

SOCIO-ECONOMIC CHARACTERISTICS OF DUCK FARMERS IN UGHELLI NORTH AND SOUTH LOCAL GOVERNMENT AREAS OF DELTA STATE OF NIGERIA: IMPLICATIONS FOR FOOD SECURITY

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Abstract

Structured questionnaire used to obtain information on the study of the socio-economic characteristics of duck farmers in Ughelli North and South Local Government areas of Delta State, and its implications for food security. For the non-literate farmers, the field assistants translated the questionnaire into the local dialect. Results indicated that the bulk of the farmers (85%) were young and middle-aged and 70 per cent of them could read and write. Eighty per cent of the respondents were men and 20 per cent were women. Their experiences in duck production ranged from 1 to 5 years. The common breed was the muscovy, apparently because of its suitability to breed for both meat and egg. This quality seems to have the potential to bridge the protein gap among the people.

Resume

UGBOMEH, M. M. GEORGE: *Caractéristiques socio-économiques des éleveurs de canard dans les zones de gouvernement local dans le nord et sud d'Ughelli dans l'état deltaïque du Nigéria: implications pour la sécurité alimentaire.* L'étude des caractéristiques socio-économiques d'éleveurs de canard dans les zones gouvernementales dans le nord et le sud Ughelli de l'état deltaïque et ses implications pour la sécurité alimentaire, utilisait le même questionnaire structuré pour obtenir d'information des éleveurs de canard instruits et non-instruits. Pour les éleveurs non-instruits les assistants d'inspecteur traduisaient les questionnaires en dialecte local. Les résultats indiquaient que la plus grande partie d'éleveurs (85%) étaient jeunes et entre deux âges et 70 pour cent d'entre eux pourraient lire et écrire. Quatre-vingt pour cent (80%) de personnes interrogées étaient des hommes et vingt pour cent (20%) étaient des femmes et leurs pratiques de la reproduction de canard variaient entre une et cinq années. L'espèce ordinaire était la moscovie apparemment à cause de la convenance de l'espèce de moscovie pour la production de viande et d'œuf. Cette qualité semble avoir le potentiel de combler le trou de protéine parmi les gens.

Introduction

According to John (1993) the necessary conditions for the survival of any country is its ability to really organize the production of food in sufficient quantities and quality for its people since food shortages, especially in the Third World countries like Nigeria, could be potential sources of social and political instability.

The socio-economic importance of ducks is related to the quality of their production husbandry. Ducks, like other common species of poultry, are produced in many parts of the tropics, especially in regions of high rainfall, riverine areas, deltas, coastal districts, and even in regions that would be seen to be unsuitable for duck production on account of their dryness (Federal Livestock De-

partment, 1991). Moreover, ducks require little investment and they are also efficient in converting less used resources like insects, weeds, aquatic plants and fallen seeds into meat and eggs. Raised in confinement, these ducks can conveniently convert 2.4-2.5 kg of concentrated feed into 1kg of weight gain. The only domestic animal that has better-feed conversion is the broiler chicken (National Research Council, 1991).

Thear & Fraser (1986) stated that some breeds of ducks such as the Khaki Campell would outlay hens, and the eggs are even bigger. Ducks continue to lay for a longer period of time than hens, which commercially at least, is replaced after one laying season. Recent statistics have shown that the poultry population of Nigeria is about 150 million with ducks accounting for about 7.90 per cent (Federal Livestock Department, 1991).

Even though the duck is well-known in Nigeria, it is not so intensively utilized in this country as it is in the Asian countries where ducks constitute major source(s) of meat and eggs for the populace. Nevertheless, ducks still hold some unrealized but excellent potentials for subsistence production in the nation (Obinne, 1997). Notwithstanding the fact that considerable efforts have been made to increase the availability of calorie/protein from crop and animal products, the general contribution of animal protein consumption (g/caput/day) in North America, and West and Eastern Europe are 66, 39, 33, respectively; the figure for Africa is 11 (CBN/NISER, 1992). Moreover, Obioha (1992) stated that with the rise in population the level and availability and, consequently, the consumption of animal protein is estimated at 8g/caput/day - about 27 g less than the minimal requirement recommended by the National Research Council of the United States of America.

However, Atala (1984) has categorically stated that certain socio-economic factors affect the adoption of agricultural innovations and by implication agricultural productivity. These socio-economic factors include sources of agricultural information, awareness, literacy, formal education, social participation, ownership of land, farm in-

come, farm labourer, level of living, community status, age, consmopoliteness and farm size.

It has been observed that the importance of such socio-economic factors and relationships on agricultural productivity in the harsh African environment has not been fully discussed or even explored (Tandoh, 1978; Lado, 1995). In Nigeria, ducks serve the following purposes: for meat and eggs; given out as gifts during festive occasions; used for religious and ancestral sacrifices; sold out for cash.

John (1993) pointed out that there are times available foodstuffs and items in one region may not be recognized or even wanted in another part of the same state or country. The problems of food preferences and food production are linked with food security. Food security is the access of the population of any country to enough food for an active and healthy life all the year round at affordable prices (World Bank, 1988).

Ekpo & Olaniyi (1995) have stated that the lives of Nigerians are characterized by poverty, misery, morbidity and under-development. Ekpere, Weidemann & Eremie (1982) stated that Nigeria is presently faced with a situation in which the demand for food is rising faster than food supply and, therefore, prices of foodstuffs have been increasing at a rapid rate. Consequently, there are insufficient supplies of proteinous food, particularly for little and growing children resulting in pronounced malnutrition with concomitant high infant mortality.

There are also indications that the level of protein consumption is much less now in Nigeria as a result of the harsh economic conditions in the country, where the drastic withdrawal of subsidies on food and other items has really reduced the real incomes of Nigerians. In spite of the development efforts aimed at enhancing the productivity of the poultry industry, these efforts have not achieved the intended results because of the rising population which has made the demand for animal products to exceed the annual supplies of these protein products. It is known that the changes that were brought into the poul-

try industry to enhance productivity have not yet involved all species of poultry. Emphasis has always been on chickens, neglecting other species of poultry, prominent among which is the duck - the yet untapped protein source (Obinne, 1997). Ayinde & Egwuenu (2001) stated that up till now, the protein consumption level in Nigeria, especially the animal protein component, is grossly below the Food and Agriculture Organization (FAO) recommendation. For instance, the consumption of chicken, which is rich in protein is very low. Could the production of ducks help to assuage the protein deficiency in Nigeria and also have a positive impact on food security?

The main objective of this paper was to determine the socio economic characteristics of duck producers in the two selected Local Government Areas of Delta State. Specifically the paper sets out to:

(i) determine the selected socio-economic characteristics of duck farmers in Ughelli North and South Local Government Area of Delta State;

(ii) ascertain the production methods of these farmers and assess their level of productive efficiency;

(iii) appraise the implications of duck production on food security.

Experimental

The population of this study comprised all the duck farmers in the two chosen local government areas because they meet the criteria for the habi-

tat of ducks as stated by Williamson & Payne (1982). In fact the authors stated that ducks are numerous in regions of high rainfall, in riverine areas, deltas, and coastal regions. Also earlier pilot studies by some other researchers revealed some excellent potentials for duck production in the selected local government areas of Delta state.

Fifty duck farmers were randomly selected from each of the two local government areas giving a simple size of 100. A questionnaire was used to collect data from the respondents. The same questionnaire was used for both the literate and non-literate respondents except that for the non-literates, the field assistants (the interviewers) of the researcher translated the questionnaire into the local dialect. The face validation in this instrument was determined by a group of experts in the Department of Agricultural Extension, University of Nigeria, Nsukka, Department of Vocational and Technical Education (Agricultural Science Unit), Delta State University, Abraka; Ministry of Agriculture and National Resources (MANR), Asaba Delta State and the Delta State Agricultural Development Programme (DADP) Ibusa Delta State. Comments from these experts were used to review the instrument prior to its administration. The jury method thus used in validating the instrument was in line with the recommendations of Crocker (1969) and Kerlinger (1975).

The split-half method was used in establishing reliability. The split-half method of establishing

TABLE I
Distribution of respondents by age and sex in the two local government areas

Age	Frequencies		Percentage	Sex			
	N	S		Male		Female	
	N	S		N	S	N	S
30-39	24	21	45	20	19	4	2
40-49	19	21	40	16	14	3	7
50-59	5	5	10	4	3	1	2
60 and above	5	-	5	4	-	1	
Total	53	47	100	44	36	9	11

N = Ughelli North Local Govt Area

S = Ughelli South Local Govt Area

reliability could be estimated from a single administration of a test. In this research, the items in the questionnaire for the respondents were divided into odd and even numbers. Thus, two scores were provided and when these two scores were correlated they gave a measure of internal consistency. To estimate the reliability of the scores based on the full length of the questionnaire, the Spearman Brown Prophecy formula was applied and a reliability coefficient of 0.896 was obtained (Gronlund, 1976). This reliability coefficient was regarded as high enough. Thorndike & Hagne (1969) stated that the appealing convenience of the split-half method has led to its wide use.

Hardakar, Lewis & McFarlane (1971) stated that efficiency in production is a relative term; and it refers to the ration of outputs to inputs in production, thus:

$$\text{Efficiency (E)} = \frac{\text{Total Output (TR)}}{\text{Total Costs (TC)}}$$

$$\text{Percentage Efficiency (PE)} = \frac{\text{Total Output (TR)}}{\text{Total Costs (TC)}} \times \frac{100}{1}$$

$$\text{Profit} = \pi = \text{TR} - \text{TC}$$

While simple frequencies and percentages were used in analysing the data collected, the 't' statistic was used in testing the null hypothesis propounded at 0.05 level of significance.

Results and discussion

Table 1 indicates that 45 per cent of the farmers were young while 40 per cent were middle aged. Only 10 per cent were between 50 and 59 years, while 5 per cent were 60 years and above. Twenty-four of the respondents, aged between 30 and 39, were from Ughelli North, while 21 of them, aged between 30 and 39 were from Ughelli South. Of the 24 in Ughelli North, 20 were males, while four were females. In Ughelli South, 19 were males,

TABLE 2
Distribution of respondents by education in the two local government areas

Level of education	Frequencies			
	N	S	Total	Percentage
No formal education at all	12	13	25	25
Secondary education	20	15	35	35
Adult education	20	20	40	40

N = Ughelli North Local Govt Area

S = Ughelli South Local Govt Area

while two were females. Of the 19 respondents aged between 40 and 49 in Ughelli North, 16 were males while three were females. In Ughelli South, out of 21 respondents of similar age group, 14 were males while seven were females. Five each of the respondents in both Ughelli North and South were aged between 50 and 59. Of the five respondents in Ughelli north, four were males. In Ughelli South, three were males and two were females. Of the five respondents in Ughelli North aged 60 and above, and none from Ughelli South four were males and one was female.

Since the majority of the farmers came from the age groups 30-39 years and 40-49 years, the implication was that the bulk of the farmers were young and middle-aged with some excellent and exuberant potentials for doing farm work which also includes duck production.

It was observed that 80 per cent of the respondents were male, while 20 per cent were female. Thus, both men and women undertook duck production. It has also been observed that women farmers contribute greatly to the upkeep of the family in these areas.

Education

Table 2 shows that 25 per cent of the respondents had no formal education, while 35 per cent had education up to the secondary school level. Forty per cent of the respondents had adult education. It was observed during the study that adult education classes were being organized for adults by the Ministry of Education in the two

local government areas to help adults to read and write. In all, 75 per cent of the duck producers could read and write. This education has implica-

TABLE 3

Distribution of respondents based on their religion in the two local government areas

Religion	Frequency			Percentage
	N	S	Total	
Christianity	42	44	86	86
Traditional religion	10	4	14	14
Islam	-	-		

N = Ughelli North Local Govt Area

S = Ughelli South Local Govt Area

tions for agricultural production since education makes people more adaptable to change by giving them basic knowledge, skills, attitudes, and valuations (Streeton *et al.*, 1982)

Religion

Although Nigeria is a secular state, the 1991 national census which stated that the population was about 88.4 million with a growth rate of 2.8 per cent per annum, but it was silent on the religion of the citizens.

TABLE 4

Percentage distribution of respondents by the management system used

Management	Frequency			Percentage
	N	S	Total	
Free range	45	43	88	88
Semi-intensive	7	5	12	12
Intensive	0	0	0	0
Total	-	-	100	100

N = Ughelli North Local Govt Area

S = Ughelli South Local Govt Area

Data analysed from Table 3 indicates that the majority of the respondents (86%) were Christians and 14 per cent were traditionalist. There were no Muslims. John (1993) had stated that above all

other factors religion has a profound influence on a people's dietary habits since it defines certain food stuffs as unclean and fit only for unbelievers. As a result certain food habits have acquired a religious sanctity which has limited their use on certain ritual occasions.

However, both Christians and traditionalists in this study did not shown any inhibitions in the use of duck products such as meat and eggs. Culturally, both the christians and the traditionalists agreed that nobody is allowed to kill ducks with their vehicles either accidentally or intentionally within their localities. Doing so

might elicit some sanctions from the communities which in some cases could be violent. Hence Modood (1999) argues that religion can be a source of renewal of a community to overcome social divisions and can provide an underpinning of compassion, fairness, justice, and public morality on which civic solidarity and civic duties rest.

Management systems

The study also looked at the management systems adopted and the experience of the duck producers.

Table 4 shows that the majority of the respondents (88%) in the two local government areas practised the free-range system while only 12 per cent of the respondents practised semi-intensive system. No farmer practised the intensive system of duck keeping.

The farmers (88%) who practised the free-range system listed some of the problems they encountered as follows:

1. Wandering of the ducks without returning to roost; in some cases where flowing streams exist, the ducks could swim away to unknown places.
2. Stealing especially at night and during festive occasions when the demand for duck meat is high.
3. Losses through wilful killings by hostile

TABLE 5
Percentage distribution of ducks kept

Breeds	Frequency			Percentage
	N	S	Total	
Muscovy	735	522	1257	85.50
Khaki Campell	56	65	121	8.30
Other White Perkins				
Indian Runner	35	40	75	5.20

N = Ughelli North Local Govt Area

S = Ughelli South Local Govt Area

neighbours who resent the incessant soiling of their environment by the ducks.

4. Killing of stray ducks in traps meant for bush animals living in the immediate environment.
5. Killing of stray ducks by predators such as snakes, dogs, and foxes.
6. Loss of eggs through destruction by snakes;
7. Occasional quarrels between duck owners over the identify of stray ducks.
8. Losses through diseases and pests
9. Loss of revenue by the farmers since mature ducks meant for sale could be stolen unexpectedly, and eggs meant for sale could be broken or stolen.

Similar observations as above have been made by other researchers (Williamson & Payne, 1982; Erebor, 1998). They have stated that the free-range system is fraught with many problems and little care for the birds. The problems listed above for the free-range system were also found among the few duck producers who practised the semi-intensive system.

Breeds of duck kept

Table 5 shows that the most common breed was muscovy which constituted about 86 per cent of the total number of ducks in the two local government areas. The Khaki Campell made up 8 per cent while other breeds like the White Pekins and the Indian Runner made up the remaining 5 per cent.

The reasons for the numerical superiority of the

muscovy breed could be based on its readiness not only to hatch its own eggs but any others put by the farmer under it. The muscovy breed also makes quite a good table bird (Thear & Fraser, 1986). Obinne (1997) extolled the muscovy breed as probably the best natural mother as measured by its success in incubating its own eggs and caring for the young ducklings.

Consequently, the number of muscovy breed in the two local government areas could be seen to be on the ascendancy, and when raised under the free range system, it could attain a body weight ranging from 2.3 kg to 7 kg (Obinne, 1997). Obinne stated that further improvement in management could also increase weight gain to an average of 4.5 kg. Therefore, Obinne (1997) has praised the quality of duck meat emphasising both its tenderness and its palatability. Many authors have stated that the culture of an area could standardize the behaviour of individuals in a group in relation to the food consumed by the majority (Foster, 1960; Abureme, 1983; John, 1993). Thus, when both chicken and its eggs are becoming quite expensive and out of reach of the common man, duck meat could be a good substitute. Hence, John (1993) stated that where substitutes still involve expensive food items and in a situation where the choice of what to eat is limited by socio-cultural factors, individuals and families within the group turn their attention to food-stuffs that were previously classified as inferior or food meant for the poor.

Experience

Kirkpatrick (1995) defined experience as the knowledge, skill or wisdom gained through practice in some activity or occupation. Studies conducted by Saigaonka & Patel (1970) and Ekperé (1973) indicated that both age and experience have some impact on agricultural productivity.

Table 6 shows that 12 per cent of the duck producers in the two local government areas had just one year's experience in duck farming, with age range of 30-39 years. They produced an estimated

TABLE 6
Distribution of respondents based on age, experience, estimated egg production and total number of ducks

Years of experience	Age of farmers	Frequency		Total	Percentage	Estimated egg production per annum	Total number of ducks
		N	S				
1	30-39	7	5	12	12	9814	93
2	30-39	13	8	21	21	18417	184
3	30-39 and 40-49	15	14	29	29	44280	445
4	50-59 and 60 and above	8	7	15	15	16370	156
5 and above	40-49	13	12	23	23	54615	575
Total	-	-	-	100	100	143496	1453

Fieldwork: 2000

N = Ughelli North Local Govt Area

S = Ughelli South Local Govt Area

9314 eggs annually and had a total of 93 ducks. Twenty-one per cent of the respondents had 2 years experience in duck production, with age range of 30-39 years, producing an estimated 18,417 eggs per annum and a total of 184 ducks. Also, 29 per cent of the respondents had 3 years experience in duck farming; the age ranged from 30 - 39 and 40 - 49 years, produced an estimated 44,280 eggs annually, and had a total of 445 ducks. Fifteen per cent of the respondents, who had 4 years experience, were in the age range of 50 - 59 and 60 years and above. They produced an estimated 15,370 eggs annually and had a total of 156 ducks. Finally 23 per cent of the duck farmers had 5 years or more experience in duck production. The age range was 40 - 49 years, produced an estimated 54,615 eggs yearly, and had a total of 575 ducks.

Relevant experience has a definite impact on production as listed below:

1. Experience gives the farmer the required knowledge and skills for input utilization for efficiency in farm operations. The farmer is

also kept aware of innovations by the extension agents. Thus, Akinwumi (1999) stated that new ideas as well as the readjustment of existing factors of production may lead to lower cost of production.

2. Through experience the farmer could accumulate capital resources and other production cycle. The resources of capital, land, materials and labour must be properly combined and managed to achieve success (Akinwumi, 1999).
3. Experience helps the farmers to keep good, accurate, and efficient records. Analysis of past records helps the farmers to understand the ratios and indicators which may point to alternative courses of action (Akinwumi, 1999).
4. Experience also gives the farmers the ability to manipulate market prices for their produce.

Level of efficiency

Efficiency refers to the ability of an organization or a farmer to conserve scarce resources (Akinwumi, 1999). Thus, production is efficient when the total cost of production is minimized. Efficiency can be improved by preventing wast-

age, damage, spoilage and loss through pilfering or stealing (Akinwumi 1999).

Moreover, efficiency refers to the skill or the capacity to do something or some activity quite satisfactorily (Kirkpatrick, 1995). Cook (1997) states that merely creating performance without building capacity is clearly not sustainable; but simply building capacity without motivating performance wastes that capacity and could lead to inefficiency. As stated earlier in this paper, Hardakar, Lewis & McFarlane (1971) have stated that efficiency is a relative concept; it is the ratio of outputs to inputs production.

It became necessary to know the productivity of the farmers both in egg and meat production. Income emanating from such production, therefore, become commanding. The estimated production (eggs and meat) and the estimated income of the duck farmers are given in Table 7. The Table indicates that the duck farmers who prac-

tised the free range system achieved an estimated egg production of 121746 during the period of one year. These eggs were sold at ₵5.00 each and thus a total estimated income from eggs was ₵608,703. These same farmers also sold 669 ducks for meat at ₵400.00 each giving a total estimated income of ₵267,600.00 The total estimated income from both egg and meat production was ₵876,303.00. The average estimated income for the free-range producers was approximately ₵9,958.00.

For the semi-intensive producers, estimated egg production was 21750 annually. The total estimated income from eggs came to ₵108,750.00 The semi-intensive producers also sold 168 ducks for meat at ₵500.00 each, and thus giving a total estimated income of ₵84,000.00. The total estimated income from both egg and meat production for the semi-intensive producers was ₵192,750.00. The average estimated income was

TABLE 7
Distribution of respondents on management system used. Estimated production (eggs and meat) and estimated income

Management	Frequency		Total	Per cent	Estimated egg production	Estimated income from sales of eggs	Total ducks sold for meat	Estimated income from sales of ducks for meat	Gross incomes from the sales of eggs and ducks	Losses through mortality and theft	Total ducks left
	N	S									
Free range system	45	43	88	88	121,746	₵608,703	669	₵276,000	₵876,303	10	600
Semi-intensive	7	5	12	12	21,750	₵108,750	168	₵84,000	₵192,750	3	3
Total	-	-	100	100	143,496	₵717,453	837	₵351,600	₵1,069,053	13	603

N = Ughelli North Local Govt Area, Delta State

S = Ughelli South Local Govt Area, Delta State

Average estimated income for the free-range farmers = $\frac{876303}{88} = ₵9,958$ approx.

Average estimated income for the semi-intensive farmers = $\frac{192750}{12} = ₵16,063$ approx.

Average estimated income for all the duck farmers = $\frac{1069053}{100} = ₵10,691$ approx.

Source: Fieldwork, 2000

TABLE 8
Two-tailed "t" test of difference between the means of the semi-intensive duck farmers and the free-range duck farmers

	Mean <i>X</i>	Standard deviation <i>SD</i>	<i>N</i>	Degree of freedom <i>df</i>	<i>t</i> cal-	<i>t</i> critical
Semi-intensive duck farmers	1338.58	106.56	112			
Free range duck farmers	110.93	16.54	88	98	37.70	1.960

approximately ₵16,063.00 for the semi-intensive farmers. The average estimated income for all the respondents was approximately ₵10,691.00.

To confirm if there was any difference in the profit margin of both classes of duck farmers, the null hypothesis earlier propounded was tested with the 't' statistic at the 0.05 level of significance. Details are given in Table 8.

Since 't' calculated is greater than the critical 't' of 1.960 at 0.05 level of significance the null hypothesis earlier propounded is rejected and the alternative hypothesis, which states that there is a significant difference between the profit margin of the semi-intensive duck farmers and the profit margin of free-range duck farmers is accepted.

The plausible reason for the higher profit margin of the semi-intensive duck producers as against that of the free-range duck farmers could be attributed to the bigger sizes of the ducks of the semi-intensive farmers, which sold at ₵500 each against those of the free-range farmers which were sold at ₵400 each. Again the few numbers of the semi-intensive duck farmers could have affected positively their profit margin.

Hanson (1975) states that pure profit is the payment for taking risks. Under conditions of perfect competition, a certain level of profit is necessary if capital is going to be retained in a particular line of production; and this has been called a normal profit. Yet normal profit would tend to disappear under conditions that are static.

Hanson (1975) further stated that profit, therefore, arises under dynamic conditions because

there will always be uncertainty in conditions that are liable to change. The greater the uncertainty, the greater will be the possibility of profit; but also the greater the risk of loss. However, profit is the reward for the successful bearing of uncertainty.

Measurement of efficiency

In calculating efficiency it is necessary to have the analyses of both the inputs (costs) and the outputs (revenue) of the free-range system and the semi-intensive systems.

Free-range system duck products

The analysis of the input costs for the free-range duck producers is given below:

1. Cost of family/hired labour = ₵ 56,762.00.
 2. Depreciation for duck building or accommodation = ₵5,564.00.
 3. Cost of duck stocking (127×200) = ₵255,800.00.
 4. Cost of occasional feeding of ducks in a year = ₵ 40,000.00.
 5. Cost of drugs administered = ₵ 7,500.00
 6. Cost of capital (interest) = ₵ 16,000.00
 7. Farm equipment depreciation = ₵ 7,500.00
 8. Losses (due to death and theft) = ₵ 2,800.00
 9. Transportation charges = ₵ 2,500.00
 10. Other charges = ₵ 3,500.00
- Total Cost = ₵ 397,916.00

The analysis of output (revenue) for duck producers using the free-range system is given below (Table 7).

1. Revenue from egg production = 121746 × 5 =

₵ 608,703.

2. Revenue from meat production = $669 \times 400 =$
₵ 267,600.

Total output = ₵ 876,303.00

Total costs (TC) = ₵ 397916

Total revenue (TR) = ₵ 876,303.00

Profit (π) = TR - TC = ₵ 876303 - ₵ 397916

Profit = ₵ 478,387

$$\text{Production efficiency} = \frac{\text{Total output}}{\text{Total cost of output}} = \frac{\text{TR}}{\text{TC}}$$

$$= \frac{876,303}{397,916} = 2.2$$

$$\text{Percentage efficiency} = \frac{876303 \times 100}{397916} = 220\%$$

$$= 220\%$$

Semi-intensive system duck producers

The analysis of the input costs for the semi-intensive duck producers are given below:

1. Cost of labour = ₵ 60,690.00
2. Depreciation for duck building = ₵ 8,735.00
3. Cost of duck stocking (174×200) = ₵ 34,800.00
4. Cost of feeding = ₵ 50,000.00
6. Interest on capital = ₵ 8,391.00
7. Farm equipment (Depreciation) = ₵ 8,200.00
8. Transportation costs = ₵ 4,000.00
9. Losses (due to mortality) = ₵ 800.00
10. Other costs = ₵ 400.00

Total costs = ₵ 184516.00

The analysis of the outputs (revenue) for duck producers using the semi-intensive system is given below (Table 7):

1. Revenue from egg production = $(21750 \times 5) =$
₵ 108,750
2. Revenue from meat production
(170×500) = ₵ 85,000

Total revenue (TR) = ₵ 193,750.00

Total cost (TC) = ₵ 184516.00

Profit (π) = TR - TC = ₵ 193750 - ₵ 184516 =
₵ 9234

$$\text{Production efficiency} = \frac{\text{Total output (TR)}}{\text{Total cost of output (TC)}}$$

$$\text{i.e. } \frac{\text{TR}}{\text{TC}} = \frac{193,750}{184,516}$$

$$= 1.05$$

$$\text{Percentage efficiency} = \frac{193,750}{184,516} \times \frac{100}{1}$$

$$= 105\%$$

From the measurements of efficiency, the free range system has production efficiency of 2.20 or a percentage efficiency of 220, while the semi-intensive system has a production efficiency of 1.05 or percentage efficiency of 105. In the context of the study, the two systems appear to be efficient but the plausible reasons for the higher efficiency of the free-range system could be due to the lower overhead cost incurred by the large number of farmers who practised the free-range system. On the other hand, the semi-intensive system has a higher overhead cost incurred by the few duck farmers who practised this system.

Consequently, both systems had positive effects on duck production. However, farmers going into duck production should first start with the free-range. If they can adequately take care of the environmental factors they can gradually graduate to the semi-intensive and intensive systems of production bearing in mind the overhead costs.

Implications for food security

To a very large extent, the potentials of ducks for meat and egg production have not been fully exploited in Nigeria. Ducks require minimal care and feed and yet yields are appreciable with quick turnover per life cycle (Obinne, 1997). Despite the paucity in research findings, the present breeds of ducks in Nigeria have impressive meat and egg yields. If raised much widely and intensively, ducks could contribute much to the nations's meat and egg supplies and probably serve as a rapid and economic source of protein, thereby contributing towards bridging the protein gap existing in Nigeria (Obinne, 1997).

In this research, the farmers' contributions to meat and egg production have been quite impressive and efficient. This has great positive impact on food security in Nigeria since both meat and eggs would be available to the people at affordable prices for sustainable growth and development as well as good economic returns to the duck farmers.

The findings of this research indicate that both the free-range and the semi-intensive systems are efficient, yet much more excellent results could be obtained if the breeds of ducks are raised much more intensively, and widely too. In this way the ducks could contribute much higher to the protein needs of the nation.

Moreover, ducks can forage excellently and can convert waste, cellulose, vegetables, scraps, etc. into palatable meat and eggs (Obinne, 1997). According to Smith (1995) duck egg contains about 13.5 per cent protein while that of chicken contains about 12.9 per cent.

Conclusion

The bulk of the respondents were young and middle-aged (85%), and only 15 per cent were regarded old. Duck production was done by both male (80%) and female (20%) farmers, and about 75 per cent of the respondents could read and write. While 86 per cent of the respondents were Christians, 14 per cent were traditionalist. About 88 per cent of the respondents practised the free-range system of poultry keeping while 12 per cent practised the semi-intensive system. Although both systems appeared to be efficient the free-range system seemed to have given a higher efficiency partly because of the lower overhead costs, and partly because of the large number of farmers who practised this system of poultry keeping.

The muscovy breed in the study was more in number than the other breeds apparently because of the suitability of the muscovy duck for meat and egg production by the duck farmers. The experience of the respondents ranged from 1 to 5 years, and this experience generally had a

definite impact on production.

The implications of duck products for food security stem from the fact that these products could assist in bridging the protein gaps in Nigeria where duck production would seem to have excellent potentials for sustenance. Also duck producers would sell their excess products to get additional income and consequently raise their standards of living.

Adedoyin, Torimiro & Farinde (1999) stated that the issue of food security has always been the concern of many developing countries like Nigeria. To be food secure is the ultimate aim of all nations of the world (Ugbomeh, 2001)

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