

## The Profitability of Turkey Production in Zaria, Kaduna State, Nigeria

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**Abstract:** An investigation was carried out in October 2004 to November 2005 on the profitability of turkey production in the Zaria area of Kaduna State, Nigeria. A survey of 50 turkey producers spread over 2 local government areas in the state (Sabon-gari LGA and Giwa LGA) were made. Structured questionnaires were employed to elicit information from the respondents. Statistical analysis was accomplished by means of descriptive statistics, cost and profitability analyses. Findings of the study indicated that turkey production was carried out mainly by adult males. Although most of the respondents had formal education, they are mostly not so experienced in turkey production. Turkey production in Kaduna state was generally a part-time occupation as respondents are engaged in other primary occupations. Diseases of turkeys reported by respondents were mainly ectoparasites and fowl pox. Cost analysis showed that feed cost accounted for as much as 36.5% of total cost of production while fixed inputs and variable inputs accounted for 34% and 66% of the total cost of production respectively. Turkey production in the study area was found to be profitable with a profitability index of 0.35, a rate of return on fixed asset of 258% and return on variable cost of 182%. Turkey production constraints include unavailability and high cost of poults, high cost of feeds, low hatchability rate, low reproductive potential, diseases/morbidity and mortality among others. The need and means of improving turkey production were highlighted.

**Key words:** Profitability, Turkey production, constraints, Kaduna State, Nigeria

### INTRODUCTION

Poultry production forms an important component of Nigeria's livestock subsector. As a provider of employment and income, poultry production constitutes an important form of livelihood for rural and urban dwellers. Poultry farmers who are well spread all over the different ecological zones of the country engage in the production of chicken, eggs, day old chicks and poultry manure for rural, urban and peri-urban populations. The bulk of the poultry meat and eggs are produced by small holders who adopt different production strategies in consonance with the little resources available to them. On the other hand commercial poultry production for meat and eggs are by urban and peri-urban dwellers (Eduvi, 2002).

The poultry population in Nigeria is estimated at 104.3 million comprising 72.4 million chickens, 11.8 million ducks, 4.7 million guinea fowls, 15.2 million pigeons and 0.2 million turkeys (FDLPCS, 1992). This is said to constitute a major animal protein source in this country. Poultry which is next only to ruminants as a source of

animal protein in Nigeria accounts for almost 25% of local meat production. In Nigeria, the supply of meat falls short of demand. Most Nigerians are poorly fed and suffer from malnutrition due to lack of adequate protein of animal source (Ajala and Alli-Balogun, 2004). In a nutritional profile of Nigeria, (4) reported that the protein supply per capita was 44 g, out of which animal products constituted less than 2 %.

With the continued rise in the cost of production of beef, sheep and chicken, which are the primary sources of animal protein in Nigeria, it has become very necessary to explore other efficient and less common but potential sources of animal protein for economic viability. Turkey (*Meleagris gallopava*) production is an aspect of the poultry industry which is not popular in Nigeria until recently. Its potentials cannot be overlooked considering the huge foreign exchange implication of the importation of improved exotic stock (Ibe, 1990). Turkey production is a specialized enterprise. While the production of other types of poultry meat has rapidly increased in recent years in Nigeria (Okoruwa *et al.*, 2006) very little has been achieved in turkey production. Consumers continue to

pay high prices for imported turkeys and even for local turkeys. The reason for apparent inertia in turkey production appears to be lack of appreciation of its potential in contributing to the protein needs of the consuming public or perhaps the lack of understanding of its management and production requirement (Nwagu, 2002).

Turkey production is one of the sources of animal protein in Nigeria. It is considered as one of the most suitable alternative for small or large scale producers considering the cost of production. Local turkeys are natural foragers and can be kept as scavengers (Peters *et al.*, 1997; NRC, 1991) reported that turkeys can be reared virtually anywhere and their natural habitat is open forest and wooded area. (Smith, 1990) reported that carcasses of turkeys contain a higher percentage of protein than the carcasses of chickens. Turkeys have also been found to be of considerable economic and social significance in traditional life of Nigerians, in that they are used as presents during festivals like christmas, both as sign of appreciation and expression of goodwill. There is also no known discriminatory attitude towards the production and consumption of turkeys (Peters *et al.*, 1997). Thus turkeys have tremendous potential that might be immensely useful in alleviating the animal protein supply problem. Despite the importance of turkey to human nutrition, research activities on turkey production are still very scanty compared to other poultry species. There is therefore a need for studies to be conducted on the economics or profitability of turkey production in Kaduna state, Nigeria.

This study is an attempt to:

- Describe the socio-economic characteristics of turkey producers in the study area;
- Ascertain the reasons why people embark on turkey production;
- Determine the costs and returns to turkey production among the keepers;
- Identify the common problems to turkey production in the area; and
- Suggest control measures.

## MATERIALS AND METHODS

**The study area:** A survey involving 50 turkey farmers was conducted in two local government areas of Kaduna state from October 2004 to November 2005. These include: Sabon-gari and Giwa Local Government Areas. Sabon-gari LGA comprises Samaru, Sabon-gari and Bassawa while Giwa LGA includes Shika and Giwa areas of Zaria. Structured questionnaires and personal interviews were

used to collect data on socio-economic variables such as household size, educational level, age, sex, marital status, flock size and years of experience, etc. Data collected on production and marketing variables include fixed inputs and variable inputs. Data were also collected on the problems of turkey production.

**Analytical techniques:** Simple descriptive statistics such as means, ranges and percentages were used to report the socio-economic characteristics of the respondents and the reasons why they embark on turkey production.

The farm budgeting model was used to analyze the profitability of turkey production. The budgetary technique emphasized the costs and returns to the turkey farming enterprise. The level of profit and profitability index were estimated using gross margin and return to management.

The Profitability Index (PI) is the Net Farm Income (NFI) per unit of Gross Revenue (GR).

Therefore,  $PI = NFI/GR$

The equation for obtaining the Net Farm Income can be stated in the following manner:

$$NFI = TR - (TVC + TFC)$$

where:

NFI = Net Farm Income in Naira  
TR = Total Revenue in Naira  
TVC = Total Variable Costs in Naira  
TFC = Total Fixed Costs in Naira

Net Farm Income signifies the difference between total returns in Naira for the farm and total expenses of production in Naira.

The Total Revenue is defined as the total money value of all turkeys produced whether sold, consumed or in stock. Total Fixed Costs are those costs incurred which do not vary when output changes and therefore have no influence on production decisions. Total Variable Cost is the cost of variable inputs such as feeds, labour and drugs used in production. They change directly with the level of production. Gross Margin is the difference between Total Revenue and Total Variable Costs.

$$GM = TR - TVC$$

The following profitability measures were calculated:

- Rate of Returns on Investment;

$$RRI (\%) = NFI/TC \times 100\%$$

where:

TC = Total Cost  
hence, TC = TFC + TVC

- Rate of Returns on Fixed Costs

$$\% = \frac{TR - TVC}{TVC} \times 100\%$$

- Rate of Returns on Variable Costs

$$\% = \frac{TR - TFC}{TVC} \times 100\%$$

- Capital Turnover (CTO) = TR/TC.

A five point numerical rating scale, with 1 representing the lowest and 5 the highest values on the scale, was used to determine the problems associated with turkey production in the study area. Score of 5 represents very high problem while 1 represents very low problem. Against each problem area, respondents were expected to circle number between 1 and 5 indicating the problem area in turkey production. The total scores of respondents for the number of problem area were expressed in:

- Weighted Average

$$X_w = \frac{5(N_1) + 4(N_2) + 3(N_3) + 2(N_4) + 1(N_5)}{F}$$

where:

$X_w$  = Weighted average

$N_1 + N_5$  = Rating scale

F = Frequency of respondents = 50

- The mean score of respondents was set at 3.00, that is

$$X = \frac{5 + 4 + 3 + 2 + 1}{5}$$

$$X = \frac{15}{5} = 3$$

## RESULTS AND DISCUSSION

**Characteristics of Turkey producers:** The results of the analysis of socio-economic characteristics of the turkey

Table 1: Demographic characteristics of turkey farmers in the study area

Characteristics	Frequency	%
<b>Age group</b>		
21-30 years	10	20.00
31-40 years	12	24.00
41-50 years	16	32.00
51-60 years	7	14.00
> 60 years	5	10.00
<b>Sex</b>		
Male	17	34.00
Female	33	66.00
<b>Marital status</b>		
Single	7	14.00
Married	43	86.00
<b>Educational level</b>		
No formal education	5	10.00
Primary education	10	20.00
Secondary education	30	60.00
Tertiary education	5	10.00
<b>Major occupation</b>		
Farming	10	20.00
Civil service	31	62.00
Trading	6	12.00
Student	3	6.00
<b>Turkey keeping experience (years)</b>		
<2 years	12	24.00
2-4 years	28	56.00
5-7 years	7	14.00
9-11 years	2	4.00
>11 years	1	2.00
<b>Household size</b>		
1-5 people	25	50.00
6-10 people	19	38.00
11-15 people	4	8.00
>15 people	2	4.00
<b>Flock size</b>		
Small (1-20 birds)	32	64.00
Medium (21-40 birds)	14	28.00
Large (41-60 birds)	4	8.00

Source: Field survey, 2005

producers in Table 1 shows that, the largest proportion of respondents falls between the active working age of 31-50 years. There were more males in the turkey production business than females (about 66 to 34%) in the study area. This finding however contradicts (Brorholt and odgaard, 1999) observations that poultry keeping is the skill of housewives. The high levels of men involvement may be due to high demand of labour in terms of feeding and medication which women may not be able to combine with household chores. Farmers with small family size (1-5) are more involved in turkey production (50%) than those with large family size. Majority of the respondents have at least secondary school education (48%) to enable them perform effectively in their management practices such as administration of drugs, vaccines, feeds as well as effective marketing of turkeys and also the technical knowledge involved in turkey production. Further revealed from the table is the fact that a greater proportion (62%) of the turkey farmers are civil servants as compared with the few others (38%) whose occupation were either crop farming, trading and student. Turkey producers

Table 2: Breed, sources and management practices of turkey producers

Parameter	Frequency	%
Breed type		
Pure local	42	84.00
Cross-bred	8	16.00
Source of parent stock		
Market	20	40.00
Neighbours	14	28.00
Friends	8	16.00
Gift	6	12.00
Government farms	2	4.00
Management system		
Intensive	13	26.00
Semi-intensive	30	60.00
Extensive	7	14.00
Sources of labour		
Hired labour	4	8.00
Family labour	31	62.00
Both hired and family labour	15	30.00
Sources of feeds		
Self-formulated feeds	37	74.00
Commercial feeds	13	26.00

Source: Field survey, 2005

production were about 20% while 80% of the respondents had between 1-4 years of experience. This is a pointer to the fact that turkey production is relatively a new venture in the study area.

**Management practices:** Three management systems were identified in the study area- intensive, semi-intensive and extensive systems (free-range). Among the respondents, the commonest type was semi-intensive (60%). Table 2 revealed that, both the intensive and semi-intensive systems of management are generally used by turkey farmers in the study area. Although the extensive system of management is less expensive, only 14% of the respondents practised the extensive system. Most respondents (84%) used pure local breed obtained from open market, friends or neighbours. However, 16% of the respondents used cross-bred. Majority of the respondents (62%) engaged family labour during production, while 30% used combination of family and hired labour with only 8% of the respondents engaging hired labour only. Only those respondents with small capacity (= 20 birds) considered family labour important in turkey production.

Among the diseases reported by respondents include worms, fowl pox, ectoparasites such as fleas, lice and ticks. Majority of the respondents (54%) carried out medications on their birds mainly against worms. This is not surprising as the scavenging birds could easily pick up worms particularly during the wet season. Only 34% of the respondents vaccinated their birds against diseases. It was observed that most of the respondents that vaccinated their birds did so only

Table 3: Distribution of respondents on the basis of their main reasons for turkey keeping

Main reasons for keeping Turkey	Frequency	Percentage
Cash only	6	12.00
Consumption only	1	2.00
Hobby (a way of life) only	1	2.00
Cash and consumption	38	76.00
Hobby and consumption	1	2.00
Hobby and cash	2	4.00
Cultural/religious	1	2.00
Total	50	100.00

Source: Field survey, 2005

against Newcastle disease using vaccines such as Lasota. Others used indigenous or ethno-veterinary treatment practices such as hot wood ash and lime to control ticks and lice while palm oil is given to control fowl pox. Onions and ground hot pepper are used to prevent mortality most especially in poults. This finding was supported by (Peters *et al.*, 1997) who reported the use of ash, lime and corn shaft in controlling ectoparasites in livestock and palm oil is used in the treatment of fowl pox. Only 12% of the respondents did not provide medications for their birds. For this category of farmers, they prefer to cull their sick birds rather than give any form of treatment.

Majority of the respondents (74%) reported that mortality was more with the poults than the adults. This finding was supported by Peters *et al.* (1997), who reported that the poults were most vulnerable to disease attack in local turkey. Mortality was attributed mainly to diseases (68%), poor system of management (12%) and poor nutrition (20%) most especially of the poults (14%). Other occasional causes of mortality reported by the respondents include predators, poisoning and accidental killings by motorists and cyclists.

Analysis in Table 3 revealed that the primary reason for keeping turkeys given by 78% of the respondents was for both cash and consumption whereas 12% of the respondents kept turkeys mainly to raise emergency cash. The turkeys served as savings accounts for their keepers from which withdrawals were made mainly in times of needs by the households. Other reasons advanced are, as a way of life (hobby) and for cultural/religious purposes.

**Costs and profitability analyses:** Table 4 shows the annual costs and returns that accrued to an average turkey farmer in the study area. The total revenue per turkey farmer was found to be ₦119,080 while the Total Cost (TC) incurred per farmer was ₦77,364.63. Cost of breeding stock amounted to ₦18,200 which represents 23.5% of the total cost of production. Cost of feeds (₦28, 200.92) constituted the highest share of the total costs, accounting for 36.5%. This validates the claims by Oluyemi and Roberts (1998), Ubosi and Sekona (2000) that

Table 4: Annual costs and returns to an average turkey farmer in Kaduna state

Item	Value (₦)	% of cost
Gross revenue	119,080.00	
Turkeys and eggs sold per year		
23 poults @ ₦280 each	6,440.00	
20 growers @ ₦550 each	11,000.00	
25 spent layers @ ₦2,000 each	50,000.00	
20 cocks (toms) @ ₦2,160 each	43,200.00	
1 crate of fertile eggs @ ₦700/crate	700.00	
Turkeys unsold/in stock for the year		
8 poults @ ₦280 each	2,240.00	
10 growers @ ₦550 each	5,500.00	
Variable costs		
Labour	4,000.00	5.2
Feed	28,200.92	36.5
Drugs/veterinary services	16,655.28	21.5
Repairs and maintenance	2,162.54	2.8
Total variable cost	51,018.74	66.0
Fixed costs		
Building (housing)	5,092.00	6.6
Feeders	960.00	1.2
Drinkers	420.00	0.5
Breeding stock (i) growers	10,000.00	12.9
(ii) cocks (toms)	8,200.00	10.6
Depreciation on tools/equipment	423.89	0.5
Depreciation on housing	1,250.00	1.6
Total fixed cost	26,345.89	34.0
Gross margin	68,061.26	
Total cost	77,364.63	
Net farm income (Return to management)	41,715.37	
Profitability index (NFI/GR)	0.35	

Source: Authors' calculations from survey data, 2005

cost of feed is the largest single variable cost in animal production. This value confirms that feed constitutes a major ingredients in turkey production. This value is however lower than the values obtained by previous studies (Ayanwale and Bamire, 1996; Nwajuiba *et al.*, 2002). This may be due to the fact that most respondents especially those that practice the extensive system of management provided supplemental feed to the turkeys, which included grains (sorghum, guinea corn and maize) and food/crop processing by-products. Another reason could be related to that advanced by Okoruwa *et al.* (2006), especially for those that practiced the intensive and to some extent the semi-intensive system of management, that various substitutes of feed ingredients are becoming available to the farmers for feed formulation whereby most costly feed ingredients are often being supplemented with less costly ones thereby reducing the overall feed cost. Cost of labour (₦4,000) constituted about 5.2% of the total cost while repairs and maintenance, building and drugs/veterinary services accounted for 2.8%, 6.6% and 21.5% respectively of the total cost of production. The cost of breeding stocks was observed to be 23.5% of the total cost. The low values (21.5%) observed for medication/drugs in relation to breeding stock is not an

the fact that most respondents used ethno-veterinary indication that this cost-item is less important but due to treatment practices which are cheaper than the modern treatment of disease control. Other items such as feeders, drinkers, depreciation on tools/equipment and depreciation on housing contributed negligible percentages to total cost of production. The cost structure as shown in Table 4 reveals that fixed cost takes only 34% of annual investment in turkey production, whereas variable cost accounts for the remaining 66%.

$$\begin{aligned} \text{Rate of Returns on Investment (\%)} &= \frac{\text{NFI}}{\text{TC}} \times 100\% \\ &= \frac{41,715.37}{77,364.63} \times 100 \\ &= 53.92\% \end{aligned}$$

$$\begin{aligned} \text{Rate of Returns on Fixed Costs (\%)} &= \frac{\text{TR} - \text{TVC}}{\text{TFC}} \times 100 \\ &= \frac{119,080 - 51,081.74}{26,345.89} \times 100 \\ &= 258\% \end{aligned}$$

$$\begin{aligned} \text{Rate of Returns on Variable Costs (\%)} &= \frac{\text{TR} - \text{TFC}}{\text{TVC}} \times 100 \\ &= \frac{119,080 - 26,345.89}{51,018.74} \times 100 \\ &= 182\% \end{aligned}$$

$$\begin{aligned} \text{The Capital Turnover (CTO)} &= \frac{\text{TR}}{\text{TC}} \\ &= \frac{119,080}{77,364.63} \\ &= 1.539 \end{aligned}$$

The farmers generated revenue through the sale of poults, growers, spent layers, cocks and eggs at different periods of production. Income generated by the enterprise was ploughed back into the business for purchasing drugs, feeds, feed ingredients and so on; thus making the Capital Turnover (CTO) per annum to be greater than 1, that is 1.539, implying that for every Naira spent on turkey production about ₦1.54 returned to the farmer as revenue.

At the end of the production year, the average turkey farmer in the study area sold 23 poults at ₦280 each and 20 growers at ₦550 each, 1 crate of fertile eggs at ₦700

Table 5: Distribution of respondents by their constraint areas in turkey production

Constraint areas	Constraint					Area raw scores	Mean score	
	Very high	High	Moderate	Low	Very low		(Xs)	Rank
Unavailability and high cost of poults	20	16	8	4	2	200	4	1 <sup>st</sup>
High cost of feeds	25	10	6	4	5	196	3.92	2 <sup>nd</sup>
Low hatchability rate	17	20	6	2	5	192	3.84	3 <sup>rd</sup>
Low reproductive potential of birds	22	10	9	5	4	191	3.82	4 <sup>th</sup>
Diseases, morbidity and mortality	19	10	8	7	6	185	3.70	5 <sup>th</sup>
Lack of reasonable degree of management skill	16	12	11	6	5	178	3.56	6 <sup>th</sup>
Access to drugs and veterinary services	18	9	8	9	6	174	3.48	7 <sup>th</sup>
Lack of capital	10	8	14	4	4	136	2.72	8 <sup>th</sup>
Theft, predators and accidents	3	5	6	10	26	99	1.98	9 <sup>th</sup>

Source: Field survey, 2005

and was left with a stock of 8 poults and 10 growers. Hence, an enterprise which owns 25 layers and 20 cocks was able to produce 31 poults and 30 growers within the production year. Thus, the turkey enterprise was essentially a part-time small scale, family enterprise. During the production year, the average farmer had invested a total of ₦77,364.63, out of which ₦51,018.74 and ₦26,343.89 were variable costs and fixed costs respectively. The Net Farm Income (NFI) which represents the return to management and labour accounted for ₦41,715.37, hence a return to investment of about 54%. However, this net income was insufficient to keep a turkey farmer fully occupied, hence the need to increase the commercialization of the turkey production.

The Profitability Index (PI) was 0.35, indicating that for every Naira earned as revenue, 35 kobo returned to the farmer as net income. With a CTO of about 1.54 and PI of 0.35, improvement in turkey production is likely to increase the returns of turkey farmers. The turnover (Gross Revenue) of ₦119,080 resulted in a net income (return to management) of ₦41,715.37 per farmer per year. This indicated the profitability of turkey production as a part-time venture in the Zaria area of Kaduna State. The rate of returns on fixed costs was estimated at 258%. Hence on an annual basis, every Naira cost incurred on fixed assets generated ₦2.58 while the rate of return on variable cost was 182%. That is, every Naira cost incurred on variable assets generated ₦1.82. This implied that, to maximize profit accruing from turkey production, there has to be a concerted effort directed at increasing the efficiency or optimal use of all variable inputs. For example, more efficient use of the feed input can bring about increased revenue realized from turkey production in the study area (Table 4).

**Constraints to Turkey production:** Analysis in Table 5 revealed constraint areas in turkey production. The major constraints to turkey production in the study area were unavailability and high cost of poults, high cost of feeds,

low hatchability rate, low reproductive potential of birds, disease/morbidity/mortality, lack of reasonable degree of management skill and access to drugs and veterinary services. Other minor problems include lack of capital and theft/predators/accidents. The high cost of feeds as a high constraint validates claims by Oluyemi and Roberts (1988) that the prospect for investment in poultry production is being hampered by high costs of inputs especially cost of feed. The constraint on disease may be partly due to poor management practices and high cost of drugs and conventional feeds.

### CONCLUSION AND APPLICATIONS

Great potential exists for turkey production in the study area. For optimum reproductive performance and for the industry to develop, however, certain changes in turkey farming are necessary which can only be brought about through sound extension education. Identified constraints to turkey production by the farmers must be addressed by all stakeholders-farmers, government, livestock scientists, veterinarians and livestock extension specialists. It is recommended that livestock extension service be strengthened and appropriate extension package be developed for the smallholder turkey farmers such as those encountered in Zaria, Kaduna state.

Turkey production is a profitable venture as revealed by this study. The study revealed that most turkey producers are smallholders, it is therefore recommended that turkey farmers be encouraged to increase their level of production for increased profitability. This could be made possible with the establishment of a reliable breeding centre in Kaduna State to ensure adequate and reliable supply of day old poults. For example, funds should be made available to research institutes such as the National Animal Production Research Institute in Zaria to assist in producing and supplying poults at affordable prices to farmers.

Feeds and drugs should be made available to producers at subsidized rate, in order to improve turkey production in the study area.

Prompt disease control measures will improve overall productivity of turkeys which in turn will generate more income for the producers, thereby improving their standard of living.

Interventions are also necessary on better management practices and easy access to soft loans in order to boost turkey production. Turkey production if encouraged is a step forward in enhancing economic empowerment of Nigerians, as well as a strategy for meeting the protein requirement of the general populace.

### REFERENCES

- Eduvie, L. O. , 2002. Poultry production as an important component of Nigeria's livestock subsector. A training manual on national training Workshop on poultry production in Nigeria in NAPRI, ABU, Shika, Zaria, Nigeria.
- Federal Department of Livestock and Pest Control Services, FDLPCS, 1992. Nigerian National Livestock Survey, Abuja, Nigeria.
- Ajala, M. K. and J. K. Alli-Balogun, 2004. Economics of rabbit production in Zaria, Kaduna State, Nigeria. *Trop. J. Anim. Sci.*, 7: 1-10.
- Food and Agricultural Organization FAO, 1990. The State of Food and Agricul. Vol., 40, Rome.
- Ibe, S.N., 1990. Utilizing local poultry genetic resources in Nigeria. Proc. 4th World Congress on Genetics Applied to Livestock Production, Edinburgh, Scotland.
- Okoruwa, V.O., A.E. Obayelu and O. Ikoyo-Eweto, 2006. Profitability of semi-intensive and intensive egg production in south-west and south-south zones of Nigeria. *Nig. J. Anim. Prod.*, 33: 118-125.
- Nwagu, B.I., 2002. Production and Management of Indigenous Poultry Species. Training Manual, National Animal Production Research Institute (NAPRI), Federal Ministry of Agriculture and Rural Development, ABU, Zaria.
- Peters, S.O., C.O.N. Ikeobi and D.D. Bamkole, 1997. Smallholder Local Turkey Production in Ogun State, Nigeria. In Sonaiya, E.B. (Ed). Issues in Family Poultry Development Research. Proceedings of an International Workshop Held in at M'Bour, Senegal. Published by the International Network for Family Poultry Development. Department of Anim. Sci. Obafemi Awolowo Univ. Ile-Ife, Nig., pp: 308.
- NRC., 1991. Microlivestock: Little known small animals with a promising economic future. National Research Council, National Academy Press, Washington, D.C.
- Smith, A.J., 1990. Poultry. The Tropical Agriculturist Series. The Macmillan Press Ltd., London.
- Brorholt, G. and P. Odgaard, 1999. Women and chicken: Traditional poultry management in Nicaragua and Tanzania. Proceedings of Development Workers Course on Poultry as a Tool in Poverty Eradication and Promotion of Gender Equality. Time Landboskole, Denmark, pp: 22-26.
- Oluyemi, J.A. and F.A. Roberts, 1988. Poultry production in the warm wet climate. Macmillan Press Ltd., Hong Kong, pp: 41-44.
- Ubosi, C.O. and A.M. Sekona, 2000. Effects of varying levels of full soyabeans and groundnut cake on the performance of broilers in hot dry environment. Proceedings of the 25th Annual Conference of Nigerian Society for Animal Production (NSAP). Michael Okpara University of Agriculture, Umudike, Abia State.
- Ayanwale, A.B. and A.S. Bamire, 1996. Cost and returns in alternative poultry egg production management systems in two local government areas of Ogun State of Nigeria. *Nig. J. Anim. Prod.*, 23: 193-198.
- Nwajuiba, C.U., B.U. Ekenyem and E.C. Nwoke, 2002. The Profitability of Peri-Urban Poultry Enterprises in Owerri. Proceedings of the 27th annual conference of Nigerian society for animal production. Federal University of Technology, Akure, Nigeria.