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Management of Laying Birds in Deep Litter and Battery Cage Systems Inorlu Local Government Area of Imo State, Nigeria: A Comparative Study

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ABSTRACT

This paper examines the management of battery cage and deep litter poultry egg production systems in Orlu Local Government Area of Imo State, Nigeria. Structured questionnaire were used in sourcing primary data of 150 poultry egg farmers which comprises of 75each of battery cage and deep litter poultry egg farmers. Descriptive statistics was applied for the study. The mean ages of the battery cage and deep litter farmers were 46 and 44 years respectively implying the farmers are still in their active years. All the battery cage farmers had formal education as against 4% of deep litter farmers. The major constraints in egg production ranked in order of high feed cost, non-remunerative price for egg and birds and supply of poor quality feed and feed ingredients. In addition are high costs of medicines and vaccines, lack of disease control facilities and high rate of electricity tariff. The paper recommends the reduction in electricity tariff, credit provision and subsidy of feed input prices. Also strengthening of existing research centers to develop genetically improved and efficient feed converting breeds of poultry is recommended too. These will however encourage egg production at all scales thus alleviating the national problem of low consumption of animal protein.

Keywords: *Budgetary technique, Battery cage, Deep litter, Poultry egg farmers*

INTRODUCTION

In poultry production, feed cost claims the largest share of the total expenses involved in the production process. Feed alone accounts for over 75% of the total cost of production, out of which 50% is expended on protein and energy sources (Ahaotu et al., 2013a and b, 2016a and b). Food production in Nigeria has not been increasing at the rate that can meet the increasing population (Ojo, 2003). Food production increases at the rate of 2.5% while food demand increases at a rate of more than 3.5%. This is due to the high rate of population growth of 2.83% (FOS, 2006) or 3.2% according to the provisional estimate of the 2006 population census.

Several factors have been generally identified as limiting to the utilization or high incorporation of non-conventional feedstuffs in livestock feed. These include low protein content, high fibre, amino acid imbalance and presence of anti-nutritional factors (Ahaotu et al., 2018a and b). Anti-nutritional factors have significant negative effects on livestock production. These effects include reduction in palatability, digestibility and utilization of ration, intoxication of different classes of livestock, resulting in mortality or decreased production of animal and reduction in the quality of meat, egg, and milk products due to the presence of hazardous residues (Akinfemi et al., 2014; Ononiwu et al., 2017 and Ahaotu et al., 2017).

The obvious difference between the rate of food production and demand for food in Nigeria has led to a food demand supply gap that has led to a widening gap between domestic food production and total food requirement. This has led to increasing resort to food importation and high rates of increase in food prices. The Poultry industry plays important role in the development of Nigerian economy. It is a major source of egg and meat which have high nutritional value particularly in the supply of protein (Olagunju and Babatunde, 2011). Poultry farming serves as anauxiliary occupation to complement the income of small and marginal farm families (Afolami et al., 2013). It occupies an essential position in the rural space because of its vast potential to bring about rapid economic growth,

particularly benefitting the weaker section of the populace (Ekunwe et al., 2006).

In Nigeria, poultry represents an appropriate system to feed the fast growing population and to provide income for small-scale farmers. The development of the poultry industry in Nigeria has been described as the fastest means of bridging the protein deficiency gap prevailing in the country. It has been reported that most Nigerian diets are deficient in animal protein, which results in poor and stunted growth as well as increase in spread of diseases and consequently death (Federal Government Nigeria/UNICEF, 1994; Apantaku et al., 1998; Maziya-Dixon et al., 2004).

Rajendran and Mohanty (2003) studied on comparative economic analysis and constraints in egg production under cage vs. deep litter systems of rearing in India and stated that the fixed investment per farm is found to be more on battery cage system of rearing for small, medium and large scale poultry egg production. In both systems, they observed that the feed cost decrease gradually when the stock size increases except in medium size group in deep litter system and accounts for more than 84% of the total cost of production irrespective of stock size and system of rearing. In their study battery cage system appeared to be more efficient than the deep litter system in producing eggs and the feed efficiency increases with decrease in stock size in both the system of rearing. The net returns per farm increase as the size of the farm increases in both the systems and the returns per farm is, however, higher in battery cage system than in deep litter system in all the three groups. They observed that the major constraints in egg production in India are high cost of feed, high cost of medicine and vaccine, supply of poor quality feed and feed ingredients, non - remunerative price for eggs, lack of disease control facilities and higher rate of electricity tariff.

Laying hens are usually kept in at least four types of management systems which include battery cages, deep litter and free range housing systems. The two systems considered in this study are battery cage system and deep litter system. These two systems were selected for evaluation because it was observed that they are the major systems of operation adopted by the poultry egg farmers in the study area. Battery cage and deep litter was adopted in the study area based on the availability of capital to the farmers and ready market for poultry product. In line with the above, this paper seeks to undertake a comparative study of the management of battery cage and deep litter system in Orlu Local Government Area of Imo - State, Nigeria. The objectives considered are the socio-economic characteristics of poultry egg farmers under battery cage and deep litter system, the costs and returns of poultry egg farmers under the two production options and comparison between the constraints encountered by the two sets of poultry farmers

METHODOLOGY

Study Area

The study area is Orlu Local Government Area of Imo - state, Nigeria. The Local Government Area was chosen as the study locations because according to Okonkwo (2011) Orlu Local Government Area is an area with many commercial poultry farms and it is popularly known for egg production and marketing in Imo State, Nigeria. Orlu Local Government Area is one of the twenty seven Local Government Areas in Imo state, Nigeria. *Orlu local government area* falls within the western senatorial district of *Imo State* otherwise known as *Imo* West Senatorial Zone or *Orlu* Zone alongside Idea to North, Idea to South, Isu, Njaba, Nkwerre, Nwangele, Oguta, Ohaji/Egbema, Orsu, Oru East and Oru West *local government areas*. This place is situated in Orlu, Imo, Nigeria, its geographical coordinates are *5° 47*' 0" North, *7°* 2' 0" East and its original name (with diacritics) is Orlu. The state is mainly agrarian and produces permanent crops and arable crops because of the favorable climatic conditions. The occupations of the rural inhabitants are predominantly farming, cultivating food and cash crops. They also embark on small, medium and large-scale livestock production such as rearing of goat, sheep, pigs, rabbits and poultry as well as marketing of the products.

Orlu local government area is found in Imo state, South-east geopolitical zone of Nigeria. The LGA is made up of several towns and villages such as Ogboko, Eziachi, Obinugwu, Obor, Umuna, Umutanze, Umuzike, Umudioka, and Ihioma. The LGA is part of the Orlu senatorial zone and has an estimated population of 393,071 inhabitants with the vast majority of the area's dwellers being members of the Igbo ethnic group. The Igbo language is commonly spoken in the LGA while the religion of

Christianity is extensively practiced in the area. Orlu LGA has an average temperature of 27 degrees centigrade with a number of rivers and streams flowing in the area. The LGA witnesses two distinct seasons which are the rainy season which usually occurs between the months of April-October and the dry season which usually falls between the months of November- March.

Sampling Procedure and Sample Size

A multi-stage sampling technique was adopted. At the first stage, a purposive sampling technique was used to select three (3) out of thesix (6) Poultry Association of Nigeria (PANOG) zones in the state based on higher population of poultry egg farmers in these zones and availability of market for poultry products. The zones include, Eziachi, Obor and Umuna. The second stage employed random selection of two (2) towns from each of the zones, this gave a total of six (6) towns -Eziachi, Obor, Umuna, Ihioma, Umuzike and Obinugwu.

The third stage employed random selection of five (5) villages from each LGA giving a total of thirty (30) villages. The final stage involved random selection of five (5) poultry egg farmers that practice either battery cage or deep litter systems of poultry egg production in each of these villages. This was followed by a snowball sampling in selecting the seventy five (75) poultry egg farmers each that practise battery cage and deep litter systems.

This gave a total of one hundred and fifty (150) poultry egg farmers that use battery cage and deep litter systems in the study area. Structured questionnaire was used to elicit information on socio-economic characteristics, costs and returns and possible constraints encountered by the respondents who operated on small, medium and large scale respectively. This was based on Omotosho and Oladele (1988), Subhash *et al*. (1999) and Ojo (2003) classification on small, medium and large scales being ≤1000 birds, between 1001 and 3000 birds and > 3000 birds in that order.

Analytical Procedure

The analytical tools adopted for this paper involve descriptive statistics that was used to describe socio-economic characteristics and constraints encountered while the budgetary technique was used for costs and returns structure of the poultry egg farmers. The descriptive statistics encompassed frequency tables, means and percentage distributions. Socio-economic characteristics that were described are age, gender, marital status, household size, experience of farmers (years) and other demographic characteristics of the farmers. Economic variables considered were quantity of eggs produced (number), stock of birds (number), feed cost (Naira),operating expenses (Naira), other cost (Naira).

The poultry farmers in the study area were asked to rank the factors that limit poultry egg production among non-remunerative price of egg and bird, supply of poor quality feed and feed ingredients, high cost of feed, lack of disease control facilities, high rate of electricity tariff and high cost of medicines and vaccines. Budgetary technique was used to estimate the financial outcome and profitability of poultry egg farmers that use either battery cage or deep litter system of poultry egg production in the study area.

The budgetary technique is as specified:

GM= TR – TVC- (1)

Where:

TR = Total Revenue from sales of eggs and birds (N)

TVC = Total variable cost for eggs and birds

GM = Gross Margin (Naira per farmer)

The net farm income is derived as follows:

π=TR – TC- (2)

Where:

π = Net Farm Income (Naira per farmer)

TR = Total Revenue from sales of eggs and birds (N)

TC = Total Cost for egg and bird which include Total Variable Cost

(TVC) plus Total Fixed Cost (TFC)

The straight line depreciation method was used to calculate the depreciation cost of the equipment (fixed assets) used in poultry egg production because it is most commonly used and it is easy to calculate. Yusuf and Malomo (2007) stated that in their use of straight line depreciation method in their work reiterated that the salvage value of the fixed asset used in poultry production is assumed to be zero. It is represented as follows:

Annual Depreciation -(3)

Where; Pp = Purchase price, S = Salvage value, n = No of years of the useful life of the asset.

The total variable cost include cost of feed (N), cost of Day Old Chick (N), cost of brooding (N), cost of veterinary services (N), cost of labour (N), cost of water (N),cost of energy (N), cost of transportation (N), cost of drugs (N) and miscellaneous(other) expenses (N).

The total fixed costs on the other hand were those costs that did not vary with output on the short run and are independent of the size of production. They include depreciation on building, battery cages, feeders, drinkers, generators, pumping machines, water tankers, de-beakers and interest on capital.

Results And Discussion

Socio-Economic Characteristics of Poultry Egg Farmers

The mean age of the poultry egg farmers was 46 years for the battery cage farmer and 44 years for that of the deep litter (Table 1). Also 46.6 percent and 58.7 percent of battery cage and deep litter poultry egg farmers are aged below 45 years. This indicates that a very active age group is involved in both systems of production. In terms of gender, the study revealed that 61.3 percent are male while 38.7 percent are female for battery cage farmers while for deep litter farmers 66.7 percent are male and 33.3 percent female. The majority of poultry egg producers being male can be attributable to lack of easy access to loans by female farmers as compared to their male counterparts. Bamiro et al(2001) also asserts that the female gender as compared to the male folks is less efficient as poultry egg farmers.

The majority of farmers in battery cage or deep litter egg production are married (81.3percent and 82.7 percent in that order). The respondents that are widowed for battery cage and deep litter farmers account for 8.0 percent and 2.7 percent respectively. The marital status of a poultry egg farmer has implication on the household size and subsequently on the availability of family labour to assist on the farm. 74.4 percent of the battery cage and 51.0 percent of the deep litter farmers have post – secondary education and by implication, more literate farmers were present in battery cage production option. This accounts for the higher level of technology and innovation in the battery cage option of egg production.

Depending on the number of birds owned by the proprietors of each farm, the poultry farms are divided into various scales of operation. Omotosho and Oladele(1988), Subhash et al. (1999) and Ojo (2003) stressed that poultry egg farmers having less than1000 birds were considered as small scale farmers, 1001-3000 as medium scale farmers while those having 3000 and above birds were large scale farmers. The distribution shows that 41.3 percent of battery cage farmers and 48.0 percent of deep litter farmers were of medium scale. On the other hand, 33.3 percent and 20.0 percent are into large scale production by battery cage and deep litter systems respectively.

Table1. *Socio-economic Characteristics of Poultry egg Farms Sampled*

Variable	Battery Cage Frequency	Percentage	Deep Litter Frequency	Percentage	Aggregate Frequency	Percentage
Age Group (Years)						
25-34	13	17.3	14	18.7	27	18.0
35-44	22	29.3	30	40.0	52	34.7
45-54	23	30.7	14	18.7	37	24.7
55-64	9	12.0	12	16.0	21	14.0
65-74	8	10.7	5	6.7	13	8.7
Total	75	100.0	75	100.0	150	100.0
Mean		46		44		
sex						
Male	46	61.3	50	66.7	96	36.0
Female	29	38.7	25	33.3	54	64.0
Total	75	100.0	75	100.0	150	100.0
Marital status						
Married	61	81.3	62	82.7	123	82.0
Single	8	10.7	11	14.7	19	12.7
Widowed	6	8.0	2	2.7	8	5.3
Total	75	100.0	75	100.0	150	100.0
Educational						

Level						
No formal						
Education	0	0.0	3	4.0	3	2.0
Primary	6	8.0	7	9.3	13	9.7
Secondary	13	17.3	14	18.7	27	18.0
NCE/OND	20	26.7	23	30.7	43	28.7
HND/B.Sc	31	41.3	24	32.0	55	36.7
M.Sc/Ph.D	5	6.7	4	5.3	9	6.0
Total	75	100.0	75	100.0	75	100.0
Scale of						
Operation						
Small (<1000 birds)	19	25.3	24	32.0	43	28.7
Medium (1001-3000 birds)	31	41.3	36	48.0	67	44.7
Large(>3000 birds)	25	33.3	15	20.0	40	26.6
Total	75	100.0	75	100.0	150	100.0
Experience (years)						
≤ 5	16	21.3	27	36.0	43	28.7
6-10	28	37.3	31	41.3	59	39.3
11-15	16	21.3	14	18.7	30	20.0
16-20	10	13.3	3	4.0	13	8.7
≥ 21	5	6.7	0	0.0	5	3.3
Total	75	100.0	150	75	150	100.0

Source: *Field Survey, 2009.*

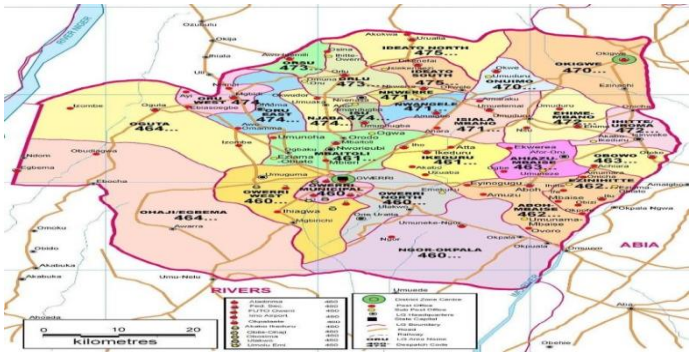

Fig 1. *Map of Imo State of Nigeria showing all the 21 Local Government Areas. Owerri municipal area was highlighted. Source: Nigeria zip code map.*

That more of the poultry egg farmers (battery cage and deep litter) operate on medium scale is in line with the findings of Oleke and Isinika (2011), who reiterated that 67.4percent of commercial poultry egg farms in Tanzania operated on medium scale.

The result further showed that 79.9 percent of battery cage and 96 percent of deep litter farmers had above 15 years' experience in the industry. The years of experience of the poultry egg farmers is supposed to have a positive influence on the profitability of the poultry farm unit *ceteris paribus.*

Costs and Returns Structure Per Production Period of an Average Poultry Egg Farmer

The total variable costs for battery cage system on small, medium and large scale were estimated as N1,699,213.37, N5,227,628.40 and N19,883,941.53 (Table 2). These accounted for 91.68 percent, 91.94 percent and 91.57 percent respectively of total cost of production for battery cage. Those for deep litter poultry egg farmers on small, medium and large scale were N1,501,569.23, N4,962,310.00 and N20,051,840.83respectively. The cost of feeding accounted for the highest proportion of the total variable costs for both systems under small, medium and large scale operations. For battery cage system, these percentage distributions of the cost of feeding were 71.97,73.45 and 73.99 percent respectively while for deep litter, these accounted for 73.62,73.45 and 76.94 percent distribution in that order.

This lends credence to the findings of Ashagidigbi *et al. (*2011) who revealed that the cost of feeding of laying birds accounted for over 70 percent of the total cost of production. The cost of purchase of laying bird's cost of day old chick and brooding are next to cost of feeding in order of magnitude. For battery cage farmers, they were5.41, 5.29 and 4.65 percent and 7.15, 6.97 and 6.13 percent in that order respectively.

Table2. *Constraints Encountered by Battery Cage Poultry Egg Farmers*

Constraint	1st	2nd	3rd	4th	5th	6th	Remark
Non-remunerative price	9	39	19	5	2	1	2
of egg and birds	(12.0)	(52.0)	(25.3)	(6.7)	(2.7)	(1.3)	
Supply of poor quality	21	19	31	2	2	0	3
feed and feed ingredient	(28.0)	(25.3)	(41.3)	(2.7)	(2.7)	(0.0)	
High cost of feed	29	17	6	14	9	0	1
	(38.7)	(22.7)	(8.0)	(18.7)	(12.0)	(0.0)	
Lack of disease control	2	0	17	16	29	11	5
Facilities	(2.7)	(0.0)	(22.7)	(21.3)	(38.7)	(14.7)	
High rate of electricity	1	1	6	18	0	49	6
Tariff	(1.3)	(1.3)	(8.0)	(24.0)	(0.0)	(65.3)	
High cost of medicine	3	0	11	33	15	13	4
and vaccine	(4.0)	(0.0)	(14.7)	(44.0)	(20.0)	(17.3)	

Figures in parenthesis are the percentages. **Source:** *Field Survey Data, 2011*

There was no major difference in this trend with respect to the deep litter system in all scales. The total fixed cost was estimated as N154,159.65, N458,140.98,N1,831,450.77 and N90,085.45, N328,537.54, N1,480,475.31 and accounted for 8.32,8.06, 8.43 percent and 5.66, 8.06, 6.88 percent of the total cost of production for small, medium and large battery cage and deep litter farmer's respectively. This shows that variable cost constitute larger proportion than total fixed cost in both options in poultry egg production. The result further revealed that the revenue from poultry eggs was higher at all levels in the battery cage than the deep litter production option. For the small, medium and large scale battery cage farmers, revenues were N1,797,958.19, N6,015,617.00 andN21,033,367.45 and for the deep litter option, they were N1,469,227.61,N5,363,884.62and N20,332,330.81. The result also showed that gross margin and net farm income were positive for both categories under the different scales of operation. The values of the revenue items, total revenue, total fixed cost, total variable cost, gross margin and net farm income are higher in battery cage under small, medium and large scales when compared to the deep litter farmers under same scales of operation.

Costs and Returns Structure Per Bird of an Average Poultry Egg Farmer

The Costs and returns structure for the profit per bird of an average poultry egg farmer is presented in (table 3). This was determined by dividing the costs and revenues of the battery cage and deep litter farmers under the different scale of operations by their corresponding mean flock size. The mean flock size of battery cage and deep litter users based on small, medium and large scale of operation was estimated as 618, 1,805,5,601 birds and 538, 1,853, 5,211 birds respectively. The cost of feed per bird was highest of all variable cost and accounted for over 70 percent of the total cost of production for the different scale of operation under both battery cage and deep litter system. and deep litter under small, medium and large scale. The feed cost per bird for the battery cage option of production was estimated as N2,158.86, N2,313.55,N2,862.52 and for the deep litter option, they were N2,178.11, N2,210.65 andN3,175.38 respectively. This is in line with the findings of Bamiro *et al* (2001) and Effiong and Onyenweaku (2006) that feed cost is the major important single cost item associated with poultry production. This increased cost of poultry feed ingredients such as maize, groundnut cake, soya bean and wheat could be attributable for this. The fixed cost for both the battery cage and deep litter systems under the different scales of operation were less than one percent.

Table3. *Constraints Encountered by Deep Litter Poultry Egg Farmers*

Constraint	1st	2nd	3rd	4th	5th	6th	Remark
Non- remunerative							
price of egg andbirds	24	14	29	6	2	0	3

	(32.0)	(18.7)	(38.7)	(8.0)	(2.7)	(0.0)	
Supply of poor quality feed							
And feed ingredient	30	32	5	3	0	5	2
	(40.0)	(42.7)	(6.7)	(4.0)	(0.0)	(6.7)	
High cost of feed	40	24	4	5	1	1	1
	(53.3)	(32.0)	(5.3)	(6.7)	(1.3)	(1.3)	
Lack of disease							
control facilities	1	4	3	12	47	8	5
	(1.3)	(5.3)	(4.0)	(16.0)	(62.7)	(10.7)	
High rate of							
electricity tariff	0	1	0	5	11	58	6
	(0.0)	(1.3)	(0.0)	(6.7)	(2.7)	(77.3)	
High cost of	5	3	7	43	9	8	4
medicine and vaccine	(6.7)	(4.0)	(9.3)	(57.3)	(12.0)	(10.7)	

Figures in parenthesis are the percentages. ***Source:*** *Field Survey Data, 2011*

The total revenue per bird which constitutes revenue from sales of egg and spent layer, gross margin and net farm income per bird were discovered to be higher in small, medium and large battery cage users when compared with the deep litter users under similar scales of operation. The gross margin per bird for small, medium and large battery cage and deep litter users were estimated as N775.33, N1,066.90, N1,541.12and N550.31, N832.15, N1,143.05 in that order respectively.

The net farm income perbird for battery cage and deep litter for small, medium and large scales were N525.88,N813.08, N1,159.65 and N382.86, N658.85, N858.94 respectively. The gross margin per bird and net farm income per bird were found to increase progressively with the increase in flock size for both systems of operation.

Constraints Encountered By Poultry Egg Farmers

The analysis revealed that battery cage (53.3 percent) and deep litter (38.7 percent)farmers ranked high cost of feed as the major problem encountered in the study area(Tables 1 and 2). This is similar to the findings of Brown (1974) and Singh (1980). The cost of transportation was the major cause as much of the feeds were supplied from the neighboring state of Lagos. Cooperative feed manufacturing that could reduce feed cost was not prevalent in the study area.

The result further revealed that 52.0 percent of battery cage farmers and 38.7 percent of deep litter ranked non-remunerative price for egg and birds as the second major problem and in that order. This is so because increasing feed cost has made cost of eggs higher. The prices received by the farmers become less than the costs of production resulting in negative returns. In addition, 41.3 percent and 42.7 percent of battery cage and deep litter farmers also ranked supply of poor quality feed and feed ingredients as the third and second major problem respectively. With the supply of good quality feed and feed ingredients, feed efficiency will be ensured and the cost of production reduced to a considerable extent. It was further revealed that 44.0 percent and 57.3 percent of battery cage and deep litter farmers respectively ranked high cost of medicine and vaccines as the fourth major problem encountered by poultry egg producers. As the layers require periodical vaccinations and medications, cost of medicines and vaccines affect the cost of production of eggs. The supply of medicines and vaccines to poultry egg farmers is mostly in the hands of people in the private sector and not necessary steps are being taken by the state and central governments to regulate them to supply at reasonable prices.Battery cage farmers (38.7 percent) and deep litter farmers (62.7 percent) ranked lack of disease control facilities as the fifth major problem. The mortality of birds in study area is high due to diseases infestation of poultry birds e.g. Marek's and infectiousbursal diseases and infectious bronchitis. No proper disease diagnosis and control measures that can reduce mortality rates are in place. The consequence is reduced farm income. Finally, the farmers also complained of high electricity tariff. This was applicable to 65.3 percent and 77.3 percent for battery cage and deep litter farmers respectively. Subsidy in any form in this respect was not prevalent in the study area.

Conclusion And Recommendation

The study revealed that majority (61.3 percent and 66.7 percent) of battery cage and deeplitter poultry egg farmers in the study area were male.

The mean age of the poultry eggfarmers were 46 years and 44 years respectively in that order. This implies that they are intheir economically active age. In the same order also, 81.3% and 82.7%; 41.3 % and 48.0%; and 33.3 % and 20.0 % are married, own medium and large scale farms respectively.The total revenue per production season for an average battery cage farmer on small, medium and large scales were N1,797,958.19, N6,015,617.00 and N21,033,367.45. The gross margin in same order were N479,154.72, N1,925,752.30 and N2,727,405.30 while the net farm incomes for same categories of farmers were N324,995.07, N1467611.32 andN2,727,405.30. Those for deep litter farmers operating on small, medium and large scales for, total revenue were N1,469,227.61, N5,363,884.62 and N20,332,330.81.

The gross margins were N296,064.34, N1,541,966.41 and N3,877,226.41 while the net farm incomes were N205,978.89, N1,213,428.86 and N2,396,751.10. These results indicate a better performance for the battery cage farmers as compared to the deep litter farmers. The gross margin and net farm income per bird were superior in the small, medium and large scale battery cage users when compared with the deep litter users under similar scales of operation. The major constraints in egg production were high cost of feed and high rate of electricity tariff. Reduction in electricity tariff, credit provision and subsidizing feed input prices will make both small and medium scale farmers to benefit in terms of cost reduction and enhanced income.

Other areas where subsidy is needed are costs of day old chicks and veterinary medications. Policies targeted at labour resource shifts to enhance the availability and so reduction of this cost item need to be put in place. Research centers and Agricultural Development Programmers (ADPs) focused at developing genetically improved breeds of poultry will help in efficient feed conversion. There is no doubt if these are put in place, efforts would have been made on the long run in encouraging investment on all scales of egg production especially in the battery cage system and the per caput protein consumption requirement problem will be on the way to being completely solved.

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