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# Economic and Environmental Impact of Poultry Waste and Production in Ilorin Metropolis, Kwara State, Nigeria

**Ezekiel Ayinde Alani[1]*, Henri Ukoha A[2] and Ismaila Yusuf Adekunle[3]**

[1]Department of Agricultural Economics, Ladoke Akintola University of Technology, Ogbomoso, Nigeria

[2]Department of Agricultural Economics and Agribusiness Management, University of Port Harcourt, Port Harcourt, Nigeria

[3]Department of Agricultural Economics and Farm Management University of Ilorin, Nigeria

**ABSTRACT**

This study investigated the economic and environmental impact of poultry production in Ilorin, Kwara State. Primary data were used and a sample of 120 poultry farmers through a multistage sampling technique was drawn from the study. The data collected were analysed using descriptive statistics, gross margin analysis, OLS regression model and Likert-type scale. The results show that the enterprise incurred an average total variable cost of N135,450.0 and total revenue within the period was estimated to be N192,323.80 which was mainly generated from the sales of poultry birds. The gross margin was found to be N56,873.8 with N0.4199 can be obtained with a unit increase in the poultry production capacity. Thus the broiler production is a profitable venture in the study area. The empirical finding based on the regression result indicate that, cost of labour, cost of chicks and marital status had positive coefficient and statistically significant in influencing the total revenue level. It means that any increase in their value will increase the revenue level. The result of vaccine/medication administered against diseases revealed that most of the poultry farmers uses Lasota vaccine (88%) against Newcastle disease, a combination of amprolium and coccimapro (27%) each for Coccidiosis, pox off (88%) for fowl pox disease, Gumboro vaccine (65%) for IBD gumboro and their sources of getting the medication/vaccines are majorly from Aromokeye agro vet and One step pharmacy. The analysis shows that among the various ways of waste management, the farmers uses the waste more for fertilizer (28%) followed by selling them (23%) while only (21%) of the farmers burn the waste (especially the dead birds) so as to prevent further spread of diseases on the farm. The empirical findings based on the environmental impact of poultry production reveals that waste generation is the major negative environmental impact of poultry production in the study area. Offensive odour also associated with poor waste management is ranked 2nd, diseases transmission, air pollution and water pollution are among the environmental impact of poultry production in the study area. Poor management system is perceived to be the major constraint, lack of security and government support ranked 2nd is seen as a problem.

***Corresponding author**

Ezekiel Ayinde Alani, Department of Agricultural Economics, Ladoke Akintola University of Technology, Ogbomoso, Nigeria.

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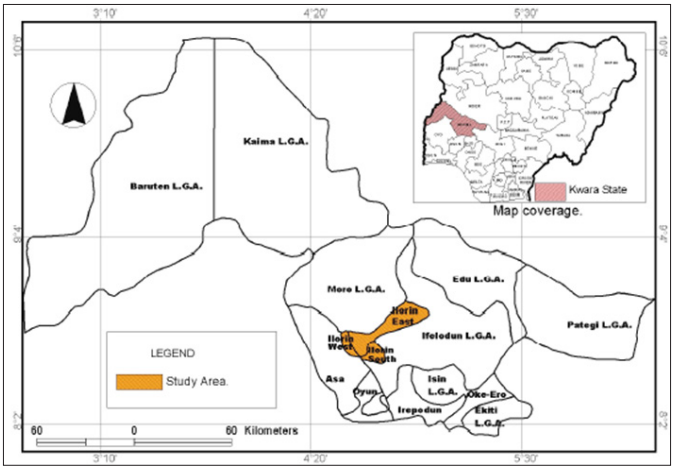
## Introduction

Poultry production is unique in essence that it offers the highest turnover rate and the quickest returns to investment outlay in the livestock enterprises [1]. Funds invested in poultry production are recovered faster than in any other livestock enterprise [2]. The rate of growth in poultry production is the highest when compared with ruminants and other monogastric animals and the cheapest, commonest and the best source of animal protein [3,4]. affirmed that returns to investment can be improved by turning out batches in a year depending on the length of the production cycle. Poultry refers to all birds of economic value to man, examples include chickens, pigeon, duck, pheasant, quail, guinea fowl and recently ostrich all which belong to the zoological class aves [5]. stated that poultry have been on earth for over 150 million years, dating back to the original wild jungle fowl. Poultry offered a range of uses to human which include: provision of meat and egg, research and medicinal purpose, production of manual which helped to improve the soil fertility, feathers from poultry birds provide human with aesthetic value [5]. The interest in poultry and poultry products has grown tremendously in the last 20 years as stated by [5]. Almost every country in the world involved in poultry production. Japan domestic production of both broiler and egg production increases steadily, countries of the Soviet Union have always been producing poultry and eggs and are continuing to increase their output to meet the new demand. China, the Middle East and Africa are all areas where increasing demand for poultry has resulted into significant increases in the number of birds being reared for meat and eggs, (FAO, 2002). Poultry refers to all birds of economic value to man as source of meat, egg and fibre. Egg production involves the use of good layer birds for the purpose of table egg production [6]. Eggs are major sources of animal protein in human diet [7]. According to the poultry goes a long way in providing animal protein for the populace because it yields quickest returns and provides for meat and eggs in a very short time. (Iwena, 2007) reported that proteins are required for the growth of young ones, formation of gametes in reproduction, formation of digestive juices, repair of worn-out tissues or cells,

production of anti-bodies as well as enzymes and hormones in the body [8]. eaffirmed that animal proteins are more "biologically complete" than vegetable proteins with regards to their amino-acids composition. Poultry is a sub-sector in the livestock industry constituting a major component of the agricultural economy. The sector provides animal protein to the populace as well as employment for a considerable percentage of the population [9]. According to poultry comes fourth among sources of animal proteins for human consumption in Nigeria and contributes about 10% of the national meat production. Poultry business is attractive because birds are able to adapt easily, have - high economic value - rapid generation time and - a high rate of productivity that can result in the production of meat within eight weeks and first egg within eighteen weeks of the first chick being hatched. Poultry management system in Nigeria is of three types which are intensive, semi-intensive and extensive, they are classified on the basis of their flock size and input and output relationship [10]. Flock size in intensive production are in thousands, whereas semi intensive production system flock size range from 50- 200 birds and keeping of big flock size in as a result of research development in artificial incubation, nutritional requirement and disease control. Poultry birds mature earlier than most breeds of livestock, they bring economic return within relatively short periods of about 10-12 weeks, poultry eggs and meat play a very important role in bridging the protein gap in Nigeria and they are generally accepted [11]. revealed that 85% of rural families keep small ruminants and local fowls primarily as an investment and sources of manure or meat at home or for use during festivals. In spite of this, livestock production is still not keeping pace with the protein requirements of the rapidly increasing Nigeria population. Demand is more than supply. Since the responsibility of any civilized government is to provide adequate food and assure an atmosphere free from hunger and malnutrition, the Federal Government of Nigeria placed a ban on importation of frozen chicken and turkey parts to encourage massive poultry production locally (Agricultural Transformation Agenda, 2012). Despite the fact that urban poultry production has become the most rapidly developing enterprises especially in Ilorin where the research is carrying out. The industry in the area has not attained the expected level of economic and environmental impact among participating members [12]. This was supported by in which his research work stated that, the factors that causes low productivity of poultry in Nigeria includes: problems of poor selections of the birds by farmers, which most of the time, may cause low productivity. Normally production is usually slow due to such problems. It is advisable for farmers to keep male's chickens away from the layer's stock, and it is the objective of farmers to produce table eggs, which will contribute towards income generating abilities to generate economic growth. Another salient point we need to consider is the age of the poultry, also a factor that needs to be observed. Because the old ones do not lay often and do not yield good quality meats. Therefore, keeping broilers, layers for more than one laying year can bring about low production. We observe that inadequate feeding and lack of diseases control are among the factors militating rapid growth of the poultry, Moreover, the inefficient and unbalanced feed ration can affect the growth and laying capacity of the birds. Many poultry diseases, especially those associated with virus, have no treatment. Lack of disease control measure within the poultry industries is capable of bringing about low production. Closely linked to this factor is poor feeders and drinkers resulting in wasted and contaminated feeds. Such feeds tend to spread disease like coccidiosis. This contributes to high mortality rate and fall in productivity. The research work also has looked into the problems of poultry production and tries to find the possible solution to the problems. The literature reviewed in this research work is related to the stated objectives to achieve both general and specific objectives. Some of the problems driven to this research work are practical problems, like the inability of poultry farmer to know the vaccine/medication to administer so as to combat the prevailing diseases. Little information is known about waste management strategies to employ. This lack of information could cause poultry farmers experiencing loss when the needed information does not get to them at right time. While some problems are theoretical problems, like lack of research similar to this conducted in the study area, as such no available literature to be found. But nevertheless, the researcher is able to find some relevant text that can serve as relevant materials for guide and making the research work successful and completion of the work within the timeframe. The major objective of this study is to analyse the economic and environmental impact of poultry production in Ilorin Kwara State, Nigeria. While the specific objectives are to: estimate the costs and returns to production in the study area, identify the factors that determine the output level of poultry production in the study area, identify the vaccines/ medications administered against poultry diseases in the study area, describe the waste management strategies employed by the poultry farmers in the study area, identify the environmental impacts of poultry production in the study area and to identify the constraints to poultry production in the study area.

**Research Methodology**

The study was conducted in Kwara State. It is located between parallels 8º and 10º north latitudes and 3º and 6º east longitudes east. The state covers an area of 35,705 Sq kilometres, the climate of the state is characterized by both the wet and dry seasons, with the rainy season starting from march and last till October, while the dry season begins in November, it has a population of 2,371,089 (Nigeria, 2007 population census figures) with a population density of 66 people/Sq Km, it population makes up 1.7% of Nigeria's total population. Kwara State is one of the seven states that make up the north central Geo-political zone in the north central part of Nigeria with its capital at Ilorin. It shares an international boundary with the republic of Benin to the west and interstate boundaries with Niger state to the north, Oyo State to the southwest, Osun and Ekiti States to the southeast and Kogi State to the east. Ilorin climate is characterized by both wet and dry season each lasting for about six months. The raining season begins towards the end of April and last till October while the dry season begins in November and ends in March. Days are very hot during the dry season; from November to January, temperatures typically range from 33°C to 34°C, while from February to April, the temperature is between 34.6°C and 37°C. Relative humidity at Ilorin in the wet season is between 75 and 80% while in the dry season it is about 65%. The daytime is always sunny with the sun brightly shinning for about 6.5-7.7 hours daily from November to May The climate supports tall grass vegetation, which is interspersed with short scattered trees (Guinea Savannah). Hence, it provides high quantity of feed for livestock animals. The only trees that are able to survive in this climate are those which are biologically suited to withstand dry conditions. Such trees have deep roots and they are adapted to conserve moisture in the dry season. The baobab, acacia, shears butter trees are typically examples of trees in the area. The vegetation on the other hands is dominated by derived scattered trees. The vegetation provides reasonable quantity of feed for livestock animals especially during the rainy season.




Map Showing the Study Area (Ilorin Metropolis)
**Source:** https//www.researchgate.net/figure/Map-of-Kwara-State-Nigeria-Showing-Ilorin-the-study-area-19_fig_321854319

## Source of Data

The primary data was collected by administering a well-structured questionnaire and interviews for those that cannot read and write. These were collected from poultry farmers in the area. The study was conducted in selected poultry farms in Ilorin metropolis. The target population for this study comprises the poultry farmers. For the purpose of the study a two (2) stage sampling procedure was used to identify poultry farmers in the study area. The first stage involve selection of the three (3) LGA which were Ilorin east, Ilorin west, Ilorin south. The second stage sampling technique involves random selection of forty (40) poultry farmers in each of the selected LGA. Overall 120 poultry farmers were sampled for the study. The data for this study was analysed using the following tools of data analysis: Descriptive statistics, Gross margin analysis, Regression analysis, Likert-type scale. Descriptive statistics such as frequencies mean and percentage was used to describe the socioeconomic characteristics of the poultry farmers, as well as to describe the poultry waste management strategies employed in the study area. Gross margin was used to examine the costs and returns to poultry production in the study area.

This is given as:

GM=TR- TVC

Where,

GM= Gross margin

TR= Total revenue

TVC= Total variable cost

Variable costs include all cash expenses associated with production and sales of input like feed, labour, and calcium supplement [13,14]. A statistical method that shows the relationship between a dependent variable and one or more independent variables shows as follows:

$$Y = \hat{a}_o + \hat{a}_1X_1 + \hat{a}_2X_2 + \hat{a}_3X_3 + \hat{a}_4X_4 + \hat{a}_5X_5 + \hat{a}_6X_6 + \hat{a}_7X_7 + Ui$$

Where,

Y = total revenue (naira)

$X_1$ = cost day old chick (naira)

$X_2$ = cost labour (naira)

$X_3$ = cost of drugs (naira)

$X_4$ = educational level of the poultry farmer

$X_5$ = source of finance for poultry production

$X_6$ = marital status

$X_7$= place of poultry production (dummy variable; 0= Major occupation, 1= Minor occupation)

Ui = Error term

Likert-type scale was used in this study to identify the environmental impacts of poultry production and to identify the constraints to poultry production in the study area. It was used to scale responses of poultry farmers in the study area. A five-point scale was employed which feedbacks were grouped into: Strongly Agree = 5, Agree = 4, Neutral =3, Disagree= 2, Strongly Disagree = 1

XW = 5(F5) + 4(F4) + 3 (F3) + 2(F2) + 1(F1)

Where,

Xw = weighted score

5-1 = rating scale of strongly agree (5) to strongly disagree (1)

F5 – F1 = frequency of the respondents in each scale

The values of the weighted scored will be used to rank the problems faced by poultry farmers.

## Results and Discussion

**Table 1: Socio-Economic Characteristics of the Poultry Farmers**

| Variables | Freq. | Percent | Cum. | mean |
|---|---|---|---|---|
| **Gender** | | | | |
| Male | 99 | 82.50 | 82.50 | |
| Female | 21 | 17.50 | 100.00 | |
| **Age** | | | | |
| 0-25 | 19 | 15.97 | 15.97 | |
| 26-35 | 26 | 21.85 | 37.82 | |
| 36-45 | 37 | 31.09 | 68.91 | |
| 46-55 | 29 | 24.37 | 93.28 | |
| 56-65 | 8 | 6.72 | 100.00 | |
| **Marital status** | | | | |
| Single | 28 | 23.53 | 23.53 | |
| Married | 65 | 54.62 | 78.15 | |
| Divorced | 10 | 8.40 | 86.55 | |
| Widow | 4 | 3.36 | 89.92 | |
| Widower | 7 | 5.88 | 95.80 | |
| Separated | 5 | 4.20 | 100.00 | |
| **Level of Education** | | | | |
| No formal | 7 | 5.88 | 5.88 | |
| Primary school | 11 | 9.24 | 15.13 | |
| Junior secondary | 13 | 10.92 | 26.05 | |
| Senior secondary | 35 | 29.41 | 55.46 | |
| Tertiary | 41 | 34.45 | 89.92 | |
| Adult education | 12 | 10.08 | 100.00 | |
| **Place of poultry production** | | | | |
| Major occupation | 47 | 39.17 | 39.17 | |
| Minor occupation | 73 | 60.83 | 100.00 | |
| **Secondary occupation** | | | | |
| Business | 41 | 34.74 | 34.74 | |
| Artisan | 27 | 22.88 | 57.62 | |
| Farming | 21 | 17.80 | 75.42 | |
| Others | 29 | 24.58 | 100.00 | |

| | | | | |
|---|---|---|---|---|
| **Household size** | | | | |
| Less than 5 | 16 | 13.79 | 13.79 | |
| 5-10 | 82 | 70.68 | 84.47 | 7.5 |
| 10-15 | 18 | 15.51 | 100.00 | |
| **Religion** | | | | |
| Christianity | 57 | 49.14 | 49.14 | |
| Islam | 57 | 49.14 | 98.28 | |
| Traditional | 2 | 1.72 | 100.00 | |

**Source: Field survey, 2020**

The table shows that 82.5% of the poultry farmers are male while about 17.5% of the respondents are females. This may be because poultry farming is a strenuous activity and the females in the study area are either involved in the marketing of poultry products or marketing of other agricultural goods. The table further reveals that about 84.03 per cent of the respondents are above age 25years and the modal age falls with age 36-45years. Thus, majority of the farmers are middle aged, this might result in positive effect on the efficiency of their poultry farming thereby enhancing proper waste management and also their ability to find the best market for their produce. The table shows that majority of the respondents were married (55%). This indicates a higher chance of involving family labour in the poultry management. About two – third of the respondents are still single, divorced or separated. Majority of the respondents (61%) take poultry farming as their minor occupation, while (39%) take it as their major occupation. This reveals that majority of the respondents do not take poultry farming as their sole source of income but rather involve in other income generating activities. Tertiary education is the highest level of education of most of the poultry farmers (35%), this might add to their skill and ability to properly manage the activities. Very few of the respondents have no formal education (6%). The modal household size is 5 to 10. The table also reveals that the major religion practiced in the household is Christianity and Islam with both having about 49%, with traditional religion being practiced by only two of the respondents (1.72%).

**Table 2: Costs and Returns from Poultry Production**

| Variables | Average cost |
|---|---|
| Total Revenue | 192,323.80 |
| Total Variable Cost | 135,450.0 |
| Cost of chicks | 47,005.6 |
| Cost of poultry feeds | 80,972.1 |
| Cost of drugs | 1,717.3 |
| Cost of electricity | 1,250.9 |
| Cost of feeding materials | 2,904.6 |
| cost of packaging materials | 10.8 |
| cost of water | 200.00 |
| Others | 1,388.7 |
| Gross margin | 56,873.8 |

**Source: Field survey, 2020**

The costs and returns of the poultry production of the respondents were analysed using the gross margin analysis. The average of the total revenue of the respondent in naira is computed to be greater than the average total cost of production yielding a positive gross marginal value which means that poultry production is worthwhile. The total variable cost includes the cost of chicks, the cost of poultry feeds used during the production period, cost on vaccination and other drugs, cost on electrical equipment (such as electric bulb), cost of water. The items were used during the given production period. The estimation of gross margin is given as; Gross margin is equal to total value of revenue – total variable cost. The table indicates that from the estimated cost and return analysis, a gross margin of N56,873.8 was obtained. This shows that poultry production is profitable in the study area but can however be improved through efficient financing.

$$profitablity\ of\ poultry\ production = \frac{\text{gross margin}}{\text{total input}} = \frac{56.873.8}{135,450.0}$$

Profitability =N0.4199kobo

Using the profitability analysis, the result shows a sum of profit of N0.4199kobo can be obtained with a unit increase in the poultry production capacity.

**Table 3: Factor Determine the Output Level in Poultry Production**

| Variables | Coefficient | Std. Err. | t values | P >\|z\| |
|---|---|---|---|---|
| Constant | -0.8537653 | 2.847717 | 2.35 | 0.004 |
| Cost of drug ($X_3$) | 0.33881 | 2.560742 | 2.92 | 0.191 |
| Cost of labour ($X_2$) | 0.47173 | 1.571453 | 2.32 | 0.004 |
| Education level ($X_4$) | 1.627765 | 1.688871 | -0.35 | 0.339 |
| Cost of chick ($X_1$) | 0.4898125 | 1.92895 | 4.65 | 0.014 |
| Source of finance ($X_5$) | -0.251459 | 1.834913 | 1.39 | 0.891 |
| Place of poultry prod. ($X_7$) | -0.6923139 | 4.958959 | -1.16 | 0.168 |
| Marital status ($X_6$) | 0.3239096 | 1.700836 | 1.89 | 0.062 |

**Source: Field survey, 2020**

R-squared = 0.5055

Adj R-squared = 0.4746

F value = 16.36

The table shows the result of the analysis on the determinants of output (total revenue) from poultry production in the study area. Cost of labour ($X_2$), cost of chick ($X_1$), marital status ($X_6$), and the intercept ($\hat{a}_o$) were significant at 0.00, 0.05, 0.1 and 0.00 levels of significance respectively. Cost of drugs ($X_3$), educational level of the respondents ($X_4$), source of finance ($X_5$), and place of poultry production (minor or major occupation) ($X_7$) was shown to have no significant effect on total revenue level. According to the regression result, costs of labour ($X_2$), cost of chick ($X_1$), and marital status ($X_6$), are positively related to the output with coefficient of 0.47173, 0.4898125 and 0.3239096 respectively. Therefore, with increase in the cost of labour, the poultry farmer's total revenue is likely to change positively. This might be as a case of hiring highly skilled labourers which almost always require much expense although their expertise and efficiency in the poultry activities will help optimize the total revenue level. It might also be because of perceived time spent by the labourer on the various poultry activities, as farmers will be able to detect the incidence of diseases easily and be proactive to it cure, preventing it from being contacted by other birds hence preventing much mortality during the production process. Also, as the cost of chick increases, the farmers might also increase the price they sell their produce, which will relatively increase their profit in the business. This is possible especially when the cost of feed decreases with the increase in cost of chick because feed takes a larger portion of the variable cost on poultry production. Marital status affects the production positively because of more obligation as the majority

of the farmers were married and their wives might be at home to manage the birds well, thereby increasing the total revenue level. $R^2$ value of 0.5317 implies that 53.17% of the variation in the dependent variable has been explained by the independent variables such as cost of labour ($X_2$), cost of chick ($X_1$),) and marital status ($X_6$), and that the remaining 46.83%was attributed to the variables not included in the model.

**Table 4: Sources of Information Available to the Farmers**

| Knowledge of poultry disease | Freq. | Percent | Cum. |
|---|---|---|---|
| Education | 26 | 28.26 | 28.26 |
| Extension agent | 26 | 28.26 | 56.52 |
| Farmers group | 12 | 13.04 | 69.57 |
| Family and Friends | 8 | 8.70 | 78.26 |
| Ministry of Agric | 18 | 19.57 | 97.83 |
| Television and Radio | 2 | 2.17 | 100.00 |

**Source: Field survey, 2020**

The table shows the result of various source of information available to the farmers as regards where they acquire the knowledge and practice of vaccination as it applies to poultry production. Most of the farmers about 28% get their information from normal Formal education and about 28% of the respondents obtain their information from Extension agents. Very few about 2% acquired the knowledge from Television and Radio.

**Table 5: Common Diseases Vaccinated/Medicated Against**

| Vaccines | Freq. | Percent | Cum. |
|---|---|---|---|
| **Newcastle** | | | |
| Yes | 82 | 82.00 | 82.00 |
| No | 18 | 18.00 | 100.00 |
| **Coccidiosis** | | | |
| Yes | 81 | 81.00 | 81.00 |
| No | 19 | 19.00 | 100.00 |
| **Fowl pox** | | | |
| Yes | 36 | 36.00 | 36.00 |
| No | 64 | 64.00 | 100.00 |
| **IBD (Gumboro)** | | | |
| Yes | 55 | 55.00 | 55.00 |
| No | 45 | 45.00 | 100.00 |
| **Fowl typhoid** | | | |
| Yes | 18 | 82.00 | 82.00 |
| No | 82 | 18.00 | 100.00 |
| **Infectious Bronchitis** | | | |
| Yes | 1 | 1.00 | 1.00 |
| No | 99 | 99.00 | 100.00 |

**Source: Field survey, 2020**

The table shows the result of the most common diseases vaccinated/medicated against by the poultry farmers. Majority of the sampled poultry producers (about 83%) do practice vaccination and medication. Most of the farmers vaccinated against Newcastle disease (82%), Coccidiosis (81%), and Gumboro (55%), and majority not vaccinating against any of Fowl pox disease (64%), Fowl typhoid (82%), and Infectious Bronchitis disease, (99%). About 17% of the poultry farmers do no vaccinate or medicate against diseases at all. This may be because few of the respondents are not educated at all and they have little or no knowledge about how to go about vaccination.

**Table 6: Common Vaccines/Medication Administered Against the Diseases**

| Vaccines/medication administered | Freq. | Percent | Cum. |
|---|---|---|---|
| **Newcastle disease** | | | |
| Lasota | 70 | 87.50 | 87.50 |
| Komorof | 2 | 2.50 | 90.00 |
| Carecaryl | 1 | 1.25 | 91.25 |
| Lasota and Komorof | 7 | 8.75 | 100.00 |
| **Coccidiosis disease** | | | |
| Amprolium | 22 | 26.83 | 26.83 |
| Coccimapro | 22 | 26.83 | 53.66 |
| Diclacox | 3 | 3.66 | 57.32 |
| Embacox | 8 | 9.76 | 67.08 |
| Embazine | 27 | 32.93 | 100.00 |
| **Fowl pox** | | | |
| Pox off | 30 | 88.24 | 88.24 |
| Pox cure | 2 | 5.88 | 94.12 |
| Izovac | 2 | 5.88 | 100.00 |
| **Gumboro** | | | |
| Biovac | 4 | 7.41 | 7.41 |
| Embazine | 5 | 9.26 | 16.67 |
| Gumboro vaccine | 35 | 64.81 | 81.48 |
| Embacox | 10 | 18.52 | 100.00 |
| **Fowl typhoid** | | | |
| Mamacox | 4 | 23.53 | 23.53 |
| Vitacox | 13 | 76.67 | 100.00 |
| **Infectious Broncitis** | | | |
| Coccidiostat | 1 | 25.00 | 25.00 |
| Embazine | 3 | 75.00 | 100.00 |

**Source: Field survey, 2020**

The table shows the different vaccines or medication administered against several diseases that could affect birds during the process of production. The result showed that most of the poultry farmers uses Lasota (88%), a combination of Amprolium and Cocccimapro at 27% each, Pox off 30 with about 88%, Gumboro vaccine (65%), Vitacox (78%) and embazine (75%) to vaccinate against Newcastle disease, Coccidiosis disease, Fowl pox disease, Gumboro disease, Fowl typhoid disease and Infectious Bronchitis respectively.

**Table 7: Sources of Getting the Vaccine/Medication**

| Source | Aromokeye | One-step pharmacy | Ibadan. | Al – Asbab vet. | Kulende mrkt. | prime-quest AC. | prime-quest AC. |
|---|---|---|---|---|---|---|---|
| Newcastle vaccine | 49(61.25) | 15 (18.75) | 4 (5.00) | 4 (5.00) | 6 (7.50) | 2 (2.50) | 0 (0.00) |
| Coccidiosis vaccine | 48(57.14) | 19 (22.62) | 2 (2.38) | 7 (8.33) | 6 (7.14) | 1 (1.99) | 1 (1.99) |
| Fowl pox vaccine | 25(71.43) | 4 (11.43) | 2 (5.71) | 2 (5.71) | 0 (0.00) | 2 (5.71) | 0 (0.00) |
| IBD (Gumboro) | 36(66.67) | 7 (12.96) | 1 (1.85) | 3 (5.56) | 4 (7.41) | 3 (5.56) | 0 (0.00) |
| Fowl typhoid | 9 (56.25) | 4 (25.00) | 1 (6.25) | 2(12.50) | 0 (0.00) | 0 (0.00) | 0 (0.00) |
| Infectious Bronchitis | 2 (66.67) | 1 (33.33) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) |

**Source: Field Survey, 2020**

The table shows the various sources the poultry farmers get their vaccines from, for vaccinating against diseases in the poultry production process. Most of those who vaccinated against Newcastle disease get their vaccine from Aromokoye (61%) followed by One-step pharmacy (19%). Also, most of the farmers who vaccinated against coccidiosis and Fowl pox diseases get their vaccines from Aromokoye, (57%) and (71%) respectively, followed by One-step pharmacy (23%) and (11%) respectively.

**Table 8: Waste Management Strategies Employed by Poultry Farmers in the Study Area**

| Waste materials | Freq. |
|---|---|
| Feather | 98 |
| Dead birds | 3 |
| Stale/cracked eggs | 17 |
| Fasces | 102 |
| Others | 17 |

**Source:** Field survey, 2020

The table shows the various waste materials from process of poultry production. A larger number of the respondents, 102, get faeces as a waste material, with very few, 3, getting dead birds as waste material from the production process. 17 of the respondents get others such as wood shavings as waste material from their production process.

**Table 9: Waste Management Practices Employed by Poultry Farmers**

| Waste management | Freq. | Percent | Cum. |
|---|---|---|---|
| Sell | 27 | 23.08 | 23.08 |
| Recycle | 4 | 3.42 | 26.50 |
| Re-use | 10 | 8.55 | 35.04 |
| Biogas production | 5 | 4.27 | 39.32 |
| Fertilizer | 33 | 28.21 | 67.52 |
| Burn | 24 | 20.51 | 88.03 |
| Sell and fertilizer | 6 | 5.13 | 93.16 |
| Fertilizer and burn | 6 | 5.13 | 98.29 |
| Re-use, fertilizer and Biogas | 1 | 0.85 | 99.15 |
| Sell, fertilizer and Burn | 1 | 0.85 | 100.00 |

**Source; Field survey, 2020**

The table shows the various methods of waste management practiced by the poultry farmers in the study area. The result showed that among the various ways of waste management, the farmers use the waste more for fertilizer with about 28%, followed by selling them (23%), which could also be used as fertilizer by those who purchase them from the poultry farms.

A reasonable amount of the poultry farmers (21%) burn the waste from their poultry farms. This might be to prevent further spread of diseases as in the case of death birds, and also containers of used vaccines/medication. About 5% of the respondents sell the waste and also use as fertilizer. Also, about 5% use as fertilizer and as well burn it.

**Table 10: Environmental Impact of Poultry Production in the Study Area**

| Impacts | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree | Mean | Rank |
|---|---|---|---|---|---|---|---|
| Offensive odor | 51 (42.50) | 37 (30.83) | 24 (20.00) | 6 (5.00) | 2 (1.67) | 4.08 | 2nd |
| Noise Pollution | 51 (42.50) | 37 (30.83) | 24 (20.00) | 6 (5.00) | 2 (1.67) | 4.08 | 2nd |
| Waste generation | 54 (45.38) | 39 (32.77) | 17 (14.29) | 6 (5.04) | 3 (2.52) | 4.14 | 1st |
| Disease transmission | 43 (35.83) | 32 (26.67) | 26 (21.67) | 16 (13.33) | 3 (2.50) | 3.80 | 3rd |
| Water pollution | 36 (30.00) | 39 (32.50) | 29 (24.17) | 13 (10.83) | 3 (2.50) | 3.61 | 5th |
| Air pollution | 40 (33.33) | 38 (31.67) | 22 (18.33) | 15 (12.50) | 5 (4.17) | 3.78 | 4th |

**Source; Field survey, 2020**

The table ranks the impact of poultry production on the environment and health of the poultry farmers, by finding the mean score from their weighted mean. From the table, waste generation is the major negative impact farmers encounter in the production process, although the waste generated service as an alternative source of profit for the producers, there are much more energy devoted to getting the waste out of the pen and this adds up to production cost, in case of when the farm hires labourers for the work.

Offensive odour, which is also associated with poultry waste and poor waste management, and Noise pollution, is ranked second following the waste generation. Also, disease transmission, air pollution and water pollution are among the negative impacts of poultry production in the study area.

**Table 11: Constraints to Poultry Production in the Study Area**

| Problems | Strongly agree | Agree | Neutral | Disagree | Strongly disagree | Mean | Rank |
|---|---|---|---|---|---|---|---|
| Poor storage facilities | 43 (35.83) | 35 (29.17) | 28 (23.33) | 9 (7.50) | 5 (4.17) | 3.85 | 3rd |
| Lack of government support | 40 (33.33) | 43 (35.83) | 23 (19.17) | 10 (8.33) | 4 (3.33) | 3.88 | 2nd |
| High cost of waste management | 31 (25.83) | 42 (35.00) | 29 (24.17) | 9 (7.50) | 9 (7.50) | 3.64 | 8th |
| Lack of security | 40 (33.33) | 41 (34.17) | 28 (23.33) | 6 (5.00) | 5 (4.17) | 3.88 | 2nd |
| Lack of cooperation among labourers | 30 (25.21) | 37 (31.09) | 26 (21.85) | 16 (13.45) | 10 (8.40) | 3.51 | 10th |
| Poor sanitation | 40 (33.33) | 37 (30.83) | 22 (18.33) | 15 (12.50) | 6 (5.00) | 3.75 | 5th |
| Poor marketing infrastructure | 36 (30.00) | 37 (30.83) | 27 (22.50) | 15 (12.50) | 5 (4.17) | 3.70 | 7th |
| Poor linkage of waste users to slab | 37 (31.62) | 35 (29.91) | 22 (18.80) | 11 (9.40) | 12 (10.26) | 3.63 | 9th |
| Lack of proper waste handling info | 40 (33.61) | 42 (35.29) | 19 (15.97) | 12 (10.08) | 6 (5.04) | 3.82 | 4th |
| Poor management system | 44 (36.67) | 37 (30.83) | 27 (22.50) | 6 (5.00) | 6 (5.00) | 3.89 | 1st |
| Inadequate provision of facilities | 39 (32.50) | 37 (30.83) | 22 (18.33) | 16 (13.33) | 6 (5.00) | 3.73 | 6th |

**Source: Field survey, 2020**

The table ranks the constraints associated with poultry production in the study area, using the mean score from their weighted scores. Poor management system is perceived to be the major constraint of poultry production in the study area. This might be the inability of the people to find a better way within the environment to properly dispose the waste. It can also be as a result of the inability of getting enough space for poultry pens, or lack of skilled labourers for poultry production. Also, Lack of security and lack of government support, rank 2, is seen as a problem. This might be as theft of birds at night as the owner cannot monitor the pen 24 hours, and providing sufficient security will add to their cost of production. Also, this might be because Government neither supports the producers with input as done with crop farmers, and with the security instability in the country, there is little or no security guaranteed from the path of the Government.

Poor marketing infrastructure, high cost of waste management and lack of cooperation among labourers also serve as constraint to the practice of poultry production in the study area. Best way to ensure market availability in poultry production is through forward contracting, this might not be rarely available to some of the sampled poultry farmers which might discourage a lot of people from thinking of going into poultry production.

## Conclusion

The study investigates the Economic and Environmental Impact of poultry production in Ilorin, Kwara State. Five important findings emerged; first poultry production is dominated by highly educated people in which majority of them were married. This indicates higher chances of involving family labour in poultry management as their wives will be at home to manage the birds well. Second, poultry production is profitable in the study area despite the constraints associated with poultry production. Third, with increase in the cost of labour, the poultry farmer's total revenue is likely to change positively by hiring skilled labourers which always require much expenses. Also as the cost of chicks increases the farmer might increase the price of their produce and it is possible especially when the cost of feed decreases as the cost of chicks increases because feeds takes a larger portion of the variable cost in poultry production. Fourth, Majority of the poultry farmers administered vaccine/medication due to the fact that vast majority of them are highly educated and only a few do not vaccinate/medicate against diseases. Most of the poultry farmers in the study area uses the waste more for fertilizer on their various farms as majority took poultry enterprise as minor occupation while other sell it to generate more income.

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