quails (Cortunix cortunix japonica). Proceedings of 39th Annual Conference of Nigerian society of animal production held at babcock university ileshan remon, ogun state. Pp 594-596

Panda,B. and Singh, R.P.(1990). Development in processing quails. *World Poultry Science* **46**:219-234

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

Saraameet, K., Mandal, A.B., Singh,K.B. and Kadam, M.M.(2008). The response of Japanese quails(heavy body line) to dietary energy levels and grass essential amino acids levels on growth performance and immune-competence. *Livestock Science* **10**:1016

Sezai, A., Kemal, K., Askin, G., Taki, K., and Maurat, S.B. (2010). Determination of body weight and some carcass traits in japanese quail of different lines kafkas university vet. Derg. 16(2): 227-280

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

Table 1: Percentage composition of experimental diets fed to quails

Ingredients	Raw soybean	Sprouted soybean	Dehulled soybean	Cooked soybean	Roasted soybean
Maize	44.86	44.86	44.86	44.86	44.86
Soybean	36.21	36.21	36.21	36.21	36.21
Wheat offal	10.00	10.00	10.00	10.00	10.00
Fishmeal	5.00	5.00	5.00	5.00	5.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Lysine	0.20	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20	0.20
Salt	0.25	0.25	0.25	0.25	0.25
Premixes	0.25	0.25	0.25	0.25	0.25
Total	**100**	**100**	**100**	**100**	**100**
Calculated analysis					
Crude protein	23.00	23.00	23.00	23.00	23.00
Metabolizable energy (kcal/kg)	2718	2718	2718	2718	2718

Table 2: Proximate composition and trypsin inhibitor of differently processed soybean

parameters	Raw	Sprouted	Dehulled	Cooked	Roasted
Dry matter	90.00	80.00	85.91	90.00	95.00
Crude protein	38.00	42.00	41.91	39.21	40.12
Crude fibre	15.17	18.21	18.91	19.22	19.11
Crude fat	12.05	11.11	9.15	5.68	6.92
Ash	10.50	11.11	9.15	5.68	6.92
Nitrogen free extract	24.28	15.50	16.66	22.28	20.34
Trypsin inhibitor (mg/g)	21.65	18.22	16.11	4.11	4.00
% destruction of trypsin inhibitor	00.00	19.00	28.00	81.02	81.53

Table 3: Performance parameters and economics of production of Japanese quails fed Differently processed soybean

parameters	Raw	Sprouted	Dehulled	Cooked	Roasted	SEM
Daily feed intake (g)	16.58[a]	17.35[b]	17.67[b]	16.65[a]	16.55[a]	*1.22
Daily weight gain (g)	2.50	2.70	2.93	2.99	2.93	*0.59
Feed conversion ratio	6.63	6.42	6.04	5.57	5.64	*1.36
Mortality rate (%)	2	0	1	1	1	-
Total feed intake(kg)	4.34	4.56	4.45	4.52	4.57	-
Total cost (N/kg)	82.00	85.21	83.51	84.61	85.23	-
Total feed cost (N)	356.00	389.00	372.00	383.00	390.00	-
Feed cost (N/kg gain)	144.00	143.00	127.00	128.00	134.00	-

SEM: Standard error of means, means bearing superscripts within the same raw are statistically different (P<0.05),

Table 4: Carcass yield and gut characteristics of Japanese quails fed differently processed soybean

Parameters	Raw	Sprouted	Dehulled	Cooked	Roasted	SEM
Live weight (%)	131.00	160.00	147.50	129.50	140.50	*32.0
Slaughter weight(%)	92.76	95.64	95.24	95.39	95.00	*298
Dressed weight (%)	60.00	62.50	73.47	70.00	75.00	*16.0
Liver weight (%)	1.83	1.26	0.73	0.78	0.73	*1.10
Pancrease (%)	2.86	1.39	1.41	1.08	1.77	*1.86
Heart weight (%)	1.43	0.64	0.68	0.78	0.73	*0.69
Abdominal fat (%)	2.43	1.38	1.41	1.32	1.85	*1.02
Small intestine	1.84	1.45	0.67	0.73	0.73	*1.17
Large intestine	2.43	1.87	1.35	1.27	1.44	*1.16

Table 5: Cut of parts of broilers fed differently processed soybean

Parameters	Raw	Sprouted	Dehulled	Cooked	Roasted	SEM
Carcass weight (%)	80.83[b]	87.83[a]	87.97[a]	86.68[a]	86.94[a]	*6.15
Neck weight (%)	3.93	4.13	4.80	4.14	4.43	*0.98
Thigh weight (%)	21.82	21.26	20.41	20.77	21.43	*1.67
Breast weight (%)	12.50	13.14	13.04	13.84	13.86	*1.36
Back weight (%)	7.12	8.25	8.20	8.00	8.00	*1.25