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Constraints and prospects of turkey production in Enugu state south-eastern Nigeria

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Abstract

The study was conducted to gather relevant information on turkey management, and prevalent diseases in turkeys, constraints and prospects of turkey production in Enugu state. The study was conducted in nine local government areas in the three senatorial zones of Enugu State, Nigeria covering 297 turkey keepers. A structured questionnaire was administered and information on the socio-economic characteristics of turkey producers, production patterns, management practices, prevalent diseases in turkeys and the common problems facing turkey production in Enugu State were identified and collected. The finding of the study indicated that turkey production was carried out mainly by adult female (53.0%), who were either secondary school holders (40.7%) or degree holders (26.3%). Majority (48.1%) had no previous experience in turkey production, however (52.3% involved in the business were within 36-50 years old. Turkey production in Enugu State was generally a part-time occupation as respondents were engaged in other primary occupation such as crop farming (32.6%), trading (24.6%) and civil service (18.5%). Turkeys were kept in small numbers (1-20) along with local chicken, exotic chicken, guinea fowl and ducks by a large (84.6%) number of the farmers. Majority (44.1%) of the turkey keepers in the study area adopted intensive system of management whereas a few (15.8%) allowed their turkeys to roam around. Constraints to turkey production as identified by the farmers in the study area were high cost of feed (86.5%), early poult mortality (85.2%), inadequate access to veterinary care (78.80%), unavailability and high cost of poult (74.40%), lack of management skills (63.3%) and lack of capital (61.7%).Fowl pox (69.0%) and Newcastle disease (57.6%) were the main disease problem constantly encountered and these diseases limit production in the study area. Turkey farmers affirmed that turkey production is a profitable and promising venture based on turkeys' high survival rate, ability to resist diseases and the cash generated after sale of the turkeys. In conclusion, despite the factors limiting turkey production as outlined by the respondents, turkey production has great potential in bridging the animal protein supply therefore, poultry farmers should be encouraged by government to increase their level of production by establishing reliable breeding centres in the south-east Nigeria which will ensure regular supply of day old poult, prompt disease control by employment of more veterinarians and provide soft loans to farmers.

Keywords: Constraints, Prospects, Turkey, Production, South-East, Nigeria.

Les Contraintes et perspectives de la production de dinde dans l'État d'Enugu au sud-est du Nigéria

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Résumé

L'étude a été menée pour recueillir des informations pertinentes sur la gestion des dindes et les maladies répandues chez les dindes, les contraintes et les perspectives de la production de dindes dans l'État d'Enugu au Nigeria. L'étude a été menée dans neuf zones de gouvernement local dans les trois zones sénatoriales de l'État d'Enugu, au Nigeria, couvrant 297 éleveurs de dindes. Un questionnaire structuré a été administré et des informations sur les caractéristiques socio-économiques des producteurs de dinde, les modes de production, les pratiques de gestion, les maladies répandues chez les dindes et les problèmes courants auxquels est confrontée la production de dinde dans l'État d'Enugu ont été identifiées et collectées. Les résultats de l'étude ont indiqué que la production de dinde était principalement réalisée par des femmes adultes (53,0%), qui étaient soit titulaires d'une école secondaire (40,7%), soit titulaires d'un diplôme (26,3%). La majorité (48,1%) n'avait aucune expérience antérieure dans la production de dinde, mais (52,3%) impliqués dans l'entreprise avaient entre 36 et 50 ans. La production de dinde dans l'État d'Enugu était généralement une activité à temps partiel, car les personnes interrogées exerçaient d'autres activités primaires telles que l'agriculture (32,6%), le commerce (24,6%) et la fonction publique (18,5%). Les dindes étaient élevées en petit nombre (1 à 20) avec du poulet local, du poulet exotique, de la pintade et des canards par un grand nombre (84,6%) des agriculteurs. La majorité (44,1%) des éleveurs de dindes de la zone d'étude ont adopté un système de gestion intensif tandis que quelques-uns (15,8%) ont laissé leurs dindes se déplacer. Les contraintes à la production de dindes identifiées par les éleveurs dans la zone d'étude étaient le coût élevé des aliments (86,5%), la mortalité précoce des dindonneaux (85,2%), l'accès insuffisant aux soins vétérinaires (78,80%), l'indisponibilité et le coût élevé des dindonneaux (74,40%).), le manque de compétences en gestion (63,3%) et le manque de capital (61,7%). La variole aviaire (69,0%) et la maladie de Newcastle (57,6%) ont été le principal problème de maladie constamment rencontré et ces maladies limitent la production dans la zone d'étude. Les éleveurs de dindes ont affirmé que la production de dindes était une entreprise rentable et prometteuse basée sur le taux de survie élevé des dindes, leur capacité à résister aux maladies et les revenus générés après la vente des dindes. En conclusion, malgré les facteurs limitant la production de dinde comme indiqué par les répondants, la production de dinde a un grand potentiel pour combler l'approvisionnement en protéines animales.Par conséquent, les aviculteurs devraient être encouragés par le gouvernement à augmenter leur niveau de production en établissant des centres d'élevage fiables dans le sud-est du Nigéria, qui garantira un approvisionnement régulier en dindonneaux d'un jour, un contrôle rapide de la maladie par l'emploi de plus de vétérinaires et accordera des prêts à des conditions avantageuses aux agriculteurs.

Mots clés : Contraintes, Perspectives, Dinde, Production, Sud-Est, Nigéria.

Introduction

Poultry sector constitute a major source of animal protein supply in Nigeria. It is next to ruminants as a source of animal protein supply in Nigeria and accounts for almost 25% of local meat production (Ajala and Alli-Balogun, 2004). According to FAO report of 1988 cited by Nwanta *et al.* (2012), Nigeria recorded the lowest animal protein intake with an average of 6g per head per day. The FAO(2010) also estimated that in an average Nigerian meal, animal protein contributes 3% against 12% recommended for healthy living. Among Nigerians, poultry meat and eggs are to some extent still considered luxury food (Adene and Oguntade, 2006). One of the major reasons for the poor intake of animal protein among Nigerians maybe due to inadequate supply of animal products occasioned by low productivity and consequent rise in cost of meat. With the continued rise in the cost of production of beef, sheep and chicken, which are the primary sources of animal protein in Nigeria, it has become very necessary to explore other efficient and less common but potential sources of animal protein for economic viability (Ajala and Alli-Balogun, 2004). Turkey is one of the potential sources of animal protein in Nigeria and is the most suitable alternative for small or large scale producers considering the cost of production. Turkey (meleagris gallopavo) is an underrated, but highly promising poultry specie type with numerous attributes such as its ability to thrive under arid conditions, tolerates heat better and has higher quality meat than other poultry specie (Fisinin and Zlochevskaya, 1989; Yakubu *et al*., 2013). Smith (1990) reported that carcasses of turkey contained a higher percentage of protein than the carcasses of chicken. Local turkeys are natural foragers and can be kept as scavengers (Peters *et al.,* 1997). Turkeys have also been found to be of considerable economic and social significance in the traditional life of Nigerians, in that they are used as gifts during festivals like Christmas and as a sign of appreciation and expression of good will (Peters *et al.,* 1997). There's no known discriminatory attitude toward the consumption of turkeys (Peters *et al.,* 1997). While the production of other types of poultry species has rapidly increased in recent times (Okoruwa *et al*.,2006) and despite its greater potential than chicken, very little successes have been recorded in turkey production in the developing countries such as Nigeria, where consumers continue to pay high prices for imported turkeys and even for local one (Shingari and Sapra 1993; Peters *et al*., 1997; Nwagu, 2002; Ojewola *et al*., 2002; Perez-Lara *et al*., 2013). The potentials of turkeys cannot be overlooked considering the huge foreign exchange involved with the importation of improved exotic stock (Ibe, 1990). According to Thear and Fraser (1986) imported turkey formed about 60% of the total turkeys in Nigerian market while the rest is supplied by other local sources. The indigenous people of Enugu state are state are involved mainly poultry keeping and other livestock specie. They predominantly keep poultry specie such as chickens (local an**d** exotic), turkeys an**d** ducks with chicken population of 108,354 and turkeys 28,985 (Ikepeze, 2005). Despite the importance of turkey to human nutrition, research activities on turkey production are still very scanty compared to other poultry species. Therefore, there's need to gather information on socio-economic characteristics, production patterns and management practices and prevalent diseases in turkeys, in order to evaluate the prospects of turkey production as well as identify the common problems facing turkey production in Enugu State.

Materials and methods

Study area

The study was conducted in Enugu State, the south east of Nigeria. Enugu State is located between latitudes 5^0 56'N and **7055'N a**nd longitudes 6^0 53' E and 7^0 55'E (NPC, 2006). It covers a total land area of about 802,295km^2 and has a population of 2.5 million with a population **d**ensity of 248 persons per square kilometer (NPC, 2006). It is bounded in the south by Abia and Imo States, in the east by Ebonyi State, in the North-east by Benue State, in the North-west by Kogi State and in the west by Anambra State. Enugu State is made up of 3 senatorial districts and 17 Local Government Areas. The senatorial zones include; Enugu east, west and north senatorial zones, which are the areas of sample collection. (Fig.1). Tropical forest and savannah predominate the area, ecologically. The annual rainfall in Enugu State is between 1.5-2.0 meters. The wet season lasts from April to October while the dry season lasts from October to early April (Ike, 2011).

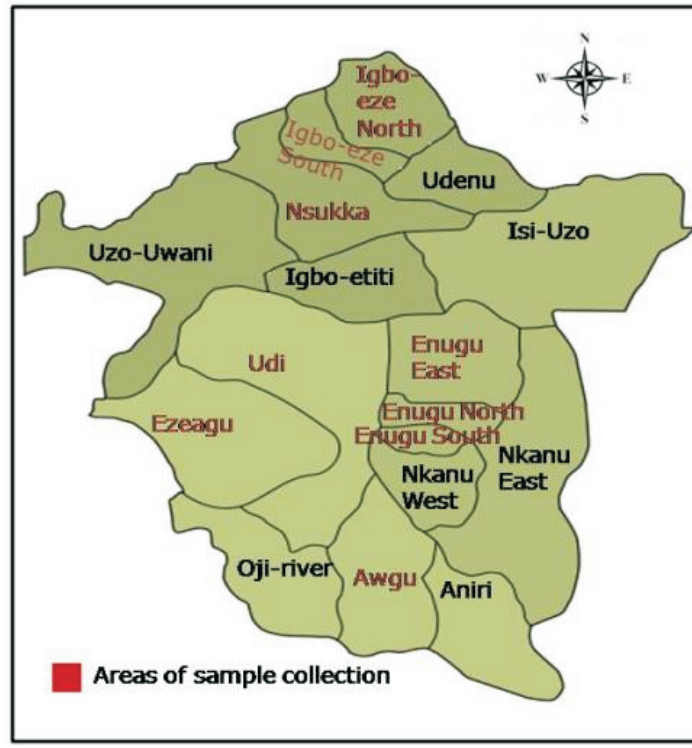

Fig. 1 Map of Enugu Sate showing the areas of sample location

Study design/population

The study design used was a cross sectional survey (Hennekens and Bury, 1987). The population used are poultry/turkey keepers. They were identified with the help of resident veterinarians who had a good knowledge of the study area.

Sample size, determination and sampling technique

A sample size of 250 respondents was determined (Thrushfield, 2005). A multi-stage sampling technique was used for selection of communities in the study area. Eighteen communities were selected for the

study. In each of the selected communities, purposive sampling technique was used to select the households that keep poultry/turkey. Selection of the turkey keepers was based on the willingness of the owners to participate in the study. Participation was encouraged by giving veterinary services to willing farmers.

Data collection

A structured questionnaire was used in data collection. The questionnaire had information on the demographic characteristics of the respondents, the production patterns, management practices and prevalent diseases in turkeys in Enugu State. 300 copies of the questionnaire were administered to willing turkey farmers with the help of veterinary assistants' resident in Enugu state to read and write. 297copies of the questionnaires correctly filled were returned.

Data presentation and statistical analyses

Data generated from this study were converted to frequencies and percentages to determine frequencies of the responses of turkey farmers to questions on flock size, diseases, management practices and productivity. Chi - Square analyses was used to determine the association between the farmers' experience in poultry production and management system adopted by turkey producers in Enugu State and also to determine the association between farmer's level of education and management system adopted by turkey farmers in Enugu State. The results are presented in Tables.

Results

The study as presented in Table 1 showed that turkey keeping in Enugu state is predominantly done by females (53.0%) when compared to males (43.0%). They major age group involved in the turkey business is between 36-50 years of age (52.3%). They turkey keepers in Enugu state are mainly crop farmers (32.6%), traders (24.6%) and civil servants (18.5%). The highest educational qualification was either a secondary school (40.7%) or degree (26.3%) certificates.

Table 1: Demographic data of turkey keepers in Enugu State

Characteristics	No of respondents (%)
Sex	
Male	127(43)
Female	170(53)
Age group	
< 20years	3(1)
21-35 years	95(32)
36-50 years	156(52.5)
>50 years	43(14.5)
Major occupation	
Students	39(13.1)
Traders	72(24.2)
Crop farming	97(.32.6)
Civil servant	56(18.1)
House wife	15(5.1)
Retirees	3(1)
Artisans	15(5.1)
Educational level	
No formal education	37(12.5)
Primary education	61(20.5)
Secondary education	121(40.7)
Tertiary education	76(26.3)
Turkey keeping experience	
< 5years	143(48.1)
5-10 years	121(40.7)
11-20 years	31(10.4)
>20 years	2(1.0)

Majority of the turkey keepers from the study had less than five years (48.1%)experience in turkey keeping and the commonest flock size kept was between 1-20 turkeys (84.6%). The preferred to keep pure local turkeys (67.7%) than cross breed (31.3%) and exotic breeds (1.0%).

Table 2: General management practices of turkey keepers in Enugu State

Parameters	Frequency (%)
Flock size	
Small (1-20)	252(84.6)
Medium (21-40)	24(8.1)
Large (40 above)	21(7.1)
Breed type	
Exotic	3(1.0)
Cross bred	93(31.3)
Pure local	201(67.7)
Source of Day-old	
Market	53(17.8)
Neighbor	149(50.2)
Commercial hatcheries	95(32.0)
Source of feed	
Self formulated	73(24.6)
Commercial feed	224(75.6)
Management system	
Intensive	131(44.1)
Semi intensive	119(40.1)
Extensive	47(15.8)

Table 2 above showed that turkey keepers obtained their poult mainly from neighbors and relations (50.2%) than commercial hatcheries (32.0%) and local market (17.8%). Commercial chicken feeds were commonly (75.4%) used in feeding their turkeys while a few (24.6%) compounded their own feed. The system of management system adopted by the majority was intensive (44.1%), semi-intensive. (40.1%) and a few (15.8%) allowed their turkeys to roam freely.

Table 3: Poultry species kept with turkeys in Enugu State

Species of poultry	No of respondents (%)
Turkeys only	57(19.2)
Turkeys and exotic chickens	175(58.9)
Turkeys and local chickens	35(11.8)
Turkeys,exotic and local chickens	15(5.1)
Turkeys,exotic chickens and others	10(3.4)
Turkeys, local chickens and others	5(1.7)

Table 3 showed that most of the farmers' rear turkeys and exotic chickens together (58.9%) whereas a few kept turkeys only (19.2%) or turkeys with local birds (11.8%) and other poultry specie. From Table 4, the problems encountered by farmers in turkey production in Enugu State includes; high cost of feed (86.5%), early poult mortality (85.2%), poor access to veterinary services (78.8%), unavailability and high cost of poults (75.4%), lack of management skill (63.3%).

Table 4: **Constraints of turkey production in Enugu State**

Factors limiting turkey production	Frequency (%)
High cost of feed	257 (86.5)
Early Poult mortality	253 (85.2)
Poor access to veterinary service	231 (78.8)
Unavailability and high cost of poult	224 (75.4)
Lack of management skill	188 (63.3)
Lack of capital	183 (61.7)

Table 5: Disease prevalence in turkeys kept in Enugu State

Disease	Frequency (%)
Newcastle disease	171(57.6)
Turkey pox	205(69.0)
Fowl typhoid	18(6.1)
Fowl cholera	11(3.7)
Fractures/nutritional deficiencies	9(3.0
Ectoparasitism	4(3.1)

From Table 5 above, turkey pox (69.0%) and Newcastle Disease (57.6%) were the main disease problems of turkeys in the study area. They main reason for keeping turkeys as shown Table 6 above was for both consumption and financial income (80.4%). Other reasons for keeping turkeys in the study area include; resistance to diseases (16.3%), have simpler feeding system (12.5%) and high egg production and hatchability (11.8%). Table 7 shows a significant association ($P < 0.05$) between farmers' years of experience and the management system adopted in keeping turkeys, thus Turkey farmers with < 5 years and 5-10 years' experience practiced mainly intensive and semi-intensive poultry keeping.

Table 6: Major reason for keeping turkeys in Enugu state

Main reason for raising turkey	Frequency (%)
Income/consumption	239(80.4)
Turkeys are resistant to diseases	48(16.3)
High egg production/hatchability	35(11.8)
Simpler feeding system	37(12.5)

Table 7: Farmers experience in poultry production and management system adopted turkey keepers in Enugu state

	No of respondents Management system			
Experience in poultry	Intensive (%)	Semi-intensive (%)	Extensive (%)	Total
<5 years	75	52	25	152
5-10 years	37	58	13	108
11-20 years	13	14	6	33
Above 20 years	1	2	1	4
Total	126	126	45	297

X^2 Calculated value- 10.6, Table value-12.592, $p< 0.05$, Chi –square analysis.

Table 8: Farmers level of education and management system adopted in Enugu state

Level of education	No. of respondents Management system			Total
	Intensive (%)	Semi-intensive (%)	Extensive (%)	
No education	8	18	7	33
Primary education	27	27	14	68
Secondary education	50	51	18	119
Tertiary education	40	32	5	77
Total	125	130	42	297

X^2 calculated value- 13.800, Table value -12.592, $p < 0.05$, Chi-square analysis

However, there was no significant association ($p > 0.05$) between the level of education of turkey farmers and the management system they adopted, even though those with a form of education; primary, secondary and tertiary education kept their turkeys more in intensively and semi-intensively system of management.

Discussion

Turkey production in Enugu State is a new venture and still at a small holder level. However, the predominance of women in turkey production in Enugu State as observed in this study is not surprising because females are actively involved in rural poultry and keeping of domestic poultry seems to be a skill for housewives. This in agreement with the report of Brobolt and Odegaard (1999) in Tanzania, Oakeley (1999) in Zimbabwe, Nielsen *(*2003) in Bangladesh, Okitoi,(2007) in Kenya and Ogunlade and Adebayo (2009) in Nigeria. However, this finding is not consistent with the report of some researchers in northern and western parts of Nigeria; (Peters *et al.,* 1997; Ajala *et al.,* 2007; Yakubu *et al.,* 2013) observed that men dominated turkey production business. This disparity recorded in these studies may be related to cultural and religious differences among the people living in the various regions. The age distribution of the majority of the turkey farmers (52.5%) fell within 36-50years of age. This is within the active working age of citizens in Nigeria and consistent with the report of Ajala *et al*. (2007). The turkey keepers that were above the age of 50 years may likely be retirees from the state and federal civil service while the minorities are school children augmenting the family income, young school leavers and graduates looking for a means of livelihood. The study also revealed that turkey keepers are engaged in other occupation such as crop farming, trading or as civil servants; this makes turkey business an additional source of income probably due to the high rate of profitability. This observation is comparable with the findings of Ajala *et al*. (2007) and Peters *et al.* (1997) also reported that civil servants were mainly part time turkey producers in their respective study area. Civil servants who were part time turkey producers do so as a way to augment their income base since salaries may not be enough to meet their family needs. Majority of the turkey keepers had a form of education which is in line with the reports of Peters *et al.* (1997) and Ajala *et al.* (2007) where majority of the respondents had at least a secondary education. Literacy is important and will enable the farmers engage in better management practices such as in the administration of drugs, vaccines and feed. Therefore, the preponderance of part-time educated farmers may be of assistance to extension officers for easy communication and understanding of extension messages especially when need to apply newer technology in poultry production.

Education and training has been shown to improve business performance and returns to farmers (Mishra *et al*., 2009). In other words, better trained and educated farmers will adopt better technology and management practices that will guarantee success and better returns on investment. It is a common finding among the turkey keepers in the state to rear local breed of turkeys sourced from open markets, friends and neighbors. Keeping mainly the local breeds of turkeys may be due to the high of cost of foreign poults which are obtainable only in commercial hatcheries. This finding is consistent with that of Peters *et al*. (1997) and Ajala *et al.* (2007).

Commercial chicken feed was predominantly used by majority, this is because feed ration for turkeys are not readily available either commercially or by self production in Nigeria and poultry feed manufacturing company may not want to venture into production of turkey ration where the market is not available. This is consistent with the observation of Etuk (2005) that farmers were unable to formulate ration for turkeys and relied on rations originally formulated for chickens. Turkeys were kept either intensively, semi-intensively or extensively by the famers as seen in the study which was also reported by Peters *et al.* (1997); Mbanasor and Sampson (2004) and Ajala *et al.* (2007). However, a greater proportion of the turkey keepers who had a form education adopted either intensive or semi intensive systems even though the extensive system where they turkeys are allowed to roam freely in search of food is less expensive. This agrees with the reports of Ajala *et al.* (2007) and Peters *et al*. (1997) that the choice of management system maybe due to the level of education and will help in controlling entry and spread of disease for better performance in poultry production in the study area. This also validates the claims of Mishra *et al*. (2009) that education and training has been shown to improve business performance and better returns for farmers. The practice of keeping turkeys along with other species of poultry as observed in the study was also reported by Peters *et al*. (1997) in Ogun State, Nigeria, where a combination of animal species was kept along with local turkeys. The practice may facilitate the introduction and spread of diseases among poultry species. Lancaster (1966) and Roy *et al. (*1998) reported that poultry are known to be sources of spread of ND virus thus keeping different species of birds together could increase the spread of ND virus from one species to another. Fowl pox and Newcastle Disease were the major diseases limiting turkey production in this study area which was also reported (Ajala, 1997; Mohammed, 2017). Many of the farmers did not use vaccines to prevent these diseases. The farmers need to be educated on the devastating and economic consequence of these diseases on poultry and awareness should be created on the use of vaccines to prevent them.

Problems of turkey production in Enugu state

High cost of commercial chickenfeed and non availability of manufactured turkey feed/feeding standards

Feed for turkeys are not manufactured in any feed mill in Nigeria this is because commercial feed millers are not even willing to venture into the production of ration for turkeys for lack of market, so farmers resort to using commercial chicken feed to rear their turkeys which they complain is expensive. They farmers do not know the scientific requirement of protein and energy for the different stages of turkey, hence the major reason why turkey production is at a small holder level in the study area and in Nigeria. This is in agreement with Ojewola (2002) that the high cost of commercial chicken feed, Inconsistency in feeding programmes as

well as lack of knowledge of adequate levels of nutrient requirement for turkeys are the major reasons why poultry farmers are not embarking in rearing turkeys at the commercial level. Turkeys are known to be good scavengers but these farmers are not aware and do not have knowledge of standard ration so they are unable to produce their own feed the resort to using chicken feed which is very expensive and because it is nutrient requirement is for chickens, it may not give the desired performance hence a delayed production an increased cost of production. Ajala *et al.* (2007).The high cost of feed was also reported by Mbanasor and Sampson (2004) and validates the claims by Oluyemi and Roberts (2000) that the prospects for investments in poultry and turkey production is being hampered by high cost of input especially the cost of feed.

Early poultmortality

The farmers lack the adequate information on the management of the turkeys from day old to adulthood. The lack of information on the brooding technique, the type of drugs and vaccine to administer is an important factor. The lack of information on the part of farmers have led to assumption by the farmers that their experience in poultry can be used in management of turkeys this has led to losses at the early stages of brooding. Mbnasor and Sampson (2002) also reported that farmers' productivity is hampered by a lack of information on the specific requirement for turkey production.

Inadequate access to veterinary care

The farmers affirmed that one of the major problems is not having access to veterinary advice and care on specific diseases, vaccines available and when they should be given. This maybe because few veterinarians are employed by the state and they unable to meet the farmers'needs. Employment of more veterinarians to cover the three senatorial zones of Enugu state, provision of animal health care delivery vehicles, and provision of poultry vaccines will be of encouragement to both the veterinarians and the farmers in increasing turkey productivity in the state. The private veterinarians on the other hand are out solely to make gain and their attention is mainly on species that are popularly reared by farmers as they are sure of been rewarded in cash.

Unavailability and high cost of poult

The study showed that farmers get their local day old poults from friends and neighbor because they cannot afford the cost of exotic breeds of turkey poult. This maybe because few hatcheries in Nigeria produce limited number of poults and with increased demand they are only able to service farmers around their location and prices go very high. These hatcheries are located in the western part and none located in the south eastern part of the country thus the cost of transportation down to the study area also increases the overall cost of day old turkey poult if available.

Lack of capital

Majority of the farmers involved in the turkey business in the study area are petty traders, civil servants and crop farmers who do not have the financial capability to go into proper commercial turkey production. Farmers have ventured to assess loans from government institutions and were turned down for lack of collateral. These farmers cannot raise capital from their meager income to commercialize turkey farmer in the area. This has kept the production of turkeys in the small holder level.

Prospects of turkey production in Enugu state

Alternative source of income and protein

The study has shown that turkey business can be an alternative source of income to individuals in the study area, presently with the rise on unemployment, young school leavers can also venture into production as a means of earning, with little investment on

housing and management, turkeys can be reared on free range, semi-intensive or intensive system. With the continued rise in the cost of production of livestock it has also become necessary to explore other sources of protein such as turkey meat for economic viability (Okrouwa *et al*. 2005).Moreover,turkey has a high dressing percentage that could amount to 67% of slaughter weight(turkey management guide 2012)

Adaptable to the climate of the study area

The hot and humid climate of Enugu state is suitable for rearing turkeys. Generally, turkeys are adaptable to a wide range of climatic conditions so it can be successfully reared almost anywhere in the world as long as they are well protected from diseases and predators.

High resistance to diseases

Turkey is more resistant when compared to domestic poultry such as chickens, quail and ducks. Mortality rate of turkeys is low when compared to other species. if veterinary care and advice are given to farmers, the production of turkeys will surpass that of chicken production and more income will be generated.

Availability of educated farmer

The farmers surveyed in this study had a form of education this is an advantage because even without much experience in management of turkeys there's huge possibility to develop turkey business from the smallholder level a commercial level in Enugu state. This was also suggested by (Mishra *et al.,* 2009) that educated farmers may be of assistance to extension officers and veterinarians for easy communication and understanding of extension messages especially for application of newer technology for an improved production, hence an improved and better performance will be guaranteed.

High market demand

At present because turkey production is still at a smallholder level in the study area the market for turkeys is limited to mainly festive periods like Christmas and Easter and the consumers pay very high prices than other poultry meat. During the non festive period there is still demand for turkey meat, but because turkeys are not available, consumers resort to imported frozen turkey, which is expensive and cannot be afforded by middle class Nigerian families. If farmers are encouraged to venture into turkey production in large scale like other species, they will be available all year round and affordable to all.

Conclusion

The study showed that despite the constraints of turkey production as outlined by the respondents, turkey production has great potential in bridging the animal protein supply, create employment and enhance the economy in the study area. It is therefore necessary that poultry farmers be encouraged to increase their level of production for increased profitability by: establishment of a reliable breeding centre in the south east Nigeria, to ensure supply of day old poults. Provision of feed or its raw materials, vaccines and drugs by the government to producers at subsidized rate must be put in place. Prompt disease control measures such as employment of more veterinarians, provision of animal health care delivery vehicles and provision of poultry vaccines by the government. Provision and easy access to soft loans to boost overall production and increase the standard of living of the farmers should be made available. Formulating feed to meet the nutritional requirement of turkeys, reduce the cost of production and increase profitability.

References

Adene, D. F. and Oguntade, A. E. 2006. The structure and importance of the commercial and village based poultry industry in Nigeria. Food

and Agricultural Organization (FAO) Poultry Production Systems ECTAD/AGAP, 1-102.

Ajala, M. K. and Alli Balogun, J. K. 2004. Economics of rabbit production in Zaria, Kaduna state,Nigeria. *Tropical Journal of Animal Science*.**7:**1-10.

Ajala, M. K., Nwagu, B. I., Sekoni, A. A. and Adeashinwa, A. O. K. 2007. Profitability of turkey production in Zaria Kaduna State,Nigeria. *Asian Journal of information technology*, **6:** 27-33.

Brobolt, G. and Odegaard. P. 1999. Women and chicken Traditional poultry poutry management in Nicaragua and Tanzania. Proceedings of Development workers course on Poultry as a tool in poverty Eradication and promotion of Gender Equality, Time Landboskole, Denmark, Pp 22-26.

Etuk, E. B. 2005. Evaluation of sorghum Grain meal as energy source in turkey diets.A research seminar paper.Dept.of Animal science and technology ,Federal University of technology Owerri,Nigeria.

Food and Agricultural Organization (FAO), 2010. The state of Food and Agriculture in Rome. Vol., 40.

Fisinin, V. I. and Zlochevskaya, K. V. 1989. Turkeys. In: Animal Genetic Resources of the USSR; FAO Animal Production and Health Paper (FAO), No.65, in Dmitriev NG, Ernst RK (eds). Rome, Italy, Pp. 481-496.

Hennekens, C. H. and Bury, J. E. 1987 Epidemiology in Medicine lippincott Willians and Wilkins.

Ibe, S. N. 1990. Utilizing local poultry genetic resources in Nigeria proc. 4th world Congress on Genetics Appied to Livestock, Edinburgh Scotland Pp. 51-53.

Ike, P. C. 2011. Resource use and technical efficiencies of small scale poultry farmers in Enugu state Nigeria, *International Journal of Poultry Sciences***10** (11): 895-898.

Ikpeze, O. O. 2005. Stratification and livestock population census for Enugu urban Nigeria″: A pilot Survey. *Animal Research International* **2(2)**: 332-335.

Lancaster, J. E. 1981. Newcastle disease-modes of spread. Veterinary Bulletin, **33**: 221 - 226.

Mbanasor, J. A. and Sampson, A. 2004. Socio- economic Determinats of turkey oriduction among soldiers. *International Journal of Poultry Science***3**(1) 497-502.

Mohammad, A., Ummay, S., Hussein, S. A., Md. Abdul, H. and Abdul, G. M. 2017. Problems and Prospects of Turkey (*Meleagris gallopavo*) Production in Bangladesh. Research in Agriculture, Livestock and Fisheries,**4**(2):77-90.

Mishra, K. A., Wilson, C. H. and Williams, R. P. 2009. Factors affecting the financial performance of new and begging farmers. Agricultural Finance Review, **69**:169-179.

Nielsen, H., Roos, N. and Thilsted, H. N. 2003. The Impact of Semi-Scavenging Poultry Production on the Consumption of Animal Source Foods by Women and Girls. *Bangladesh. Journal of Nutrition*.,**133**:4027S-4030S.

Nwagu, B. I. 2002. Production and Management of Indigenous. Poultry species.Training manual, national Animal Production Resrach Institute (NAPRI), Federal Ministry of Agriculture and Development. ABU,Zaria.

Nwanta, J. A., Shoyinka, S. V. O., Chah,

K. F., Onunkwo, J. I., Onyenwe, I. W., Eze, J. I., Iheagwam, C. J., Njoga, E. O., Onyema, I., Ogbu, K. I., Mbegbu, C. E., Nnadozie, P. N., Ibe, E. C. and Olademeji, T. K. 2012. Production characteristics, disease prevalenceand herd-health management of pigs in south - east Nigeria. *Journal of Swine health and production*.**19**(6) 331-339.

NPC, (National Population Commission), 2006. *Population Census of the Federal Republic of Nigeria: Analytical Report at the National Population Commission*, Abuja.

Ogunlade, I. and Adebayo, S. A. 2009. socio economic status of women in rural poultry production in selected area of Kwara state *International journal of poultry science***(1)** 55-59.

Ojewola, G. S., Ukachukwu, S. N. and Oyenucheya, F. 2002. Comparative carcass characteristics of Indigenous Turkey poults fed different agro-industrial by-products. *Tropical Journal of Animal Science*.3:2

Oakeley, R. 1999. The socio- economic environment of Newcastle disease control strategies for backyard poultry systems proceedings of a workshop-poultry as atool in poverty eradication and preomotion of gender equality.http://www.ardaf.org/NR/rdnlyes F3AIEB7-8054-863EAAIE6CA5D333/011111999 17OAKELEY.

Okitoi, L. O., Ondwasy, H. O., Siamba, D. N. and Nkurumah, D. 2007. Traditional herbal preparations for indigenous poultry health management in Western Kenya.Livestock Research for Rural Development.Volume 19, Article 72. Retrieved April 19, 2012,

Okoruwa, V. O., Obayelu, A. E. and Ikoyo-Eweto, O. 2006. Profitability of Semi-intensive and intensive egg production in south-west and south-south zones of Nigeria. Nigerian *Journal of. Animal Production***33**:118-125.

Oluyemi, J. A. and Roberts, F. A. 2000.Poultry production in the warm wet climate. Macmillian Press Ltd. Hong Kong Pp. 41-44.

Peters, S. O., Ikeobi, C. O. N. and Bamkole, D. D. 1997. Smallerholder local Turkey Production Production in Ogun State, Nigeria. In: Sonaiya, E.B. (Ed). Issues in Family Poultry Development Research. Proceedings of an international workshop held in at M'Bour Senegal. Published by 1997 the International Network for Family Poultry Development Department of Anim. Sci. Obafemi Awolowo Univ. Ile-Ife Nigeria pp 308.

Perez-Lara, E., Camacho-Escobar, M. A., Avila-Serrano, N. Y., Arroyo-Ledezma, J., Sanchez- Bernal, E. I., Torre, M. R. and Reyes-Borques, V. 2013. Productive evaluation of slow growing Mexican turkeys with different diets in confinement, *Open Journal of Animal Sciences*, **3**(1): 46-53

Roy, P., Venugopalan, A.T., Selvarangam, R. and Ramaswamy, V. 1998. Velogenic Newcastle disease virus in captive wild birds. *Tropical Animal Health and Producion,***30**(5): 299-303.

Shingaria and sapra Shingari, B. K. 1993. Turkey raising for profit. In: Asian Livestock (FAO) **18** (11):150-151.

Smith, A. J. 1990. Poultry; The Tropical Agriculturist series. The Macmillian Press Ltd, London.

Thear, K. and and Fraser, A. 1986. The complete book of raising livestock and poultry Nigerian Edition, University services Ltd, Lagos.

Thrushfield, M. 2005. Veterinary Epidemieology 3rd edition Singapore Blackwell Sciences pg 233.

Turkey management Guide 2012 central poultry development organization (SR),hessarghatta,Bangalore 560088, website: http://www.cpdosrbmg.Kar.nic.in

Yakubu, A., Abimuku, H. K., Musa-Azara, I. S., Idahor, K. O. and Akinsola, O. M. 2013. Assessment of flock structure, preference in selection and traits of economic importance for domestic turkey (Meleagris gallopavo) genetic resources in Nasarawa State, Nigeria. Livestock Research in Rural Development **25** (1).

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