Turkey Production in Gwagwalada Area Council of Federal Capital Territory, Abuja, Nigeria

Agbonika D.A, Folorunsho S.T

Abstract— **Turkey production in gwagwalada is still on a small scale compared to other poultry birds' production. This paper estimated the cost and returns of turkey production using structured questionnaire to elicit information from 60 turkey producers in gwagwalada area council of federal capital territory, Abuja, Nigeria. Descriptive statistics was used to get socio-economic characteristics such as age, marital status, gender, level of education, etc of the turkey producers, net farm income model was used for cost and return analysis, gross margin model shows the profitability index. Findings of the study show that turkey production was carried out mainly as secondary activities by adults of 35-44 years of age. The respondents had formal education. Turkey production in the study area was found to be profitable with a profit investment ratio of 0.82. The cost of feeding was as high as 50.8%, fixed and variable input was 9.2% and 90.85% of the total cost of production respectively. The system of production was 85% semi-intensive style. The major diseases of turkeys reported in the area were fowl pox and ectoparasites. High cost of poults, high cost of feeds, unorganized market, poor extension services, high cost of vaccine/drugs, turkey theft were the constraints of turkey production in the area. Advantages of turkey production, proper management of turkey production and government roles in making turkey production lucrative were stated.**

Index Terms— **cost and returns analysis, turkey, turkey production**

I. INTRODUCTION

The poultry population in Nigeria is estimated at 104.3 million comprising of 72.4 million chickens, 11.8 million of ducks, 4.7 million of guinea fowls, 15.2 million of pigeons and 0.2 million of turkey [1],[16]. According to [2],[7] in 2018 poultry production in Nigeria amounts up to 454 billion tonnes of meat and 3.8 million eggs per year, with a standing population of 180 million birds. About 80 million chickens are raised in extensive systems, 60 million in semi-intensive systems and the remaining 40 million in intensive systems [3]. The poultry is said to constitute a major animal protein source in this country. Turkey (*Meleagris gallopavo)* belongs to the family of birds called Meleagrididae. The young birds are called poults, the male birds are referred to as turkey cocks or toms while the female are called turkey hens [4]. Turkey production is an aspect of the poultry industry which although not popular in Nigeria, is very popular in many parts of the world especially Europe and America where they play an important role in the supply of meat and eggs. The meat is especially considered by many as a luxury meat. Apart from their role in protein supply, they have an aesthetic value due to their beauty [4]. Turkeys are known to be adaptable to wide range of climatic conditions and can be raised successfully almost anywhere in the world if they are well fed and protected against diseases, predators and adverse weather conditions. Turkey is a poultry bird or domestic fowl that is easy to rear. In Nigeria, most people prefer to eat turkey meat compare to other meat like goat meat, cow meat, etc. apart from being the most demanded meat turkey is one of the fastest growing poultry fowl that can be reared. Poultry production forms an important component of Nigeria's livestock subsector. Poultry production is gaining popularity in the developing countries due to its role in bridging the protein malnutrition in their diets, economic empowerment of the resource poor segment of the society [5] [13]. Poultry production is practice in all levels ranging from subsistence to large scale commercial operations. Poultry meat and eggs are the most consumed animal protein; unrestricted by any religion or culture in Nigeria. It was recorded that the poultry industry contributed about 25% of the country's Agricultural GDP [6],[1]. Nigeria presently produces above 550,000mt of poultry meat per annum and 700,000mt of eggs according to [7],[8]. Despite this, Nigeria is far from meeting her domestic demand when compared with developed countries that involved in poultry production. As a provider of employment and income, poultry production constitutes an important form of livelihood for rural and urban dwellers. The bulk of the poultry meat and eggs are produced by small holders who adopt different production strategies in consonance with the little resources available to them while the commercial poultry production for meat and eggs are by urban and peri-urban dwellers [8]. Poultry offers the greatest scope for increasing the quantity and quality of animal protein. Poultry meat and eggs account for about 30% of total livestock output in Nigeria, of which eggs account for over 80 per cent. Turkey production in Nigeria is largely at the small holder level [9],[10]. The consistent rise in the cost of production of cow, goats and other meat that are common necessitate the need to explore other meat like Turkey [11]. According to [4], turkeys are more delicate than chickens and they are raised mainly for meat. Research on this poult that supply protein is very necessary in the Federal capital of Nigeria were population keep rising as a result of influcs of people from other state of the nation, urban-rural migration, birth increase etc. Turkey production has tremendous potential of covering the supply-demand gap of meat. It is on this note that this study attempt to describe the socio-economic characteristics

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of turkey farmers in gwagwalada area council, determine the various system of production used, determine the resource use efficiency in turkey production, determine the cost and returns and identify the constraints to turkey production in gwagwalada area council.

II. STUDY AREA

Gwagwalada Areal Council has an area of 1,043 km² and a population of 157,770 at the 2006 census [2]. Gwagwalada area council lies between latitude $07^0.57'$N and longitude $07^0.7'$E. The area council consist of several people of different ethnic group due to the nature of jobs within the Federal Capital Territory Abuja and has several markets. The area council house universities, polytechnic, college of education, several ministry headquarters. This makes the area council a centre for high class elite that have interest for exotic meat. Turkey most times is given as gift during festive periods. Structured questionnaire was administered on the turkey farmers using face to face interview and oral discussion to get data. The primary data collected focused on variables such as educational status, marital status, sex, age, educational level, major occupation, household size and years of experience of turkey farmers. Others include; membership of cooperative societies, flock size, capital acquisition, management system and information concerning price of day-old poults, feed cost, feed source, quantity of feed, medication cost, building and other production equipment costs, labour cost and man-hours input for the production cycle and problems militating against turkey production in the study area. The data collected cover about 40 weeks.

III. ANALYTICAL TECHNIQUES

The following tools were used to analyse the data collected: Descriptive statistics was used to analyse the socioeconomic characteristics, system of production used by the turkey farmers and to identify the major problem militating against turkey production. This involves the use of range, percentages, and mean. Resource use Efficiency was calculated using efficiency ratio, Net Farm Income Analysis was used to determine the cost and returns of turkey production.

The equation for Efficiency ratio is expressed as;

A. Efficiency ratio(r) $= MFC/MVP$ -------------- (1)
Where,
r = Efficiency Ratio
MVP = Marginal value product
MFC = Marginal factor cost of a particular input (x_1)
$MPP = \frac{dy}{dx} = \frac{b1Y}{X1}$ ………………….…….…… (2)
$MVPx_1 = MPPx_1 XPy$ …………………………… (3)
Y and *X* are the mean values of the output and input being considered respectively.
bi = is the estimated regression coefficient of input xi
Py = is the unit price of output
Xi = is the various input i.e 1 to n
If r =1, it means that resources are efficiently utilized. i. e

MVP = MFC = 1
If r >1, it implies that resources are under-utilized and If r <1, it implies that resources are over utilized.
The implicit equation is:
Y = F (x1, x2, x3, μ) …………………… (4)
Where,
Y = Turkeys output in kg
x_1 = Labour (man hours)
x_2 = Feed (kg)
x_3 = Capital
μ = errors term included to capture the effect of other variables not included in the Model.

Cobb –Douglas functional form of equation is considered fit in this research given that it allows for ease in estimating elasticity of production, return to scale and marginal productivity directly and the R^2 value.it is expressed as;
Log Y = Loga + $b_1$logx_1 + $b_2$logx_2 + $b_3$logx_3 + e …………… (5)
.

B. Net Farm Income (NFI) as:

$$NFI = TR - TC$$
…………………………………………………… (6)
NFI = Net Farm Income
TR = Total Returns/ Receipts of turkey output (₦)
TC = Total cost (TCV + TFC) (₦)
TVC = Total variable cost (₦)
TFC = Total fixed cost (₦)

C. Gross Margin (GM) = TR – TVC

IV. RESULT AND DISCUSSION

A. Socio-economics Characteristics

The result of the socio-economic characteristics of turkey farmers is as shown in table 1. The highest proportion of the turkey farmers' falls within the age group of 35-44 years. This implies that the majority of the turkey producers in the study area were in the productive and active age and they are likely to accept and adopt beneficial innovations and technologies faster. More married people 65% were involved in the turkey production than the single, this maybe as a result of sourcing for more funds to cater for the family. This in line with [12] that the bulk of turkey producers were married who took turkey production as means of supplementing family income. There were more female (85%) turkey producers in the study area than the male counterpart of (15%). This agrees with [12],[4] that opined that poultry keeping is the activities of women but contradicts [10] that found out more male involvement in turkey production in Zaria. Majority of the turkey farmers in the study area had secondary education (45%) showing they are enlighten to the extent of taking proper measures in the management of turkey. The respondents were majorly civil servant (60%) and had 1-5 years of experience in the production of turkey. The household size 6-10 person was 80% being the highest. This shows that the availability of labour was not difficult in handling the production of turkey enabling them have 1-20

population of stock (70%). The size of stock might be due to the fact that the cost of poult is high and most women involved in the production of turkey being civil servants do not have

Table 1: Socio-economic characteristics of Turkey farmers

characteristics	frequency	percentage
Age		
25-34	12	20
35-44	24	40
45-54	18	30
55-64	6	10
> 65	0	0
Marital status		
single	18	30
married	39	65
divorced	3	5
sex		
male	9	15
female	51	85
Education level		
No Education	3	5
primary education	12	20
secondary education	27	45
higher institution	18	30
Household size		
.1-5	9	15
.6-10	48	80
.11-15	3	5
years of experience		
.1-5	48	80
.6-10	6	10
.11-15	6	10
major occupation		
Turkey farming	21	35
civil sevant	36	60
self employed	3	5
population of stock		
.1-20	42	70
.21-40	15	25
.41-60	3	5
>60	0	
Access to credit		
personal savings	42	70
friends/relatives	12	20
bank	6	10
Source: Field survey 2018		

easy access to credit as 70% make use of personal savings and only about 20% had access to bank loan.

B. System of turkey production

In the study area 75% of local bred and 25% of cross-bred were raised and two system of turkey production was identified. The turkey farmers used intensive and semi-intensive (which is the combination of deep litter and free range) system. The intensive system which is total confinement of the turkey was 25% while semi-intensive (75%) was the major type of production system practiced. The farmer that practice semi-intensive did so to minimize cost of production in terms of feed purchase but those that practiced intensive system had the advantages of better control and protection of their turkeys against loss that can be due to thieves and other predators. The necessary health care practices such as sanitation, routine vaccination, avoidance of over-crowding and curative measures were carried out by the turkey farmers in the study area. Cleaning and disinfecting their turkey houses a week before the arrival of their poults were the sanitary measures carried out. They also carried out a routine and daily cleaning by removing turkey droppings and change of wet litter materials. Vaccination for turkeys was carried out Table 2 shows the type of vaccination done. Family labour (85%) was the major source of labour while hire labour was 15%. The feed used was 65% farmer's formulation to reduce cost of feed purchase and 35% commercial feed.

Table 2: Turkey Vaccination Schedule			
Disease	**Vaccine**	**Route**	**Age of Turkey**
Newcaslte disease	vaccine Lasota	Intraocular/drinking water	1st week
Erysipelas	Erysipelas bactrin	Intraocular/drinking water	8 weeks
Fowl typhoid	typhoid vaccine	In drinking water	8 weeks
Coccidiosis	Sulfaquainoxaline	In feed or water	8 weeks
Fowl pox	Fowl pox	intra-muscular or via the living web	12 weeks
Newcastle	Komarov	In drinking water	12 weeks
source: field 2018			
LaSota vaccine could be repeated at interval of one months (4 weeks)			
fowl pox and newcastle disease vaccine can be repeated			

e 3: Breeds, system of production, health care and Input			
Activities	**Frequency**	**Percentage**	
Breed			
Local	45	75	
Cross bred	15	25	
System of keeping			
Intensive	15	25	
Semi-intensive	45	75	
Housing type			
Cement	54	90	
Mud	6	10	
Labour			
Family	51	85	
Hired	9	15	
Feed			
Commercial	21	35	
Farmers formulatio	39	65	
Source: survey 2018			

Table 4: Marginal value productivities and Resourse use Efficien						
Variables	**X**	**MPP**	**Bi**	**MFC**	**MVP**	**R**
Labour(manhr)	655	0.81	0.64	500	37654	75.31
Capital(naira)	56785	0.01	0.66	4000	300	0.075
Feed(kg)	904	0.19	0.36	2500	1500	0.6
source: survey 2018						

Y = 670
MPP = BiY/X
Y= output mean
X= input mean
Bi= regression coefficient

The farmers kept the turkeys for a longer period (40 weeks) before disposing them thereby feeding the turkeys beyond the economic weight gain. Also over utilization of feed could be due to wastage of feed by the turkey producers as a result of over filling of feeders and the use of spoilt feeders. The feeds therefore need to be used efficiently by using good feeders and by disposing matured turkeys as soon as they attain their economic weights.

D. Cost and Returns analysis

Table 5 shows the cost and returns to an average turkey farmer in Gwagwalada area council. The total revenue was ₦739,600.00, the variable cost was 90.85% (₦123000) of total cost and fixed cost was 9.2% (₦12500). The cost of feeds was 50.8% (₦68800) having the highest amount confirming that feed constitute a major ingredient in turkey production. Labour was 19.2% (₦26000) followed by drugs/veterinary service which was 11.8% (₦16000). Housing and equipment made up the fixed costs which was just 9.2% compared to 90.85% variable costs. The variable cost seems to be the largest value in the production of turkey in the study area and this is in line with [10],[15] that variable costs most times surpasses fixed costs in turkey production. The sale of matured turkey at the end of the production cycle amounted to ₦654000, also the farmers sold their poult, manure from the production and feed empty bags were sold to generate income giving the farmer the total revenue of ₦739600.

Other measures to prevent diseases and death of turkey like: Desnooding, Beak Trimming (Debeaking), Claw Clipping, wing clipping were also done. Desnooding is the removal of the snood to prevent injuries from pecking or fighting which may result to erysipelas disease. The snood can be cut off close to the head with sharp, pointed scissors around 3 week old or can be remove by fingernails at day old. Debeaking is done in order to control feather pecking and cannibalism especially when they are to be raised in intensive housing system [13]. It is usually done at 10 days of age. Beak of adult turkeys can also be trimmed using nail clippers or appropriate scissors. Claw Clipping is the removal of toenails which is usually done at the hatchery but it can also be done at 5 weeks old [14]. This is to prevent tearing of flesh during fight and mating. The most common form of toe clipping involves cutting the inside and middle toe on each foot. Toes can be cut with surgical scissors, a nail clipper or a modified hot-blade debeaker. The semi- intensive system practice in the area of study which is a combination of confinement and range practice wing clipping at 15 week old in order to prevent flight over the range fence. This practice prevents the turkeys from jumping out of the range into predators.

C. Resource use Efficiency

: The economic efficiency of resources used based on the ratios of marginal value product (MVP) to marginal factor cost (MFC) in table 4 indicated that feed and capital were over utilized (r = 0.60 and r = 0.075) respectively while labour was underutilized (R = 75.308).

Table 5: cost and return of turkey production in gwagwalada area council,FCT

items	values(	Percentage
Returns		
Matured Turkey sale	654000	
poult sales	60000	
manure sales	25600	
Total Returns	739600	
Variable cost		
labour	26000	19.2
feeds	68800	50.8
drugs/veterinary se	16000	11.8
transportation	8200	6.1
repairs and structur	4000	2.95
Total variable cost	123000	90.85
Fixed costs		
Housing	6000	4.4
Equipment	6500	4.8
Total fixed cost	12500	9.2
Gross margin	616600	
Total Cost	135500	
Net farm income	604100	
Profitability index	0.82	
source: survey 2018		

TC =TFC + TVC
TC =₦ 135500
GM = TR - TVC
GM = ₦616600
NFI = TR – TC
NFI = ₦604100
Rate of returns on investment = NFI / TC X 100
= ₦604100 / ₦135500 X 100
= ₦446%

The rate of return on investment for turkey production in the study area was ₦446%, the net farm income of ₦ 604100 and capital turnover of 5.45 implying that for every naira invested there is a return of ₦5.45 to turkey farmer. The profit investment ratio which is an index that represents the relationship between the cost and benefit of turkey production is less than one (0.82) this depicts the need for turkey production commercialization and necessity of extension agent reaching out to turkey farmers for capacity building. There is great potential for turkey production in the study area if turkey farming is improved.

V.   PROBLEMS OF TURKEY PRODUCTION

Table 6 shows the problems militating against turkey production. The major problems identified to be militating turkey production in the study area are high cost of poult. A poult cost about ₦2100 which is quite expensive compared to other poultry birds. The cost of feed was Identified as the second major problem followed by lack of organized market (18.33%), poor extension service (13.33%). Inadequate capital (10%), poor veterinary services (5%), and theft of turkey (3.33%).

Table 6 : Major problems identified militating against turkey production in the study area

Problems	Frequency	%
High cost of poult	18	30
High cost of feed	12	20
Lack of organized market	11	18.33
Poor extension services	8	13.33
Inadequate capital	6	10
Poor vertinary services	3	5
Theft of turkey	2	3.33
Total	60	100

VI.   CONCLUSION

Turkey production in the study area has the potential of increasing profit. There is need to encourage the farmers in terms of setting up an organized market for the sale of the turkeys. Extension agent/workers should mobilize the turkey farmer to increase production via workshops/seminars and educating the farmer on appropriate management system to adopt in the area. The inability of the farmers to easily access credit was one of the identified problems; therefore government should make access to credit more flexible for farmers. The production of turkey will create job opportunity for people and also help close the demand-supply deficit of protein. Private sectors should also invest in the production of turkey in terms of feed production to lower the high cost of feed production.

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