PROFITABILITY OF DUCK ENTERPRISES IN OYO AND LAGOS STATES, NIGERIA

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ABSTRACT

The prevailing malnutrition problem in Nigeria is attributed to low animal protein intake. A panacea for this protein deficiency problem is to embark on accelerated protein production from poultry species with high growth rate in meat production, quick income generation and high profit. One of such potential source of animal protein, which is not popularly produced in Nigeria, is duck. The objective of the study is to determine the costs and returns to duck enterprises in an attempt to examine the profitability of duck enterprises in Oyo and Lagos States in South-western Nigeria. A multistage sampling technique was used to select two hundred respondents. Data on quantities and prices of inputs and outputs were collected from the respondents. Data were analysed using enterprise budgeting. Results of the analyses indicated that the duck farmer who was in duck eggs enterprise has estimated higher profit margin (82.1), return per naira outlay (4.8), benefit cost ratio (5.6) than his counterparts in broiler and duckling enterprises. Farmers who were in duck egg enterprise has higher earnings per ₦1 expended on labour (38.8) compared to his counterparts in broiler and duckling enterprises. However, duck enterprises were profitable but the profit (₦ 301, 814.8) accruable to an average farmer from duck egg enterprise was higher than those obtained from broiler (₦ 41, 486.4) and duckling (₦1, 403) enterprises. It is therefore recommended that livestock extension officers should educate the poultry farmers to embrace commercial production of duck enterprises.

Keywords: duck, enterprises, economics, Oyo, Lagos

INTRODUCTION

Animal protein shortage has become a major problem in Nigeria with its attendance negative influence on the health and general well-being of the ever increasing population (Ahaotu *et al*., 2010).The low consumption of animal protein in Nigeria has been partly attributed to the concentration of commercial animal production on a few species at the neglect of others (Ugbomeh, 2002).The need to match the supply of animal products, particularly meat and eggs, with the protein requirements of Nigeria teaming population has necessitated the current interest in the hitherto promising but neglected species of poultry such as duck (Akinola and Essien, 2011). A number of advantages are associated with duck production. Duck has been found to adapt to a wide range of environmental conditions. They are resistant to common poultry diseases such as Leukosis, Marek disease, infectious bronchitis and other respiratory diseases (Ike, 2017).Ducks could utilize planktons, grass, insects and agricultural by-products; hence, reducing cost of feeding (Jason, 2006) which is a major challenge in chickens production. Ducks act as biological means of pest control by eating snails and other crop pests (Alam *et al*.,

2012).In spite of all the apparent advantages inherent in the duck, most commercial and backyard poultry farmers do not consider duck farming to be a worthwhile venture in Nigeria.(Aiyedun and Oludairo, 2016). Pingel (2009) attributed low level of demand for duck meat and eggs in African countries to lack of information on the nutritional value of ducks.

The objective of the study is to determine the costs and returns to duck enterprises in the study area. Achieving this objective will increase the body of knowledge in duck production and provide information for present and prospective duck farmers in the operation and for policy making.

METHODOLOGY

The study was carried out in Oyo, and Lagos States in South-western Nigeria. The region has two agro-ecological zones; rainforest and savannah zones. These zones are conducivefor the practice of agriculture. The climate is notably with dry and wet season, the dry season starts from November to March while the wet season starts from April and ends in October.The total population of the two states is 9,015,125 (NPC, 2006). The production of livestock such as goats, sheep, pigs, rabbits and poultry (chicken and duck especially) is popular in the study area.

The selection of respondents was multi-stage, involving purposive sampling method, as well as random sampling. The first stage involved a purposive selection of four Local Government Areas (LGAs) from each state, Oyo State (Oyo West, Oyo East, Atiba and Afijio LGAs and Lagos State (Epe, Eredo, Eti-osa and Ikorodu LGAs) based on the duck production potential. At the second stage, five villages were also purposively selected from each of the four LGAs based on the duck production potential. The third stage involved a random selection of five duck farmers from each of the selected villages, totalling two hundred respondents. The primary data were collected, using a pre-tested structured questionnaire, on quantities and prices of inputs and outputs in the study area during the 2015/2016production season. An enterprise budgeting technique was used to determine return to management.

The budgetary technique analysis was used to evaluate levels of profitability of the enterprise by estimating the revenue, gross margin and net farm income at the end of the production process. The difference between the two parameters is a measure of net profit or return in duck production. The following were computed for each category of duck farmers:

(i) Gross revenue (GR): GR = P*Y, where P = Output price and Y = Yield,

(ii) Gross Margin (GM): GM = GR-TVC, where GM = Gross Margin, GR = Gross revenue

TVC = Total Variable Costs

(iii) Net Farm Income (NFl) = GM-TFC

(iv) Operating Expense ratio = GR/TVC

(v) Net Farm Income ratio = GM / NFI

(vi) Return/Naira outlay = TC/NFI

Where: TC =TVC+TFC and TC = Total Cost

TFC= Total Fixed Cost in Naira (depreciated for housing units, swimming units)

The fixed inputs are not normally used up in the production process and were therefore depreciated using the straight line method. The choice of this method is based on its ease ofcomputation. The depreciation is given by:

$D = P – S/N$ ……..... (1)

Where: D= Depreciation; P= Purchase value of the asset; S= Salvage value, which is the price of theasset after its expected years of

usage, and,N= Life span of the asset measured in years.

The respondents were classified into three groups based on their production objectives, namely (i) Rearing ducks for eggs; (ii) Rearing ducks for meat; and (iii) Rearing ducks for ducklings

Rearing ducks for eggs with point of lay ducks as foundation stock

The following assumptions were made for duck eggs enterprise:

(1) The foundation stocks were 5 months old point of lay ducks;

(2) The mortality rate was 10 per cent;

(3) The production period was 13 months and the production cycle was 18 months.

(4) Ducks started to lay eggs at 5 months old and continued to lay until 18 months. The total laying period was 13 months (52 weeks);

(5) Duck laid more eggs during the first half of the year of their laying period than at the end of one and half years;

(6) The total number of eggs laid per duck was 105 eggs per laying period (52 weeks);

(7) The calculation was made for the whole laying period;

(8) Spent layers served as meat which was a by-product of duck egg enterprise.

Thus, eggs enterprise had two sources of revenue namely; eggs laid and spent layers for meat.

Rearing ducks for meat

The respondents were grouped into two based on the foundation stock being (i) Day old Chicken(ii) Duckling

The following assumptions were made for duck broiler enterprise:

(1) The foundation stock was either day-old drake or duckling drake;

(2) The production cycle was 5 months.

Rearing ducks for ducklings with day-old chick as foundation stock

The following assumptions were made for duckling enterprise:

(1) The foundation stocks were day old chicks; (2) The production cycle was 3 months, in line with recommended weaning age (3 months) at that time the duckling has received all necessary immunization.

RESULTS AND DISCUSSION

Profitability of duck egg enterprise with point of lay ducks as foundation stock

As revealed in Table 1, point of lay accounted for 42.4 per cent (highest share) of the total costs while drugs and veterinary services accounted for 9.8 per cent of the total cost of production. Gross margin and net income of₦303, 547.8 and ₦301, 814.8 respectively indicate that duck egg enterprise was profitable in the study area. The ratio of net returns to total expenses of 4.8 implies that for every ₦1 expended, there is a return of ₦ 4.8 to the enterprise. The operating cash expenses ratio of 17.5per cent connotes that about 18.0 per cent of the gross revenue was used to cover the operating expenses while the remaining 82 per cent of gross revenue went to farmer's equity and unpaid labour and management. Benefit /cost ratio and labour efficiency analysis were 5.6 and 38.8 respectively implies viability of the enterprise and good performance of labour in each operation in comparison to the standardsdefined. Using all these measures of performance, duck eggs enterprise can be said to be profitable and profitability can still be increased under improved management.

Table 1: Average enterprise budget (₦) of duck eggs per production period (13 months)

S/n	Item	Mean amount (₦)	Percentage of revenue/cost
***1**	**REVENUE:**		
i	105 eggs /duck (31) at ₦ 100 per egg	325,500	88.5
ii	Culled birds (31) at ₦ 1,364.8	42,308.8	11.5
a	Total Revenue (TR)	367,808.8	
2	**VARIABLE COSTS**		
i	Cost of foundation stock:		
	35 point of lay at ₦ 800 per bird	28,000	42.4
ii	Cost of labour	9,477	14.4
iii	Cost of drugs & Veterinary services	6,500	9.8
iv	Maintenance cost on housing units	1,076	1.6
v	Maintenance cost on swimming units		
	Cost of feed	488	0.7
vi	Total Variable Costs (TVC)	18,720	28.4
b	**Gross Margin(GM) = (TR-TVC)**	64,261	97.4
c	**FIXED COSTS:**	303,547.8	
3	Depreciation on housing unit		
i	Depreciation on swimming unit	1,083	1.6
ii	Total Fixed Cost (TFC)	650	1.0
d	Total Cost (TC)= (TFC+TVC)	1,733	2.6
e	**Net Income (NI) = (GM-TFC)**	65,994	
f	**Profit Margin (%) = f/ a x100**	301,814.8	
g	**Return Per Naira Outlay(₦) = f/e**		82.1
h	**Operating Expense Ratio (%)= b/a**		4.8
i	**Benefit Cost Ratio (BCR) = a/e**		17.5
j	**Labour efficiency = a /2 (ii)**		5.6
k			38.8

Source: Field survey, 2016

*Foundation stock: 35 point of lay; Number of ducks remaining at maturity = 31 (10% mortality). Duck-hens start laying at the age of 5 months. The number of eggs lay per duck was 105 eggs. Overall eggs laid were 3,255 eggs (31ducks x 105 eggs).

Profitability of duck broiler production with day-old chicks as foundation stock

As shown in Table 2, feed had the largest share of the total costs constituting about 32.5 per cent while maintenance cost on swimming units accounted for 1.0 per cent (lowest share) of the total cost of production. The average amount realized from drake was ₦59, 875.2. The gross margin and net income/ return to management were ₦ 41,338.2 and ₦ 40,671.2 respectively. The profit margin percentage was 68.0 per cent. The return per naira invested of 2.1 implies that for every ₦1 expended in duck production enterprise, there is a return of ₦2.1 to the enterprise and the operating cash expenses ratio of 31.0 per cent connotes that 31 per cent of the gross revenue was used to cover the operating expenses. Benefit-cost ratio and labour efficiency analysis results were 3.1 and 16.4 respectively suggesting that the enterprise is viable. Using all these measures of performance duck broiler enterprise with day-old chicks as foundation stock was profitable.

Profitability of duck broiler enterprise with duckling as foundation stock

The estimated costs and returns to duck meat enterprise with ducklings as foundation stock are presented in Table 3. From the analysis, feed accounted for about 11.6 per cent of the total costs of production while drugs and veterinary services accounted for 4.0 per cent of production cost. The gross margin and net income were ₦ 41,753.4 and ₦ 41,486.4 respectively. The profit margin percentage was 63 per cent meaning the enterprise has a net income of ₦ 0.63 for each naira of total revenue earned.

The return per naira outlay was 1.7 implies that for every ₦1 expended in duck production enterprise there is a return of ₦1.7 to the enterprise and the operating cash expenses ratio of 37 per cent connotes that 37 per cent of the gross revenue was used to cover the operating expenses. Also the financial evaluation of the enterprise using both benefit-cost ratio and labour efficiency analyses were 2.7 and 22.7 respectively implies viability of the enterprise and profitable with positive return to management. This is in line with the study of Afrin *et al*. (2016), who researched on profitability analysis and gender division of labour in duck rearing: a case of Kishoreganj district in Bangladesh.

Table 2: Average enterprise budget (₦) of broiler duck (with day-old as foundation stock) for 5 months production period

S/n	Item	Mean amount (₦)	Percentage of revenue/cost
***1**	**REVENUE:**		
i	28 drakes at ₦ 2,138.4 per drake	59,875.2	
a	**Total Revenue (TR)**	59,875.2	
2	**VARIABLE COSTS**		
i	Cost of foundation stock:		
	35 day old at ₦ 130 per bird	4,550	23.7
ii	Cost of labour (₦ 270/man-day)	3,645	18.9
iii	Cost of drugs & Veterinary services	3,500	18.2
iv	Maintenance cost on housing units	414	2.2
v	Maintenance cost on swimming units	188	1.0
vi	Cost of feed	6,240	32.5
b	Total Variable Costs (TVC)	18,537	96.5
c	**Gross Margin(GM) = (TR-TVC)**	41,338.2	
3	**FIXED COSTS:**		
i	Depreciation on housing unit	417	2.2
ii	Depreciation on swimming unit	250	1.3
d	Total Fixed Cost (TFC)	667	3.5
e	Total Cost (TC)= (TFC+TVC)	19,204	
f	**Net Income (NI) = (GM-TFC)**	40,671.2	
g	**Profit Margin (%) = f/ a x100**		68.0
h	**Return Per Naira Outlay(₦) = f/e**		2.1
i	**Operating Expense Ratio (%)= b/a**		31.0
j	**Benefit Cost Ratio (BCR) = a/e**		3.1
k	**Labour efficiency = a / 2(ii)**		16.4

Source: Field survey, 2016

*Foundation stock: 35 day old drakes; Number of drakes remaining at maturity = 28 (20% mortality). The selling age for the stock was 5 months. Beyond, the efficiency of feed conversion to live weight is considerably reduced it is usually a waste of time and feed. Weight of drake at 5 months was 3.8 kg.

Table 3: Average enterprise budget (₦) of duck broiler (with ducklings as foundation stock) for 2 months production period

S/n	Item	Mean amount (₦)	Percentage of revenue/cost
***1**	**REVENUE:**		
i	31 drakes at ₦ 2,138.4 per drake	66,290.4	
a	**Total Revenue (TR)**	66,290.4	
2	**VARIABLE COSTS**		
i	Cost of foundation stock:		
	35 ducklings at ₦ 500 per bird	17,500	70.6
ii	Cost of labour (₦ 270/man-day)	2,916	11.8
iii	Cost of drugs & Veterinary services	1,000	4.0
iv	Maintenance cost on housing units	166	0.7
v	Maintenance cost on swimming units	75	0.3
vi	Cost of feed	2,880	11.6
b	Total Variable Costs (TVC)	24,537	98.9
c	**Gross Margin(GM) = (TR-TVC)**	41,753.4	
3	**FIXED COSTS:**		
i	Depreciation on housing unit	167	0.7
ii	Depreciation on swimming unit	100	0.4
d	Total Fixed Cost (TFC)	267	1.1
e	Total Cost (TC)= (TFC+TVC)	24,804	
f	**Net Income (NI) = (GM-TFC)**	41,486.4	
g	**Profit Margin (%) = f/ a x100**		62.6
h	**Return Per Naira Outlay(₦) = f/e**		1.7
i	**Operating Expense Ratio (%)= b/a**		37.0
j	**Benefit Cost Ratio (BCR) = a/e**		2.7
k	**Labour efficiency = a/ 2(ii)**		22.7

Source: Field survey, 2016

*Foundation stock: 35 ducklings drakes; Number of drakes remaining at maturity = 31 (10% mortality). Production period: 2 months; Weight of drake at 5 months was 3.8 kg

Profitability of duckling enterprise with day-old chick as foundation stock

As shown in Table 4, foundation stock accounted for about 36.1 per cent (largest share) of the total cost while maintenance cost on swimming units had 0.9 per cent (lowest share) of the total cost of production.

Table 4: Average enterprise budget (₦) of duckling (with day-old as foundation stock) for 3 months production period

S/n	Item	Mean amount (₦)	Percentage of revenue/cost
1	**REVENUE:**		
i	28 ducklings at ₦ 500 /duck	14,000	
a	Total Revenue (TR)	14,000	
2	**VARIABLE COSTS**		
i	Cost of foundation stock:		
	35 day old at ₦ 130 per bird	4,550	36.1
ii	Cost of labour (₦ 270/ man-day)	2,187	17.4
iii	Cost of drugs & Veterinary services	1,500	11.9
iv	Maintenance cost on housing units	248	2.0
v	Maintenance cost on swimming units	112	0.9
vi	Cost of feed	3,600	28.6
b	Total Variable Costs (TVC)	12,197	96.8
c	**Gross Margin(GM) = (TR-TVC)**	1,803	
3	**FIXED COSTS:**		
i	Depreciation on housing unit	250	2.0
ii	Depreciation on swimming unit	150	1.2
d	Total Fixed Cost (TFC)	400	3.2
e	Total Cost (TC)= (TFC+TVC)	12,597	
f	**Net Income (NI) = (GM-TFC)**	1,403	
g	**Profit Margin (%) = f/ a x100**		10.0
h	**Return Per Naira Outlay(₦) = f/e**		0.1
i	**Operating Expense Ratio (%)= b/a**		87.1
j	**Benefit Cost Ratio (BCR) = a/e**		1.1
k	**Labour efficiency = a/ 2(ii)**		6.4

Source: Field survey, 2016

*Foundation stock: 35 day old; Number of ducks remaining at maturity drake = 28 (20% mortality). Production period: 3 months. Weight of duckling at 3 months was 1.6 kg.

The average revenue realized from duckling was ₦14, 000, while the gross margin and net income were ₦ 1,803 and ₦ 1,403 respectively. The profit margin percentage was 10 per cent and return per naira outlay was 0.1 implies that for every ₦1 expended in duckling production enterprise there is a return of ₦ 0.1 to the enterprise and the operating cash expenses ratio of 87.1 per cent connotes that 87 per cent of the gross revenue was used to cover the operating expenses. Benefit/cost ratio and labour efficiency analysis were 1.1 and 6.4 respectively. Using all these measures of performance, duckling enterprise was viable and profitable in the study area.

Relative profitability of rearing duck for eggs, meat and ducklings production

Tables 1-4 indicated that a farmer who was in duck eggs enterprise has estimated

higher profit margin (82.1), return per naira outlay (4.8), benefit cost ratio (5.6), and return to management (₦301,814.8) than his counterparts in broiler and duckling enterprises. Farmers who were in duck egg enterprise has higher earnings per ₦1 expended on labour (38.8) compared to his counterparts in broiler and duckling enterprises. This was due to the fact that there were two products namely eggs (major product) and spent layers in duck egg enterprise. However, the low returns obtained by farmers in duckling enterprise may be probably due to high (20%) level of mortality observed by farmers with day-old as foundation stock. In addition, mature ducks are much more marketable than ducklings. However, duck enterprise based on the above assumed production objectives of eggs production were more profitable than meat, and duckling enterprises.

SUMMARY AND CONCLUSION

The study was carried out in Oyo and Lagos States in South-western Nigeria and determined the costs and returns to duck production. Data were obtained from a total of two hundred respondents selected using multi-stage random sampling and purposive procedure and interviewed by means of a structured questionnaire. The data collected were analysed using enterprise budgeting. All duck enterprises were profitable in the study area. The return (₦ 301, 814.8) accruable to an average farmer from duck egg enterprise was higher than those obtained for broiler (₦ 41, 486.4) and duckling (₦1, 403) enterprises. Since the study indicated that separating the farm business into different enterprises is profitable, it is therefore recommended that livestock extension officers should educate and encourage duck farmers to undertake commercial production of eggs and meat in order to improve their income earning capacity.

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