



## Economic Analysis of Backyard Poultry Farming in Akoko North West Local Government Area of Ondo State, Nigeria

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### Abstract

The study investigated the economic assessment of backyard poultry farming in Akoko North West Local Government Area of Ondo State, Nigeria. Primary data were used and a sample of 152 backyard poultry owners through a multistage sampling technique was drawn from the study. The data collected were analyzed using descriptive statistics, budgetary analysis and multiple linear regression model. The profitability analysis revealed that the cost of production and revenue per bird were ₦3,987.52 and ₦4,210.11 respectively with the gross margin and profit of ₦537.99 and ₦222.59 per bird respectively which indicated that the enterprise is profitable. The result of multiple regression showed that farming experience, education, costs of labour and feeds were the main factors that statistically determined backyard poultry productivity. Inadequate funds, unstable price, lack of access to extension services and expensive feeds were the major constraints encountering by the backyard poultry owners in the study area.

**Keywords:** backyard, poultry, profitability, production.

### 1.0 Introduction

Poultry production is an important agricultural activity usually carries out in all rural communities in Africa and most of them scavenge on available local resources. Though neglected in the development themes for a long time, nowadays many researchers and development agents are making a strong consensus that the smallholder chicken production plays a major role in poverty alleviation and food security at household level. It provides off – farm employment and income generating opportunity as well as source of gifts and religious sacrifices (Wethli, 1995; Sonaiya, 1990; Gueye, 2003; Sonaiya, 2000). Poultry are groups of domestic birds raised for their meat and eggs. Chickens, geese, quails and ducks are of greatest worldwide commercial importance. Ornamental birds, such as swans and peacocks are birds raised for exhibition or cockfighting, are sometimes called poultry. Scavenging chickens also help in waste disposal system by converting leftover of grains and human foods and insects into valuable protein foods- egg and meat (Doviet, 2005). The smallholder poultry production considered as an income yielding activity that fits well with the concept of small – scale agricultural development. Moreover, land, which is a critical production resource in rural area, is not a limiting factor in the smallholder chicken production systems. Village chicken products are often one of the main sources of animal protein for poor households. Eggs are a source of high quality protein for sick and malnourished children under the age of five. Due to their small size and fast reproduction compared to most livestock, chickens are more often slaughtered and eaten among the household (Delgado *et al.*, 1998). However, according to Tadelles and Peter (2003) opined that only 32% of the animal protein needs of the household are supplied from poultry. The contribution of backyard poultry to rural farming households as well as high as their number has been of great tool in cushion the effect of poverty syndrome in the rural area. Future prospects for rearing village chickens believed to be promising as there is traditionally high demand for higher quality than that of exotic breeds (Crawford, 1992). By its numerous importances, rural poultry contributes to the protein supply of the human population. Thus, for its role in the supply of chickens and eggs, rural poultry production in the country can never be over-emphasized.

Poultry farming is possible in widely different agro-climate environment (National Commission on Agriculture [NCA], 1997), as the fowl possesses marked physiological adaptability. Requirements of small space, low capital investment, quick return from outlay and well distributed turn over throughout the year make poultry farming remunerative in both rural and urban areas. Poultry meat and eggs are highly nutritious; the meat is rich in proteins and is a good source of phosphorus and other minerals and of B – complex vitamins. Poultry meat contains less fat than most cuts of beef and pork; and poultry liver is especially rich in vitamin A (Dana, 1998, Saha, 2003).

Livestock production is one of the important components of agriculture. This sector has expanded strongly since 1986 at an average rate of 5.7 percent per year, higher than crop and other agriculture service sectors. According to Mgayen (2006) Epprecht, (2005) as cited in Hanh *et al.* (2007) almost 80% of rural households are involved in Poultry production through backyard and garden raising, because this is a traditional industry linking with rice cultivation. Connecting crop and animal production, especially with Poultry such as chickens and ducks is a common component of mixed farming system in rural areas, generating an integral part of village life with important social functions. Poultry production generates 5-10 percent of rural family income or even 80 to 100 percent of total household income. It contributes almost all of the poultry products consumed in the villages (Weaver, 2009).

Therefore, poultry production is considered very important for rural people (Burgos *et al.*, 2007). It contributes to many livelihood indicators for rural people including income, nutrition, food security, savings and insurance. In terms of income generation and food security, the sale of those poultry and their products (e.g. egg, meat) is important. Through

sales, farmers can buy other kinds of food or inputs to produce other types of food e.g. (seed to produce grain). Besides, Poultry farming functions as insurance in the fight against shocks and stresses, such as crop failures, sickness and deaths. Poultry keeping also contributes to household nutrition, as many poor households rely on their own poultry production to provide the main part of their animal protein consumption. This provides not only protein but also micronutrients such as iron, vitamin A and other that are of crucial importance for health, especially for children (Epprecht, 2008). Moreover, poultry keeping is particularly important means for rural women in terms of income and employment (Weaver, 2009). This study therefore looked at the management practices, profitability, factors affecting productivity and problems militating against backyard poultry farming in Akoko Northwest Local Government Area of Ondo State, Nigeria. With the low level of protein supply in the country couples with food insecurity and unemployment saga, it is expected that the study will do justice in addressing the viability and profitability of the backyard poultry enterprise as a panacea to the problems stated.

## 2.0 Research Methodology

### 2.1 Study Area

The study was carried out in Akoko Northwest Local Government Area (LGA) of Ondo State Nigeria. Akoko Northwest is one of 18 LGAs that comprises Ondo State. Its headquarters is situated at Okeagbe. It has an area of 512km and a population of 213,792 (National Population Commission [NPC], 2006). Agriculture, the main occupation of the people, provides income and employment for over 75% of the population of the LGA. The People engage in arable and cash food crops Production, marketing and animal husbandry such as poultry, piggery and fishery.

### 2.2 Source and Method of Data Collection

Data for the study were obtained mainly from primary source using a set of well-structured questionnaire assisted with interview schedule to take care of the illiterate respondents. Data were collected on the socio-economic characteristics of the respondents, cultural and management practices, costs and returns, productivity and main constraints to effective and efficient backyard poultry production.

### 2.3 Sampling Procedure and Sample Size

A multistage sampling technique was used for this study. It commenced by purposively selecting eight (8) out of thirteen backyard poultry producing communities in Akoko Northwest LGA based on their population and contribution to the livestock production in the area. They are Okeagbe, Ikaram, Arigidi, Ese, Irun, Ogbagi, Ajowa, Eriti. Secondly, a systematic random sampling technique was used to select twenty (20) rural households from each town/communiy making a total sample size of one hundred and sixty (160) respondents interviewed but only one hundred and fifty two (152) copies of questionnaira were eventually valid and used for the analysis of this study.

### 2.4 Methods of Data Analysis

The data were analyzed using descriptive statistics such as means, standard deviation, percentages to analyze the socioeconomic characteristics, management practices, constraints to backyard poultry farming in the study area. Net profit analysis to analyze the profitability of backyard poultry farming in the study area. Again, the multiple linear regression model was employed to analyze the productivity of backyard poultry farmers.

#### 2.4.1 Profitability Analysis

Gross margin analysis was used to determine the cost and returns from backyard poultry production and the Net Farm Income (NFI) of the poultry owners were as well estimated. The Gross Margin and Net Farm Income will be estimated given equations 1 and 2.

$$GM = TVP - TVC \dots\dots\dots(1) \quad \text{and,} \quad NFI = GM - TFC \dots\dots\dots(2)$$

where,

GM = gross margin

TVP = total value of production (₦)

TVC = total variable cost (₦)

NFI = net farm income (₦)

TFC = total fixed cost (₦)

If  $GM > 0$ , then backyard poultry enterprise is considered profitable.

#### 2.4.2 Regression Analysis

Regression analysis was used to analyze the determinants of backyard poultry production given the input-output production relationships of the farmers. The explicit function of the Double log regression models was presented below.  
 $\text{Log } Y_i = b_0 + b_1 \text{Log } X_1 + b_2 \text{Log } X_2 + b_3 \text{Log } X_3 + b_4 \text{Log } X_4 + b_5 \text{Log } X_5 + b_6 \text{Log } X_6 + b_7 \text{Log } X_7 + b_8 \text{Log } X_8 + b_9 \text{Log } X_9 + U_i$   
 $Y_i$  = Total revenue (TR) of the respondent  $i$ th;  $\text{Log}$  = natural log;  $U_i$  = error term;  $b_0$  = intercept term;  $X_i$  = vectors of explanatory variables which are poultry farming experience (year), Major occupation (1 = poultry farming and 0 = otherwise), level of education (measure in category), household size (number); cost of labour (naira), cost of parent stock (naira), cost of feeds (naira), cost of medication (naira), depreciation cost on equipment (naira).

## 3.0 Results and Discussion

### 3.1 Personal and Socio-economic Characteristics of Sampled Respondents

The personal and socio-economic characteristics of the sampled respondents were shown in Table 1 where majority of the poultry owners (61.8%) were less than and equal to 50 years' old according to the category in the Table 1 and the

average age was 46.8. This implies that young people dominating poultry backyard farming in the study area. This finding was in line with Amos (2007) who reported that majority of poultry producers were less than 50 years' old and as well concur with Ojo (2009) that negated the a-priori assertion that small-scale farmers in Nigeria were old and ageing (Ajibefun and Abdulkadri 1999). About 54% of the respondents were female, indicating that female dominated the enterprise. The probable reason is because female has enough time in taking good care of birds at home more than male most especially rearing of the local birds serve as a pet and hobby to the old women. This result was in contrary to many findings in the literature such as Amos (2007), Maikasuwa and Jabo (2011) where male household dominated poultry farming. Majority of the respondents (68.4%) were married, indicating that married households were more involved in backyard poultry farming than unmarried households. This study supports the finding that married farmers were more involved in backyard poultry farming than unmarried farmers (Amos, 2007; Maikasuwa and Jabo, 2011). Majority of the respondents (77.6%) had been in backyard poultry business for at least 6 years' old. This implies that the sampled respondents were well groomed and experienced in the enterprise. Education results in changes in overall behaviours, since, it is the process of imparting, or acquiring knowledge and habit through instruction or study (Saha, 2003). Over 70% of the sampled respondents were educated and had at least primary school education. This is an incentive for adoption of innovations vis-à-vis development in the enterprise. Education is one of the important factors that accelerates growth and development of any enterprise. Majority of the poultry owner's household (89%) had a large family size according to the grouping in the Table (more than 5 persons per house). This has been a good source of labour in the study area. This supports most of the studies that confirmed large house size among the farming households where they see family size as a work force that supply the most needed labour requirement for production activities in the study area (Emaikwu *et al.*, 2011). Only few of poultry owners (37.5%) took poultry production as their major occupation while 62.5% had another occupation to support their livelihood such as other livestock, crop farming, civil servant, trading among others.

Table 1: Distribution of the Respondents by Socio-economic Characteristics

Socio-economic characteristics	Frequency	Percentage (%)
<b>Age</b>		
Teenager (less than 18 years)	11	7.2
Young (18 - 50 years)	83	54.6
Old (more than 50 years)	58	38.2
<b>Sex</b>		
Female	82	53.9
Male	70	46.1
<b>Marital Status</b>		
Single	48	31.6
Married	104	68.4
<b>Poultry Farming Experience (Year)</b>		
1 – 5	34	22.4
6 – 10	57	37.5
11 – 15	24	15.8
16 and Above	37	24.3
<b>Level of Education</b>		
No formal education	51	33.6
Primary school education	43	28.3
Secondary school education	37	24.3
Tertiary education	14	9.2
Others	7	4.6
<b>Family Size</b>		
Small ( $\leq 5$ members)	63	41.4
Large ( $> 5$ members)	89	58.6
<b>Production as a Major Occupation</b>		
Yes	57	37.5
No	95	58.6
<b>Total</b>	<b>152</b>	<b>100.0</b>

Source: Computed from Field Survey Data, 2013

### 3.2 Management Practices in Backyard Poultry Farming

The management practices among backyard poultry owners were examined and detailed in Table 2. Type of birds reared were posed to the poultry owners and multiple choices were allowed because most of them combined different types of bird for different purposes. It was revealed that majority of the respondents (67.1%) reared layer birds. The probable reason for high demand was due to the dual purposes of the layer bird. They start the rearing earlier so that they can get enough eggs before the end of the year when they will sell them for meat purpose during the festive periods. The result also showed that 59.9% of the respondents reared broiler birds followed by local birds (43.4%) and then cockerel birds (27.0%). Broiler bird, according to the respondents would have been preferred due to the fact that broilers

mature earlier and give high turnover than the other types but it is very prone to disease and other environment attacks. Majority of the owners (55.3%) had a small flock size and most of the respondents in this category were those rearing local birds, while only 25 respondents had a flock size of 250 birds and above.

Table 2: Distribution of the respondents by management practices

Management practices	Frequency	Percentage (%)
<b>Types/spiece of birds reared</b>		
Local birds	66	43.4
Broilers	91	59.9
Cockerels	41	27.0
Layers	102	67.1
<b>Flock Size</b>		
Small (less than 50 birds)	84	55.3
Medium (50 - 249 birds)	43	28.9
Large (250 and above birds)	25	16.4
Total	152	100.0

Source: Computed from Field Survey Data, 2013

A perusal of the Table 3 shows that 25% of the poultry owners reared the birds in backyard/free range system. While 58.6% of the respondent followed the semi-intensive system and 67.8% of the poultry owner used intensive system. Although, majority of the poultry owners were rearing the birds in backyard/free-range system but they made necessary arrangement for night shelter of the birds to protect them from predators which is similar to the findings of Aklobessi (1990), Dana (1998) and Saha (2003). It can be deduced from the Table that majority of the poultry owner (43.4%) constructed separate house for the birds and 33.6% of the respondents reported that birds shared the same house with the owner. 23.0% of the owners did not construct house for the chicks and therefore make the birds to sleep on the tree, bush and uncompleted or dilapidated building.

Table 3: Distribution of the respondents by system of bird keeping

System of Rearing Birds	Frequency	Percentage (%)
Backyard/free range	38	25.0
Semi-intensive	89	58.6
Intensive	103	67.8
<b>Night Shelter</b>		
Constructed separately for birds	51	33.6
Birds share same house with owners	66	43.4
Birds sleep in the bush/tree/eslewhere	35	23.0

Source: Computed from Field Survey Data, 2013

Feeding is very paramount in poultry enterprise. Majority of the sampled poultry owners (93.4%) provide feed for their birds while just 6.6% of the owners allowed the birds for scavenging in the surroundings of the house, village alleys, gardens, field e.t.c from where they fulfill their requirement of feed. During scavenging, the birds generally fed on kitchen wastes, earthworms, grasshoppers, ants, green grasses, leafy vegetables, seeds etc. In addition to scavenging, all the poultry owners offered a handful of broken wheat, rice maize etc. These findings are similar to the findings of Singh and Johari (1990), Sonaiya (1990), Dana (1998) and Saha (2003). The source of drinking water according to the Table also shows that 68.4% of the respondents get water for their birds from well and about 6% of the owners get their water from tap. 25.7% of the owners who are all local birds owners allowed their birds to get water from stream/river/drainage/gutter. They said that most of the local birds source for water themselves during scavenging but they only provide feed once per day and mostly in the morning.

The rural poultry owners are not much bothered about disease aspects of the poultry. The Table clearly showed that majority of the respondent (84.2%) treated their sick birds by themselves while only 15.8% of them consulted veterinary doctor. This is an indication that the health care to the respondents was not significant. This result is in agreement with reports from other develop countries (Buldgen *et al.*, 1992; Kitalyi, 1998; Dessie and Ogle, 1996). They also complained of inability to afford doctor's service and medications as a reason for not patronizing veterinary practitioners whenever their birds are sick.

Table 4: Distribution of the respondents by feed provision and health management

Variables	Frequency	Percentage%
<b>Provision of feed</b>		
Yes	142	93.4
No	10	6.6
<b>Source of Water</b>		
Well	104	68.4
Tap	9	5.9
Stream/river/drainage/gutter	39	25.7
<b>Health care</b>		
Self	128	84.2
Veterinary doctor	24	15.8
Total	152	100.0

Source: Computed from Field Survey Data, 2013

### 3.3: Profitability Analysis of Backyard Poultry Enterprise in the Study Area

The average production cycle of the backyard poultry owners was two (2) but it should be noted that those rearing local birds could not really give exact value because most of them practise free-range system and there is no record for the birds. It was revealed in Table 5 that the average total production cost per bird was ₦3,987.52 while the average total revenue was ₦4,310.11 per bird in the study area. The average total variable cost took 92.10% of the average total production cost with the cost of feeds being the highest (52.77%). It implies that feeding is very germane in the production of backyard poultry and the owners believed that when you feed the bird well, it will reflect in the final yield. Miscellaneous and labour costs contributed 20.31% and 15.45% to the production costs respectively. Costs of water, medication and parent stock as well contributed 0.52%, 0.81% and 2.24% respectively. Therefore, given the gross margin and net farm income of ₦537.99 and ₦222.59 per bird respectively, indicated that backyard poultry farming is very profitable. Again, the value of BCR of 1.06 which implies that the owner will realize ₦1.06 on each naira expended. This further confirms the profitability of backyard poultry business.

Table 5: Profitability of Backyard Poultry Production per bird in the Study Area

Average Costs	Amount (₦)	Percentage (%)
<b>a. Variable Cost</b>		
Cost of feed	2,104.02	52.77
Cost of Labour	615.91	15.45
Cost of parent stock	89.14	2.24
Cost of medication	32.34	0.81
Cost of water	20.71	0.52
Miscellaneous	810.00	20.31
<b>Total Variable cost</b>	<b>3,672.12</b>	<b>92.10</b>
<b>b. Fixed Cost</b>		
Depreciation cost of equipment	315.40	7.91
<b>Total Fixed Cost</b>	<b>315.40</b>	<b>7.91</b>
<b>Total Cost</b>	<b>3,987.52</b>	<b>100.00</b>
<b>Total Revenue</b>	<b>4,210.11</b>	
<b>Gross margin</b>	<b>537.99</b>	
<b>Net Farm Income</b>	<b>222.59</b>	
<b>Benefit-cost-ratio (BCR) = ATR/ATC</b>	<b>1.06</b>	

Source: Author's Computation, 2013.

### 3.4 Production function analysis for backyard poultry production

The total revenue accrued from the backyard poultry production was regressed against inputs and socio-economic characteristics in order to determine factors contributing to/responsible for the productivity of the business. The  $R^2$  -value of 0.678 implied that the regressors accounted for 67.8% of the variations in the output while the F-value (4.57) was significant and therefore implies that all the predictors considered for the analysis jointly exerted significant influence on the output of the poultry production. The result revealed that backyard poultry experience and level of education had a positive coefficient and statistically significant in influencing output. It means that any increase in their value, will increase backyard poultry output. It explicitly indicated that the higher the number of years in backyard poultry production couples with advancement in the level of education would definitely increase and boost production efficiency vis-à-vis output. In other way round, costs of labour and feeds had a negative coefficient but significant in explaining output. It implies that any increase in their value will reduce output. Therefore, in order to maximize output, cost of labour and feeds must be minimized in the course of backyard poultry production.

Table 6: Estimated production function for backyard poultry farmers in the study area

Variable	Coefficient	Std.Error	P-value
Farming Experience	2.88*	0.80	0.001
Major occupation	12.31	9.78	0.109
Level of Education	3.80*	1.79	0.041
Cost of labour	-6.24*	3.35	0.031
Cost of parent stock	70.92	133.45	0.950
Cost of feeds	-19.92*	10.47	0.043
Cost of medication	-1.36	1.23	0.101
Equipment	1.16	1.64	0.710
Constant	-70.18	192.44	0.973

$R^2 = 0.678$ ; Adjusted  $R^2 = 0.598$ ; F-value = 4.57\*, \* = Significant at 5% level

Source: Computed from Field Survey Data, 2013

### 3.5 Problems militating against backyard poultry production

The distribution of the respondents based on the challenges facing by the backyard poultry owners was shown in the Table 7. A list of problems that was gathered from the literature was posed to the respondents to tick as applicable to them and multiple choices were allowed. Out of ten (10) problems identified, an inadequate fund (98.0%) was ranked highest as the problem encountered by the sampled respondents. It was observed during the interview that all of them

were emphasizing on lack of loan and there is no financial institution in the communities that are ready to lend out money, as a result, this is affecting the business. Instability of price and market problem was ranked second and it said that price of birds always fall at the festive periods and there is no ready market for the birds in the study area. Lack of extension service and government support was ranked third in the list. They complained that government does not make the environment conducive for the rearing of backyard poultry production and hardly do they see extension agents that are supposed to be intermediary between the farmers and government. Expensive feeds and irregularity in supply, extreme weather and high costs of medication were ranked fifth, sixth and seventh in the identified problems. Theft (8<sup>th</sup>) was said to be rampant during the festive periods most especially the local birds. Litter materials (9<sup>th</sup>) were scarce because the wood shavings that were using are now used for cooking, therefore make it not available and competitive. Cannibalism was the least problem mentioned and this category belongs to those that keep birds in deep litter house.

Table 7: Distribution of the respondents by problems militating against backyard poultry production in the study area

Constraints	Frequency	Percent	Rank
Inadequate funds	149	98.0	1 <sup>st</sup>
Expensive medication, failure of veterinary drugs and vaccines	81	53.3	6 <sup>th</sup>
Expensive feeds and irregularity in supply	103	67.8	4 <sup>th</sup>
Diseases outbreak	67	44.1	7 <sup>th</sup>
Lack of access to extension service and government support	141	92.8	3 <sup>rd</sup>
Price instability and market	148	97.4	2 <sup>nd</sup>
Theft	66	43.4	8 <sup>th</sup>
Cannibalism	35	23.0	10 <sup>th</sup>
Extreme weather	89	58.6	5 <sup>th</sup>
Change of litter materials	66	40.1	9 <sup>th</sup>

Source: Computed from field survey data, 2013. Note: multiple Choices Allowed

#### 4.0 Conclusion

The study investigated into the viability and profitability of backyard poultry production in Akoko Northwest LGA of Ondo State, Nigeria. It was observed that the enterprise was profitable despite the constraints to effective and efficient production faced by the poultry owners in the study area. Backyard poultry farming experience and their educational level increase the productivity of the enterprise significantly while costs of labour and feeds significantly reduce it, poultry owners should therefore pay close attention to these factors in order to boost poultry production. The amount spent on labour should be drastically reduced while local feeds can be encouraged among the poultry owners by using unconventional feed stuffs like dried cassava peel and rice bran so that the costs expended on the two variables can be reduced in order to boost poultry productivity. Since they faced challenges on funds, prices and market, and extension services, it is therefore recommended that government should establish agricultural banks close to the farmers with minimum interest rate and as well help the poultry farmers in stabilizing the price and create conducive market environment most especially during the festive periods. Competent extensionists should be employed to visit and enlighten poultry owners on the technicality of production processes and how they can formulate feeds for their birds. This will not only enhance the skills of the farmers but also create employment opportunity mainly to the youth and profoundly increase their incomes.

#### References

- Ajibefun, I. and Daramola, A. G. (1999). Measurement and Sources of Technical Inefficiency in Poultry Egg Production in Ondo State, Nigeria. *Journal of Economics and Rural Developmen, University of Ibadan*. 13(2): 85-94.
- Aklobessi, K K (1990) Smallholder Rural Poultry Production in Togo. In: CTA Seminar Proceedings, Smallholder Rural Poultry Production, Thessaloniki, Greece, 2: Pp 237-242.
- Amos, T. T.(2007). An analysis of Productivity and Technical Efficiency of Smallholder cocoa Farmers in Nigeria. *J. Soc. Sci*, 2007, 15(2):127-133.
- Buldgen A, Detimmerman F, Sall B and Compère R. (1992). Etude Des Paramètres Démogrphiques Et Zootechniques De La Poule Locale Du Bassin Arachidier Sénégalais. *Revue D'élevage Et De Médecine Vétérinaire Des Pays Tropicaux*, 45(3-4):341-347.
- Burgos, S. Hanh P.T.H., Holand-Holst D. and Burgos S.A. (2007). Characterization of Poultry Production Systems In Vietnam *International Journal of poultry sciences* 6:709-712
- Crawford, R.D. (1992). A Global Review of Genetic Resources of Poultry. The Management of Global Animal Genetic Resources (Hodges Eds). Proc. FAO Expert Consultation, April 1992, Rome.
- Dana, S. S. (1998). Animal Husbandry Practices Among Santal and Lodha Tribes of Medinipur District of West Bengal. Ph.D. Thesis, Division of Extension Education, IVRI, Izatnagar.
- Delgado, C. Courbois, C. and Rosegrant, M. (1998). Global Food Demand and the Contribution of Livestock as we Enter the New Millennium. International Food Policy Research Institute, Market and Structural Studies Division. Pp36.
- Dessie, T. and Ogle, B. (1996). Studies on Poultry Production Systems in the Central Highlands of Ethiopia. Swedish University of Agricultural Sciences, M.Sc. Thesis, Department of Animal Nutrition and Management.

- Doviet, Mimh (2005). Effect of Supplementation, Breed, Season and Location Of Feed Intake And Performance of Scavenging Chickens In Vietnam. Doctorial thesis. Swedish University of Agricultural Science.
- Emaikwu, K.K.; Chikwendu, D.O. and Sani, A.S. (2011). Determinants of flock size in broiler production in Kaduna State of Nigeria. *Journal of Agricultural Extension and Rural Development* Vol.3(11), pp. 202 – 211.
- Epprecht, M (2008). Geographic Dimensions of Livestock Holdings in Viet Nam: Spatial Relationships Among Poverty Infrastructure and Environment.
- Gueye, E.F. (2003). Poverty Alleviation, Food Security and the Well-Being of the Human Population Through Family Poultry In Low Income Food-Deficit Countries. Senegalese Institute of Agricultural Research (ISRA), B.P.2057, Dakar-hann, Senegal.
- Hanh, P.T.H, S. Burgos and D. Roland. Holst, (2007). The Poultry Sector in Vietnam. Prospect for Small Holder Producers In The Aftermath of the HPAI Crisis. PPLPI Research Report.
- Kitalyi, A. J. (1998). Village Chicken Production System in Rural Africa; Household Food Security And Gender Issues. FAO, Rome. <http://www.fao.org/DOCREP/003/W8989E/W8989E00.htm#TOC>
- Maikasuwa, M.A. and Jabo, M.S.M. (2011). Profitability of Backyard Poultry Farming in Sokoto Metropolis, Sokoto State, North-West, Nigeria. *Nigerian Journal of Basic and Applied Science* (2011), 19(1): 111 – 115.
- (NCA) National Commission on Agriculture, (1997). India Council of Agricultural Research. Krishi Bhavan, Dr. Rajendra Prasad Road, New Delhi-110001. INDIA.
- (NPC) National Population Commission (2006). The Nigeria Population Census, 2006. Retrieved from [http://www.population.gov.ng/index.php?option=com\\_content&view=article&id=89](http://www.population.gov.ng/index.php?option=com_content&view=article&id=89) (verified on 12 December, 2011).
- Ojo, S.O. (2009). Backyard Farming: A panacea for food security in Nigeria. *J Hum Ecol*, 28 (2): 127 – 133 (2009).
- Saha, D. (2003). Status of Rural Poultry Production in North 24 Parganas District of West Bengal. M.V.Sc. Thesis, Division of Extension Education, IVRI, Izatnagar.
- Singh, D. P. and Johari, D. C. (1990). Kadaknath the Native Fowl Needs to be Conserved. *Indian Farming*, March 1990, Pp. 29-32.
- Sonaiya, E.B. (1990). The Context and Prospects For Development of Smallholder Rural Poultry Production in Africa. In Proceedings, CTA Seminar On Smallholder Rural Poultry Production, Thessaloniki, Greece, 9–13 October 1990, Vol. 1, Pp35–52.
- Sonaiya, E.B. (2000). Family Poultry and Food Security: Research Requirements in Science, Technology And Socioeconomics. Proceedings XXI World's Poultry Congress, Montreal, Canada, August 20-24.
- Tadelle, D. and Peter, K.J. (2003). Indigenous Chicken in Ethiopia: Neglected But Worth The Cost Of Conservation Through Improved Utilization. Humboldt University of Berlin.
- Weaver, B. (2009). Scope for Backyard Poultry (BYP). Development Under the Special Training Program of the Madhya Pradesh women in Agriculture (MAPWA) Project.
- Wethli, E. (1995). Poultry Development Study. Family Framing Rehabilitation Program. Maputo. Consultoria E Projectos . Lda.