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Avian Influenza Awareness and Profitability of Poultry Egg Production in Oyo State, Nigeria

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Abstract: This study examines the effects of customers' awareness of avian influenza on poultry egg production enterprise in Lagelu local government area of Oyo State. Primary data were collected from forty-eight poultry farms in the study area using multistage sampling technique. Data collected were analyzed using descriptive statistics, budgetary analysis and multiple regression analysis. The result showed that poultry egg production in the study area is dominated by male (75%) with about 50% of the farmers in their productive age i.e. 21-40 years. Majority of the farmers had formal education (87.5%). The outbreak of the news accounted for about 85% reduction in the farmers' gross margin per bird. The most effective home grown strategy to restore consumers' confidence was routine hygiene management. The literacy level of farmers afford the farmers the opportunity of timely information about the disease and possible general management practices.

Key words: Poultry production, avian influenza, profitability, Nigeria

INTRODUCTION

Livestock production which includes poultry, milk and egg production is an integral part of urban agriculture and has been acknowledged by the Food and Agricultural Organization (FAO) as the second most important sub sector after grain production in the agricultural sector of most developing countries (Livestock in Development, 1999). Its importance also derives from the fact that it partially or fully sustains the livelihood of about 675 million, of the rural and urban poor (Akpabio *et al*., 2007). In Nigeria production of eggs and poultry birds occupies a prime position for improving animal protein consumption of both rural and urban households. It offers the quickest returns to investment outlays in livestock enterprise by virtue of its short gestation period, high feed conversion ratio alongside being the cheapest, commonest and best source of animal protein in the country (Obi and Sonaiya, 1995; Ojo, 2002). In spite of these potentials, poultry industry in Nigeria is yet to witness a commensurable growth owing to major problems identified by Ojo (2002) as high and rising cost of poultry production (especially feed cost), improvement of local breeds and prevalence of high risk of mortality in the industry. Over the decades however, various studies had indicated a dearth of animal protein in the diet of majority of Nigerian households (Olayide *et al*., 1975; Aromolaran, 1999; Mbanasor, 2002; Nworgu, 2007; Oteku *et al*., 2006). The consumption level had persistently been below the recommended daily requirements of protein of 35-45 g for an adult. Therefore, the poultry industry has been described as the fastest means of bridging the protein deficiency gap prevailing in Nigeria (Ojo, 2002). According to Akpabio *et al*. (2007), poultry production in Nigeria is estimated to be about 140 million birds which comparatively make Nigeria to be well developed in poultry industry among West African nations. It was also reported that Nigeria's poultry stock constituted about 0.80% world stock and its 476, 000 metric tones of eggs constituted 0.80% world stock in 2004. Ekunwa *et al*. (2006) revealed that the growth rate of about 0.3% in 2003 rose to 10.3% in 2004, mainly due to increased local demand which arose from the National government ban on importation of poultry products. Steinfeld (2003) stated that the rationale for the promotion of poultry production is predicated on the fact that it can be expanded to replace red meat in countries like Nigeria which has high growth rate. In addition, it improves human nutrition, generates income and supplies input (e.g. manure) for crop production and confessionary industry (egg yolk).

Statement of the problems: In spite of the seemingly impressive break-through of the poultry industry in Nigeria, the outbreak of Highly Pathogenic Avian Influenza (HPAI) sub type HSN1 disease reported in 2006 in eight states in Nigeria which includes Kaduna, Jigawa, Kano, Banchi, Plateau, Nasarawa, Kastina and

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Lagos (IRIN, 2007) created a major set back on the rapidly expanding industry. The outbreak of the disease incidence occurred at a period when the country was exploring strategies for expanding into markets in the West African sub region (IRIN, 2007).

The avian influenza popularly called 'birdflu' is a viral disease affecting nerves and respiratory system of birds. The virus has an incubation period of few hours to days and mortality rate reach up to 90-100% often within 48 h of showing clinical signs (WHO, 2006). The greatest danger is the possibility of human infection. The disease and its serious effect has been reported in several countries. First reported in Italy in 1878, it has been observed in South Africa 1961, USA, 1971, Australia, 1975, Ireland 1983, Mexico 1994 and Pakistan 1994. The most serious in recent time was in Hong Kong 2003, Netherlands 2003 and South Korea 2003 (WHO, 2003).

It is expected that such natural calamities would have some sort of impact on the industry and the magnitude of such impact depends to a large extent on the capabilities and efficiency of the existing disaster management mechanism as well as the level of information assessment that prevails within the market. Obayelu (2007) noted that the incidence of this disease in Nigeria, a country where most village households, maintain free ranging flocks of poultry as a source of income and food, was a "shock" to poultry farmers, consumers and the economy at large. The impact of the shock led many poultry farmers into psychological breakdown due to losses incurred and it also affected animal protein intake of the populace. Other impacts include low market demand and supply for the product which consequently reduce income resulting in financial constraints for the farming household.

Outside the direct economic losses that is sure to arise from depopulation through high mortality and morbidity of infected birds, other possible implications includes reduced volume of domestic supply and increased production cost. Regardless of the fact that the disease outbreak was not observed in other states aside those earlier mentioned, the morbid scare of the consumption of poultry products occurred in all other states (i.e. those states that did not experience the outbreak incidence) and this affected production and marketing of poultry products especially eggs and broiler meat.

It is in view of these problems that the study aimed at examining the economic implications of the awareness of the outbreak of avian influenza disease on small holder egg production in Lagelu Local Government Area of Oyo State. The study focused on the socio-economic characteristics of poultry farmers in the study area. It examined the level of awareness of the disease and management practices adopted by farmers to prevent/minimize the disease effect. Lastly, the study examined the factors determining the awareness of the disease and the economic impact on the profitability of the poultry industry during the period.

MATERIALS AND METHODS

The study was carried out in Lagelu Local Government Area of Ibadan metropolis in Nigeria, the Oyo State capital. A multi-stage sampling technique was used to select the respondents. The first stage involves the use of systematic sampling technique to select seven wards out of the fourteen wards in the local government area. Eight poultry farmers were randomly selected from the list of the poultry farmers in each of the selected wards, this represent the second stage. A well structured questionnaire was used to collect the data. A total of 56 poultry farms were selected but only 48 were eventually used for the study. Information from other farms was discarded because they were not detailed enough.

Descriptive statistics such as frequency distribution table and percentages, budgetary analysis and inferential statistics were used to analyze the data collected, linear regression model was used to estimate the determinants of the farmers' awareness of avian influenza disease. Explicitly, the model is:

$$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots\ldots \beta_5 X_5 + e_i \quad (1)$$

Where,

Y_i = Awareness index generated from level of knowledge of the disease.
α = Constant term
β_1 = Coefficient to be determined
X_1 = Age in years
X_2 = Education in years spent in school
X_3 = Membership in farmers association (yes = 1, No = 0)
X_4 = Other source of income (yes = 1, No = 0)
X_5 = Frequency of contact with extension agent (number)
e_i = Error term.

A dummy variable (Yes = 1 and No = 0) was used to score the various medium through which farmers were aware of the incidence of bird flu disease e.g. radio, television, extension bulletin, news papers, extension agent, fellow farmers, research institute, agricultural show or exhibition, internet, etc. An aggregation of this score (maximum score was 10 and minimum score was 0) was multiplied by hundred to obtain the awareness index that was used as the dependent variable.

The effect of the awareness on cost and returns from the production, eggs and culled birds before, during and after the avian influenza incidence was examined using the budgetary technique. The enterprise budget equations are:

Gross margin analysis:

$$GM = TR - TVC \quad (2)$$

Net revenue analysis:

$$\Pi = TR - TC \quad (3)$$

Where

$$TC = TVC + TFC \text{ and } TR = P_iQ_i \quad (4)$$

$$\Pi = P_iQ_i - TVC - TFC \quad (5)$$

TC is the total cost, TVC is total variable cost for birds and eggs and this include cost of birds, medication and imputed cost of labour, feeding watering and general management of birds. TFC is total fixed cost which includes cost of all fixed assets e.g. building, battery cage, water tanks, etc., TR is total revenue, Π is profit (net revenue), P_i is price of eggs in trays and culled birds, Q_i is quantity of egg sold in trays and culled birds.

RESULTS AND DISCUSSION

The socio-economic characteristics of the respondents are presented in Table 1. The mean age was 40 years. The result showed that the farmers were within the physical productive age i.e. between ages of 21-40 and 40-60 years (50% each). About 75% of the respondents were male and 25% were female. The result showed that male dominates the poultry industry in the study area. About 75% of the respondents were married. In terms of educational attainment, majority of the farmers had tertiary education (62%) while just 12% had no formal education. This might be responsible for high level of awareness of the outbreak of the disease within a short period. About 62% of the respondents were full time poultry farmers while 38% of them were involved on part time basis.

Majority of the respondents used battery cage for the management system of their birds (60%) while 15% practiced both deep litter and battery cage. The average farm size is about 1200 poultry birds. From the table, 25% of the respondents had less than 500 poultry birds while 45% accounted for those whole have between 501-1500 birds. This implies that poultry production in the study area is largely in the hands of small and medium scale (Adepoju, 2009). On the average, the farmers had about 10 years experience in poultry farming. While 8% of the farmers had less than a year experience in poultry keeping, majority of the respondents (45%) claimed to have between 6-10 years experience. About 75% of the farmers do not belong to any association, a forum where information may be disseminated. The farmers' awareness of the outbreak of the avian influenza disease may be more connected to their level of education than membership in farmers' association.

The Net Revenue and Gross Margin analysis is presented in Table 2. The result revealed that feed cost account for about 70% of the total cost of production in the study area. The gross margin per bird was ₦2154.03

Table 1: Socio economic characteristics of the poultry farmers

Variable	Frequency	Percentage
Age (yrs)		
21-40	24	50.0
41-60	24	50.0
>60	0	0.0
	48	100.0
Sex		
Male	36	75.0
Female	12	25.0
	48	100.0
Marital status		
Single	12	25.0
Married	36	75.0
	48	100.0
Level of operation		
Full time	30	62.5
Part time	18	37.5
	48	100.0
Education		
<1 year	6	12.5
1-6 years	6	12.5
6-12 years	6	12.5
>12 years	30	62.5
	48	100.0
Experience		
<1 year	4	8.3
1-5 years	16	33.3
6-10 years	22	45.8
>10 years	6	12.5
	48	100.0
Management practices		
Deep litter	8	15.0
Battery cage	28	60.0
Both	12	25.0
Farm capacity		
<500 birds	12	15.0
500-1500 birds	22	45.8
>1500 birds	14	29.2
Membership in association		
Yes	12	25.0
No	36	75.0
Awareness about avian influenza		
Yes	42	87.5
No	6	12.5
	48	100.0

Table 2: Cost and return analysis of poultry production in the study area

Variable	Before mean value (₦)	During mean value (₦)	After mean value (₦)
Operating cost	823188.61	796281.89	872163.47
Feed cost	2161203.43	2085431.63	2431158.25
Total variable cost	2984392.04	2881713.52	3303321.72
Total fixed cost	205132.80	205132.80	205132.80
Total cost	3189524.84	30868446.32	3508454.52
Total revenue	6215432.46	3307546.01	6817546.87
Gross margin	3231040.42	425786.48	3514248.15
Net revenue	30252907.62	220699.69	3309115.35
Gross margin/bird	2154.03 (100)	315.40 (15)	2342.83 (109)
Net revenue/bird	2017.27 (100)	163.00 (08)	2206.08 (109)

Percentage values in parenthesis

while the net revenue per bird was ₦2017.27. This indicates that poultry production was a profitable venture before the outbreak. However, during the outbreak, gross margin per bird reduced sharply to about 15% (using the period before the outbreak as the base) i.e. from ₦2154.03 to ₦315. The disparity between these incomes is as a result of the glut occurrence experienced in both culled birds and poultry eggs during the period.

The price and production shocks during the outbreak might be due to consumers consideration of other protein sources. After the outbreak of the disease, demand for poultry products gradually increased when consumers had the assurance that the spread of the disease has been abated or prevented. This led to increase in the gross margin per bird from ₦315 to ₦2342.83. The difference between the gross margin and net revenue per bird for the period before and during the incidence was enormous and therefore indicates that the outbreak of the disease highly reduce the revenue from the production process. This singular incidence was very strong and capable of throwing many small holder poultry entrepreneurs out of business.

Table 3 presents the ranking of the various management strategies and the consequence of the awareness of the disease on poultry farms. The result revealed that maintenance of simple hygiene with mean score of 3.0 is the most effective means of preventing the spread of the disease by the birds. Other methods include good feeding and immediate culling of available birds. The mean score were 1.0 and 1.55 respectively. Ranking of the consequences of the awareness in ascending order revealed that egg glut and fall in egg price ranked highest followed by culled layer glut and a fall in its price. Layers and feed shortage had the lowest rank.

The OLS estimate of the factors affecting awareness of avian influenza disease is presented in Table 4. The result revealed that as poultry farmers increase in age and years of experience in poultry production, their knowledge about the symptoms, mode of spread and prevention as well as control is enhanced. Also access

Table 3: Ranking of management strategies adopted and consequences of avian influenza awareness on poultry egg production

Strategies/Consequences	Total score	Mean score	Remark
Strategies			
Simple hygiene	54	3.0	Very effective
Good feeding	12	1.0	Not effective
Culling	18	1.5	Not effective
Advertisement	30	2.5	Effective
Consequences			
Shortage of layers	42	1.4	Low
Shortage of feed	36	1.2	Low
Egg glut	108	3.0	Very low
Culled layer glut	102	2.8	High
Loss of egg	66	2.2	Moderate
Loss of culled layer	84	2.3	Moderate
Fall in egg price	108	3.0	Very high
Fall in culled layer price	102	2.8	High

to additional/alternative means of income outside poultry production and membership in farmers association can afford the farmers the opportunity of improving their awareness about the general management of the disease. However, stepwise regression model excluded extension contact from the model. This could be an indication that frequency of extension visit is not a significant determinant of awareness of avian influenza among poultry farmers. This implies that sudden attack of the avian influenza does not allow for channel information through the existing extension workers as this may not allow for quick dissemination of information required to curtail the disease.

About 87.9% of the variation in poultry farmers' level of awareness about avian influenza disease is explained by the independent variables. The joint significance of the independent variable on farmers' level of awareness of avian influenza as shown by the F value of 75.3 which is significant at 1% probability level.

Conclusion: This study showed the main consequences of the spread of the awareness about avian influenza on poultry egg production include fall in sales of eggs and culled layers. Hence, there was enormous loss in

Table 4: Result of the OLS regression analysis

Variable	Coefficient	Standard error	T-value	Significance	Remark
Constant	-0.609	0.833	-0.731	0.465	Sig
Poultry experience*	0.085	0.83	2.259	0.030	Sig
Alternative income**	6.893	0.535	12.876	0.000	Sig
Association membership**	5.778	0.550	10.506	0.000	Sig
Age**	0.287	0.029	9.996	0.000	Sig
Adjusted R^2	0.879				Sig
F-value**	75.300			0.000	Sig

**Significant at $p \leq 0.01$

poultry farm income capable of limiting the growth of the poultry sub-sector. Safety campaign and price incentive measures were however effective to restore the loss image of the industry within a year. Such concerted efforts should however continue to prevent the re-occurrence of the avian influenza disease and its associated consequences in the future. Further strategies to supplement existing ones should include the creation of effective surveillance mechanism to detect the disease as quick as possible. Also, periodic sensitization campaigns on disease and the risk management practices among farmers should be encouraged. Lastly, there should be provision of adequate incentives to offer protection to poultry farmers during such natural shocks.

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