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PROBLEMS AND PROSPECTS OF TURKEY (*Meleagris gallopavo*) PRODUCTION IN BANGLADESH

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ABSTRACT

The study investigated the production status, problems and prospects of turkey production in Bangladesh following survey and multistage sampling procedure. Average flock size, weight of a tom and hen were 15.34±2.38, 6.58±0.15 and 2.39±0.06 kg, respectively. Commercial, homemade, and both homemade and commercial feed were used by 21.74, 30.43 and 47.83% farmers, respectively. Both tom and hen attained puberty at 7.22±0.06 months, a hen laid 69.46±0.78 eggs *per annum* and weight of each egg was 66.13±0.63 g. Fertility and hatchability of eggs were 50±3 and 32±1%, respectively. Male and female ratio maintained 1:4.60±0.17. Main reasons of lower hatchability were low egg fertility, faulty incubation, and both low egg fertility and faulty incubation as per 50.0, 21.7 and 28.3% farmers, respectively. None of the farmers used artificial insemination (AI) except natural breeding. Main advantages of turkey rearing over other poultry species were low disease, high market price, low feeding cost and low mortality according to 41.3, 28.3, 17.4 and 13.1% farmers, respectively. While 36.9% farmers had encountered disease, 80.4% had not used vaccine. An egg, a poult and an adult turkey were sold at BDT 76.2±1.79, 838.5±22.8 and 2587.2±74.8, respectively. In fact, turkey production is still at primitive stage which is characterized by poor housing, feeding, breeding and healthcare practices, so vigorous public extension service, training, research and marketing strategies are immediately needed to improve this sector in Bangladesh.

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INTRODUCTION

Bangladesh is a small country with a large population about 160 million, situated between 88º10' and 92º41' East longitudes and between 20º34' and 26º38' North latitudes in south Asia with flat land area (147,570 sq.km). Traditional backyard poultry keeping has been practiced in this country since time immemorial. Besbes (2009) reported that the worldwide poultry sector consists of chickens (63%), ducks (11%), geese (9%), turkeys (5%), pigeons (3%) and guinea fowls (3%). From the last decade, demand for poultry products has been increased rapidly in Bangladesh, and propelled by rising levels of income, population and urbanization. Experience shows that climate of Bangladesh is convenient to rear different poultry species. Poultry meat alone contributes 37% of the total meat production in Bangladesh (Begum et al., 2011).

Poultry transform feed into animal protein very rapidly. Poultry consumption in developing countries is projected to grow at 3.4% *per annum* to 2030, followed by beef at 2.2% and ovine meat at 2.1%, and in the world as a whole, poultry consumption is projected to grow at 2.5% *per annum* to 2030, with other meats growing at 1.7% or less (FAO, 2007). The environmental impact of poultry production is a continuing challenge and it is predicted that global consumption of poultry meat will increase between 2000 and 2030 at an average annual rate of 2.51% (Fiala, 2008).

In fact, poultry keeping is an integral part of the rural household that provides family income for the small, marginal and landless poor. The farmers who cannot afford to rear cattle and goat can easily rear poultry. However, among the livestock sector, the poultry industry (specially, commercial broiler and layer) is in the line to be destroyed due to severity of avian influenza (bird flu). Thus, it is crying need to search the alternative protein source to meet up the increasing demand. In order to maximize food production and meet protein requirements in developing countries, variable options need to be explored and evaluated (Owen et al., 2008). Turkey meat may be a one of the best options for alternative protein source in Bangladesh. Turkey production is an important and highly profitable agricultural industry with a rising global demand for its products (Yakubu et al., 2013), and they are adaptable to wide range of climatic conditions (Ogundipe and Dafwang, 1980). Karki (2005) stated that consumption of turkeys and broilers as white meat was rising worldwide and a similar trend also existed in developing countries. In the whole world, total production of turkey meat was 5.6 million ton in 2012, which was higher than 5.1 million ton in 2003, a decade earlier (FAOSTAT, 2012). Turkey is an excellent insect forager and most crops that are troubled by insect population including vegetables are candidates for insect control by turkeys (Grimes et al., 2007). Turkey thrives better under arid conditions, tolerates heat better, ranges farther and has higher quality meat (Yakubu et al., 2013). But turkey production has not been fully exploited in Bangladesh including other developing countries despite its huge potential over other poultry species.

In fact, turkey is a newly introduced poultry species in Bangladesh. Farmers are rearing turkey as an ornamental bird with a limited extent without having prior experience. Mainly interested farmers started turkey farming by importing day-old turkey chicks (Poult) from neighboring country, India. Its popularity is increasing gradually because of gamey flavor of meat with lower fat content. So, it may have high potential for production and marketing in Bangladesh. However, there is scanty study conducted previously regarding turkey production in Bangladesh. Therefore, the study has been undertaken to investigate the present status and production system of turkey and turkey farmers, and the problems and prospects of turkey production and marketing in Bangladesh.

MATERIALS AND MEHTODS

Study site and duration of the experiment

The study area was different districts of seven (7) divisions of Bangladesh. Famers of Dhaka, Gazipur, Rangpur, Dinajpur, Nilphamari, Bogra, Narshighdi, Mymensingh, Natore, Naogaon, Pabna, Sirajgonj, Chittagong, Sylhet, Khulna, Satkhira, Barisal, Kushtia, Rajbari and Noakhali districts were interviewed (Figure 1). The study period was from February to June 2016.

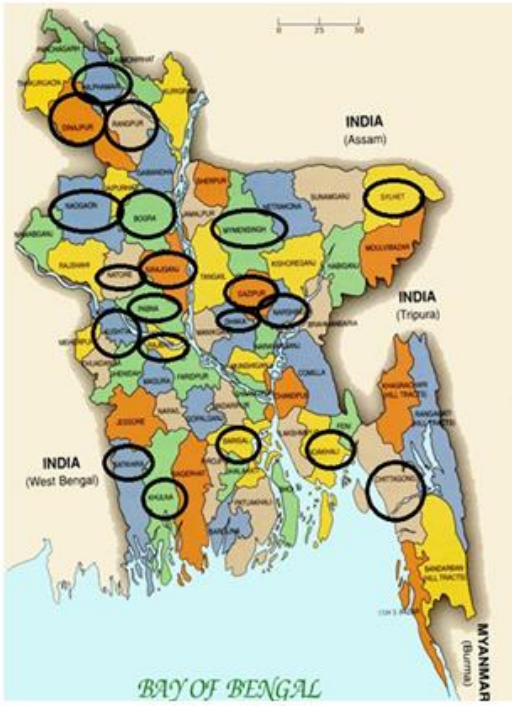

Figure 1. Black circle on the map of Bangladesh showing the study districts (*source: www.lged.gov.bd*)

Experimental design

Exploratory research design was followed to conduct the study. The methods-survey, review of secondary data, interview, observation and Focus Group Discussion (FGD) were conducted taking representative sample from all over Bangladesh. The questionnaire was carefully designed keeping in mind the objectives. The questionnaire contained both open and closed forms of questions. Most easy, simple and direct questions were asked to obtain information. The questionnaire was pre-tested with three (3) farmers for judging suitability for the farmers. After having feedback from field test, necessary modifications were done and the questionnaire was finalized for data collection.

Sampling Technique and Sample Size

A multistage sampling procedure was followed. Purposive sampling procedure was followed to select districts from seven divisions giving focus on concentration of turkey farms. There was no list of turkey farmers in the hand of any government and non-government agencies because of its newness in Bangladesh. So keeping in view the objectives of the study, a list of 56 turkey farmers was prepared from all over Bangladesh via personal communication, Facebook, bikroy.com and other sources. Simple random sampling technique was used to select 49 turkey farmers. The sample size of the respondents was determined by using proportion sample formula: the Slovin's formula (Adanza, 2006).The formula is presented below:

$$n = \frac{N}{1+N(e)^2}$$

Where;

n is the sample size sought;

N is the research population,

e is the level of confidence (taken as 95%).

The sample size (n) for this study calculated using the formula was:

$$n = \frac{56}{1+56(0.05)^2} = 49.$$

Therefore, primary data were collected from 49 respondent farmers selected from different divisions of Bangladesh.

Data collection

Direct observation, interview and farm record analysis methods were applied during collecting data for the study. Primary data were collected from turkey farmers were on farmers' personal information (age and education level), housing, feeding, breeding, management, disease, marketing, problems and prospects. Some parameters like flock size, number of egg production, weight of egg, male and female ratio etc. were taken. The sources of secondary data were review of literature from official documents, Journals, libraries, research institutes, internet etc. Participatory Rural Appraisal (PRA) tools like Focus Group Discussion (FGD), seasonality analysis of disease and market etc. were also used in relevant cases to collect and verify data. The researcher performed all the interviews to ensure consistency in data quality.

Statistical analysis

Collected data were complied, tabulated and analyzed. Qualitative data were converted into quantitative forms by means of suitable score whenever needed and the local units were converted into standard unit scales. Data were analyzed using the Statistical Package for Social Sciences (SPSS) program package (SPSS, 2013). Simple descriptive statistics such as frequency distributions, percentages, mean and standard error of mean (SEM) were applied to illustrate the results.

Problems encountered during the study

Travelling to remote village was a big problem. Sometimes paraphrasing of scientific terms took time. Some of the farmers hesitated to answer questions regarding giving information on source of turkey, profitability and hatching technique. Sometimes farmers were not available on the scheduled time because of family and social obligations and other business reasons.

Limitations of the study

There was limitation of transport to meet those farmers who were living in remote areas. Most of the farmers used to not keep record of farming activities properly. So, farmers provided information recalling their memories. For this reason, in some cases value judgment was applied to have necessary data.

RESULTS

General farming management status and practices

Demography of farmers

To understand demographic and socioeconomic context of existing turkey farmers' data on age, education, sex, access to technical support and prior experience of other farming were collected. The average age of the respondent farmers was 40.5±1.38 years. Ownership of 98% turkey farms was belonged to the male farmers. Duration of turkey farming of the respondents was 20.2±1.56 months. The study showed that 4.34, 4.35, 26.09, 47.83 and 17.39% farmers obtained educational qualification <SSC, SSC, Bachelor and Masters Degree, respectively (Figure 2).

Purpose of turkey rearing

Turkey rearing is a new farming activity in Bangladesh. The study showed that 34.78, 19.57 and 45.65% respondent farmers were rearing turkey for ornamental, both egg and meat, and both meat and ornamental purposes, respectively.

Source of receiving technical support

The farmers seek technical support from different sources. The study showed that 10.88, 10.87, 28.26 and 50.00% farmers took technical support from Department of Livestock Services (DLS), both internet and DLS, internet and other farmers, and other farmers, respectively (Figure 3).

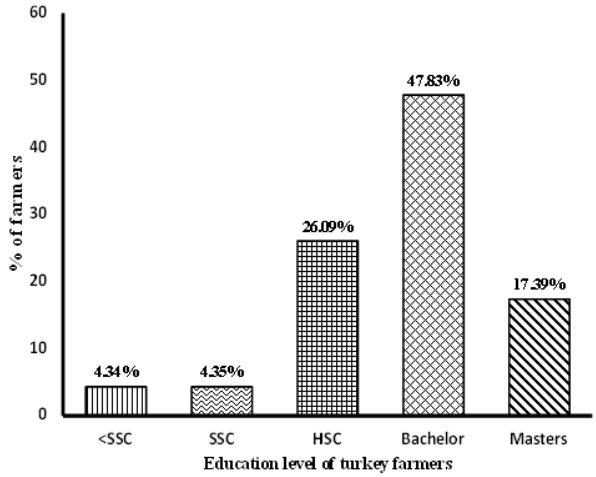

Figure 2. Education level of interviewed turkey farmers of Bangladesh

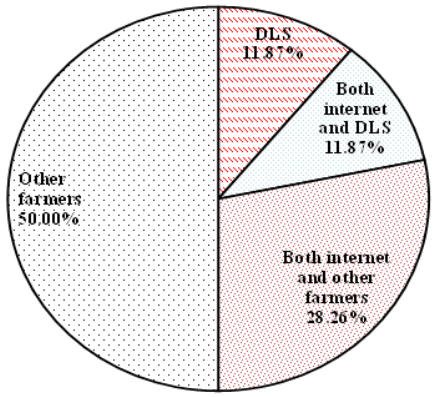

Figure 3. Source of receiving technical support for turkey farmers

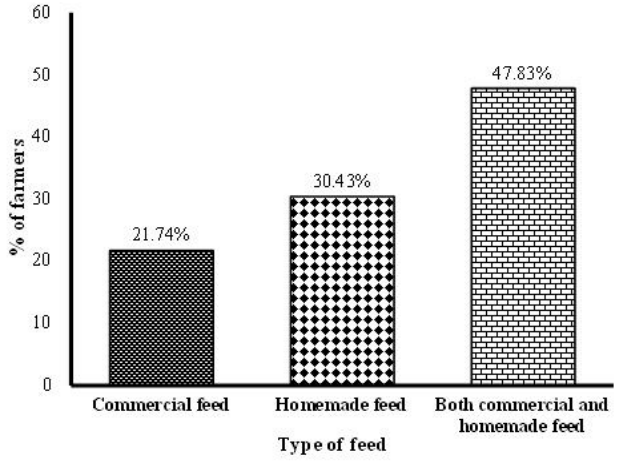

Figure 4. Type of feed used by farmers for feeding turkey

Figure 5. Wastage of feed in traditional turkey rearing system

Flock structure

The results obtained from the study on flock structure are presented in Table 1. It showed that average flock size of turkey was 15.34±2.38. The number of male (Tom) and female turkey (hen) ownership were 5.43±1.02 and 8.65±1.51, respectively. On the other hand average age of male and female turkeys found was 9.79±0.32 and 8.64±0.26 months, respectively. Average weight found were 6.58±0.15 and 2.95±0.06 kg for male and female turkey, respectively. Most of the farmers (88.86%) were raising both white and black color turkey birds while 9.25 and 1.89% were raising only white and black variety, respectively.

Housing and management

Results on turkey housing showed that 3.41, 64.92 and 31.67% farmers were raising turkey in free range, semi-intensive and intensive system, respectively. While 51.42% farmers informed that they took extra care during hot period for comfort of turkey, 48.58% did not take any extra care. On the other hand, 27.55% farmers took additional care during winter season while 72.45% did not take additional care. During winter and summer season farmers followed brooding period for 20.34±0.73 and 7.86±0.40 days, respectively (Table 1). It was found that while 16.25% farmers followed lighting procedure for breeder turkey, 83.75% had not followed. Most of the farmers did not use scientifically constructed nest box to facilitate laying of eggs by hen.

Feeding

The study showed that 21.74, 30.43 and 47.83% farmers used commercial, homemade, and both homemade and commercial feed, respectively for feeding their turkey (Figure 4). None of the interviewed turkey farmers calculated feed efficiency (FE) and wastage of feed found happened in many farms due to lack of using proper feeding methods (Figure 5).

Table 1. Average data on general farming management of turkey farming in Bangladesh

Parameters	Mean± SEM
Age of farmers (year)	40.54±1.38
Experience of turkey farming (months)	20.19±1.56
Flock size (number)	15.34±2.38
Number of male turkey	5.43±1.02
Number of female turkey	8.65±1.51
Age of Tom (month)	9.79±0.32
Age of Hen (month)	8.64±0.26
Length of brooding in winter (days)	20.34±0.73
Length of brooding in summer (days)	7.86±0.40
Price of adult turkey (BDT)	2587±74.7
Price of egg (BDT)	76.15±1.79
Price of one month old poult (BDT)	838±22.8

Table 2. Average productive and reproductive performance of turkey in Bangladesh

Parameters	Mean± SEM
Weight of adult Tom (kg)	6.58±0.15
Weight of adult Hen (kg)	2.39±0.06
Weight of egg (g)	66.13±0.63
Fertility percent of turkey egg (%)	50.00±3.00
Hatching percent of turkey egg (%)	32.00±1.00
Egg production/hen/year (No.)	69.46±0.78
Number of clutch in a year (No.)	2.3±0.01
Egg production in a clutch (No.)	25±0.80
Duration of a clutch (month)	2.2±0.3
Ratio of male to female (♂:♀)	1: 4.60±0.17

Health Management

The study showed that while 36.96% farmers had encountered diseases like New Castle disease, Fowl cholera, Fowl pox, Mycoplasmosis etc., 63.04% had not experienced any disease. Similarly, while 19.57% farmers had used vaccine, 80.43% had not used any vaccine (Figure 6).

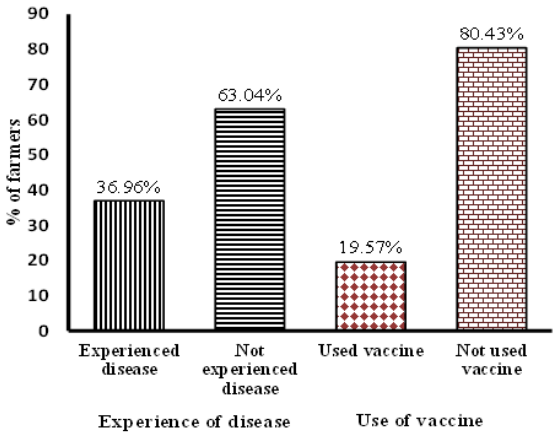

Figure 6. Farmers' experience on turkey disease and use of vaccine

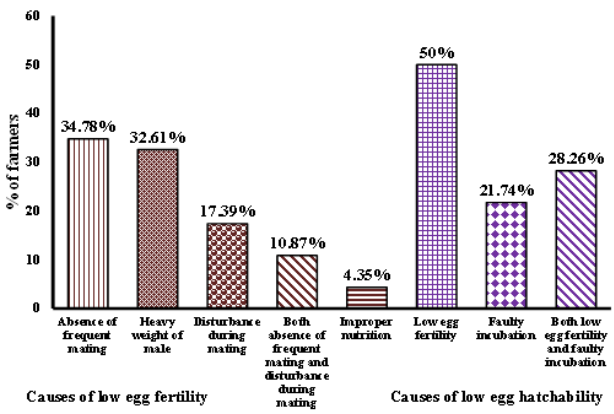

Figure 7. Farmers' perception on causes of low egg fertility and hatchability

Marketing

Results showed that farmers sold an egg, a poult and an adult male/female turkey at the rate of BDT 76.15±1.79, 838±22.8 and 2587±74.8, respectively (Table 1). Farmers did not keep record for which purpose the customers purchased turkey. Usually, customers who intended to farming, purchased turkey in pair i.e. one male and one female.

Productive and reproductive performance

Productive and reproductive performances of turkey are presented in Table 2. Average weight of the tom and hen found 6.58±0.15 and 2.39±0.06 kg, respectively. Farmers' experiences revealed that both tom and hen attained puberty at the same age and it was 7.22±0.06 months. A hen laid on an average 69.46±0.78 eggs per annum and weight of each egg was 66.13±0.63 g.

Male-female ratio and farmers experience on fertility

Male and female ratio maintained by the interviewed farmers was 1:4.60±0.17. Average fertility of turkey egg was experienced by the respondent farmers was 50.00±3.00%. In case of low fertility 34.78, 32.61, 17.39, 10.87, and 4.35% farmers identified the main reason as absence of frequent mating, heavy weight of male, disturbance during mating, both absence of frequent mating and disturbance during mating and improper nutrition in diet, respectively (Figure 7 and 8).

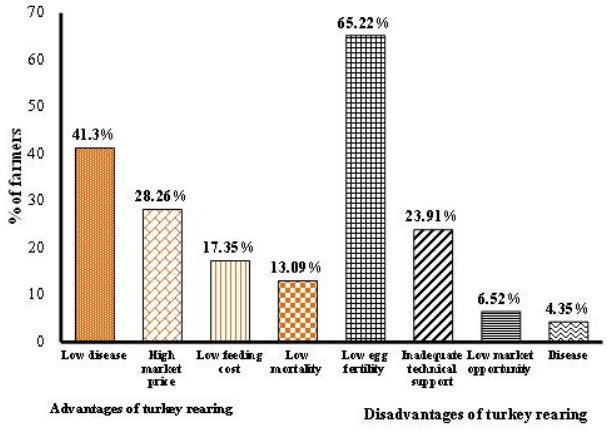

Figure 10. Farmers' perception on advantage and disadvantage of turkey

Figure 11. Improper brooding of turkey poult with chick and duckling by farmers

Figure 12. Foraging of turkey flock at farmer's garden

Figure 13. Severe attack of fowl pox at poult stage of turkey

Farmers experience of egg hatchability

Farmers experienced 32.00±1.00% hatchability of eggs which indicated lower fertility and not viable from business point of view. With this regard, 50.00, 21.74 and 28.26% farmers opined that the main reason of lower hatchability were low egg fertility, faulty incubation, and both low egg fertility and faulty incubation, respectively (Figure 7). Results on using hatching medium of turkey eggs showed that 10.8, 18.9, 37.8 and 27.0% farmers hatched their eggs using turkey hen, chicken hen, both turkey and chicken hen, and incubator, respectively (Figure 9).

Breeding methods used by turkey farmers

All the interviewed farmers followed natural breeding for reproduction of turkey. None of the farmers used artificial insemination (AI) as an assisted reproductive technique for turkey breeding.

Clutch size

Farmers experienced 2.3±0.01 clutch for turkey hen in a year. Average egg production in each clutch was 23.37±0.80. Duration of each clutch was 2.2±0.3 month.

Farmers' perception on problems of turkey farming

As the main problems, low egg fertility, inadequate technical support, low market opportunity and disease were identified by 65.22, 23.91, 6.52 and 4.35% farmers, respectively (Figure 10).

Farmers' perception on prospects of turkey farming

According to 41.30, 28.26, 17.35 and 13.09% farmers' opinion main advantages of turkey rearing over other poultry species were low disease, high market price, low feeding cost and low mortality, respectively (Figure 10).

DISCUSSION

Turkey farming is a new farming enterprise in Bangladesh. Comparatively young population get involved with this farming and ownership of farming mostly belonged to male farmers. The present results on gender difference in the ownership of turkey agrees with the report of Yakubu et al. (2013) who observed a higher numbers of male than female among turkey keepers in Nassarawa state, Nigeria. Analysis of education data revealed that 100% farmer respondents received formal education ranges from less than Secondary School Certificate (SSC) to Master's Degree. The results indicate that participation of women in turkey farming is lower and turkey farmers are educated and most of them have prior experience. So, there is big possibility to flourish turkey farming by these farmers in near future.

The present study showed that although most of the farmers were rearing turkey for hatching egg and meat purposes, a large percent of farmers were raising turkey only for ornamental purpose. But there is a big opportunity to increase production for meat purposes because of its increasing demand to consumers of Bangladesh. Brant (1998) reported that different varieties of turkey are grown for pleasure and for competition at shows and exhibitions by hobbyists and fanciers in America. Most of the farmers were dependent on other farmers than government livestock offices for having technical support. The interviewed livestock officers informed that as turkey is a new species to them, so they do not have adequate awareness, knowledge and skill on it. It was observed that none of the farmers received any kind of training on turkey rearing. Average flock size of turkey was small because of newness of the enterprise. It was observed that some farmers were raising turkeys with other domestic fowl like chicken and duck in semi-intensive system. Most of the farmers reared both white and black turkeys. But white turkey is the most favored globally for meat (Osama et al., 2013). From discussion with farmers and farm observation it was assumed that the existing black and white birds would be the results of crossing between Broad Breasted Bronze, Broad Breasted White and Beltsville small white variety. They used sand, rice husk, wood shavings, coarse paper etc. as litter material. Even it was found that some farmers had not used any litter for mature turkey. It might be possible because of lower number of turkey in a flock. But in case of larger flock size adequate supply of suitable dry litter is a must to increase comfort and reduce disease incidence.

Most of the farmers used traditional broiler and layer brooding system for turkey. They used electrical brooder with bulbs and maintained temperature between 90ºF to 95ºF. But few farmers did not follow standard procedure for brooding which caused death of many poults at early stage. (Figure 11). Usually young poults by nature are reluctant to eat and drink in the first few days of life because of poor eye sight and nervousness; and for this reason force feeding is necessary during brooding period. But farmers were not aware about it. It was found that sometimes farmers fed poults manually without knowing the main reason. Results indicate that most of the farmers were not aware about turkey management in terms of housing, lighting, maintenance of hot and cold period.

Most of the farmers fed both homemade and commercial broiler and layer feed for feeding turkey. In case of homemade feed, they used a mixture of maize, wheat, broken rice and vegetables like cabbage, water spinach (*Ipomoea aquatic*), malabar spinachc (*Basella alba*) and grass. They allowed the turkey flock for foraging (Figure 12). Farmers were not aware about feed efficiency. But the importance of feed efficiency is high due to the high cost of feed, which represents approximately 70% of the total cost of a turkey production system (Wood and Willems, 2014). Most of the farmers supplied concentrate feed in the morning and evening. Supply of *ad libitum* water was not practiced in all the farms. It was observed that they did not follow nutrient requirement rules for turkey; even most of the farmers did not know it. But Turkey poults have high protein requirements for their first seven week (Robbins, 1983). Although farmers were rearing turkeys as breeder, they did not know about breeder ration requirement. In fact, their knowledge level on turkey feeding was very poor. Similar findings were found by Ojewola et al. (2002) in Nigeria and they reported that the farmers fed their breeder turkeys with different classes of commercial chicken feed probably because of insufficient knowledge of the levels of nutrient requirements of breeder turkeys.

Results indicate that prevalence of turkey disease was comparatively low. Most of the farmers had not used vaccines as preventive measure. Few farmers used vaccines mainly for New Castle disease, Fowl Pox and Fowl Cholera diseases. It seems that local turkeys are like indigenous chicken which are hardy and have high level of immunity against disease. Another reason of low disease prevalence might be that lower concentration of turkey farming in Bangladesh. Another reason of low use of vaccine might be that some farmers faced problems because of use of low potent vaccine. Being informed from victim farmers, other became either cautious or reluctant in using vaccine. But the poult stage was found to be the most vulnerable stage for disease attack of the local turkey. It was found that Fowl Pox mainly suffered turkey at poult stage (Figure 13). Peters (1997) reported that 74 (77.9%) out of the 95 interviewed turkey farmers had no record of disease attack in their flock in Nigeria. During in depth discussion on the issue it was found that most of the farmers did not follow deworming schedule for turkey as like chicken. Some experienced respiratory infection which might be due to Mycoplasma. Some farmers got weak poults with malformed legs which might be caused owing to improper temperature and humidity during incubation and poor nutrition of parents. Few farmers used ethno veterinary drugs such as the aloevera, turmeric etc. to treat sick turkey. There were divergent views on their efficacy in controlling and treating diseases and most of the knowledge on ethno-veterinary medicines was passed on orally to future generations.

The study revealed that price of adult turkey and poults were higher in Bangladesh in comparison to international market. The main reasons are that turkey subsector is still at the beginning stage in Bangladesh and in most cases turkeys were sold for ornamental purposes while some buyer bought also turkeys for farming as well as consumption purposes. Farmers bought egg for hatching purpose, so that they could raise turkey after incubating egg. Poults were sold without identifying their sex at the age from day old to 4-5 weeks of age. Selection and price of turkey depends on appearance, color, size and weight. Yakubu et al. (2013) showed that body size, egg number, hatchability, heat tolerance, body conformation and disease resistance were the traits of utmost importance for selection purpose among rural turkey farmers in Nasarawa state, Nigeria. However, there is absence of structured market for turkey in Bangladesh.

Weight of available adult tom, hen and egg in Bangladesh were comparatively lower than that of developed countries. This might be because of lighter varieties of turkey reared by the farmers of Bangladesh. The mating ratio found in the present study was higher than the ratio of 1: 2.75 reported by Yakubu et al. (2013) for turkey raised by local farmers at Nassarawa state in Nigeria. However, it was at the higher limit of the continuum (1.67-3.69) reported for native turkey breeders in the state of Me-hoecan, Mexico (Lopez Zavaha et al., 2008).

In fact, several factors like age, temperature, duration of light, mating problems, low nutrient etc., might be the reasons of low fertility of turkey hen in Bangladesh. But fertility is a very important measure of reproductive efficiency (Malecki et al., 2004). The problem of unfertilized eggs has long been identified as one of the most critical factors limiting the success of breeding programs and ranges from 10.0–98.2% (Dzoma and Motshegwa, 2009). Hatchability of eggs was lower because of lower fertility including insufficient knowledge of farmers on turkey breeding and egg incubating procedure. Although commercial livestock species completely dependent upon artificial insemination (AI) for fertile egg production (Juliet and Bakst, 2008), none of the respondent farmers used this technique.

Problems of turkey farming

Low fertility, hatchability and use of turkey reproduction technology

From the present study it was found that none of the farmers used AI technique and even they had not heard about it earlier regarding turkey breeding. In fact, adult body weight of tom has been increased over time due to advance researches and become too large to achieve natural fertilization. Anthony (2001) reported that modern White Turkey was developed for rapid growth rate through a selection process, which makes it so different from their wild ancestors that they are unable to mate naturally because of their heavy weight and AI has become necessary. Moreover, it has been reported that the hatchability of medium sized turkey eggs is better than that of small or large eggs (Kaygisiz et al., 1994). Age of the breeder is important factor which affects egg weight, internal and external quality egg, hatching performance and the quality of poult. It was reported that as hen age increases, the weight of egg increases and both shell quality and internal egg quality decrease (Erensayın, 2000). In addition to low egg yield, unsatisfactory egg fertility and hatchability constitute a major problem for turkey breeding enterprises (Ozcelik et al., 2009).

Inadequate access to technical information and support

The farmers did not have adequate access to necessary information regarding turkey rearing and in case of problems they did not get enough technical support from different government and non-government line agencies. This situation is also prevailed in other developing countries. Mbanasor and Saampson (2004) also reported that there was obvious lack of information on specific requirements for turkey production in Nigeria.

Low marketing facilities

Market of turkey is unlike broiler and layer in Bangladesh. There is absence of well-organized market for turkey and its products. No structured market value chain has been identified yet in Bangladesh. Farmers buy and sell turkey mainly through personal communication, Internet services (bikroy.com, Facebook etc.) and at the market of ornamental birds. Turkey selling problems is also identified in other developing countries as stated by Peters et al. (1997) in a study conducted on small holder local turkey production in Ogun State Nigeria, found that sale of turkeys were more during Christmas and festive period than other periods of the year. Although, turkey meat is being sold in department stores in capital city Dhaka, a large numbers of consumers were not habituated of taking turkey meat.

Poor housing

Farmers did not know the scientifically accepted space requirement for rearing turkey. They gave space on the basis of assumption. Moreover, they were not aware of about using of suitable litter materials and their management. Many farmers did not take special care during extreme hot and cold situation which ultimately hampered the production performance of birds.

Non availability of manufactured feeds and feeding standard

Feeds for turkey are not manufactured by any feed mill in Bangladesh. So farmers fed their turkeys by their homemade feed as well as a mixture of homemade and broiler/layer feed. They did not know the scientific requirement of energy, protein and other nutrients for different categories of turkey. Similar things was happened in Nigeria as reported that turkey production in Nigeria has largely remained at the smallholder level due to high cost of feed, inconsistency in feeding program, as well as lack of knowledge of the adequate levels of nutrient requirement (Ojewola et al., 2002). Although turkey is a good forager, some of the farmers did not know this fact so that they could not reduce feeding cost. Farmers did not have expertise to formulate balanced rations for turkey, thereby relying on rations originally formulated for layer and broiler chicken, with the assumption that chicken feed could bring same or better results. In this connection Etuk (2005) reported that lack of knowledge of limitations of feed ingredients used in turkey feeds leads to poor growth. But proper nutrition is a basic pre-requisite for successful poultry production (Kekeocha, 1984), to increase resistance to diseases and explore genetic potentiality.

Inadequate capacity building facilities

There is absence of opportunity for capacity building of turkey farmers in terms of receiving training, getting information, participating in workshop and seminar. As most of the concern stakeholders are not aware enough about turkey farming in Bangladesh, farmers are not getting required knowledge and skill. Therefore they are using traditional procedure for rearing turkey. But egg weight, fertility, hatchability and late embryonic mortality varied greatly between traditional and modern breeding management system (Lariviere et al., 2009).

Prospects of turkey farming

Adapted to the climate of Bangladesh

Turkey is a unique bird which is suitable for rearing in hot humid climatic condition like in Bangladesh. But due to unknown reasons it has not been explored in Bangladesh and other developing countries. In fact, turkeys are 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 and predators. The meat of turkey is considered by many as a luxury meat. Moreover, it has an aesthetic value due to their beauty (Ogundipe and Dafwang, 1980). For this reason turkey is becoming popular gradually in developing countries like in Bangladesh. Anandh et al. (2011) reported that commercial turkey farming is becoming popular in India.

Low disease prevalence

Turkey is more disease resistant in comparison to other poultry species like chicken, duck and quail. Mortality rate of turkey is very low in comparison to other poultry bird. Sampath (2012) reported that turkeys are resistant to Marek's and Infectious bronchitis and commonly encountered with other diseases like mycoplasmosis, fowl cholera, erysipelas and hemorrhagic enteritis. Farmers mostly do vaccination only for New Castle disease and Fowl cholera.

Low feeding cost

In fact, feed cost represents two thirds of the total costs in a poultry production system and consequently it would be valuable to identify animals that eat less but perform at the same level as their contemporaries. Turkeys are good foragers and it could reduce feeding cost. However, other poultry species such as geese and turkey can obtain added nutrients from forage because they are better able to digest fiber due to larger microbial population in their digestive tracts (Brad et al., 2010). On the other hand, Soliven (1984) reported that according to opinion of farmers of the Philippines, turkey rearing is profitable as long as the poults are properly fed and taken care of, and cost of production is cheap as almost 50% of the feed they eat is green vegetables and field grasses as supplement to commercial feeds.

Higher market demand

At present turkey market is limited to some particular customers as an ornamental bird as well as for meat purposes; and its price is higher than other poultry species. There are a good number of Christian people in Bangladesh who are fond of turkey meat in Christmas day. So there is huge opportunity to expand turkey market in Bangladesh as well as in abroad.

Alternative source of income and protein

While broiler meat market is facing problems of higher diseases and lower taste, turkey meat could be an alternative for consumers. So it could be an effective alternative source of protein. Moreover, this bird is quite suitable for uplifting livelihoods of small and marginal farmers as it can be easily reared in free range and under both intensive and semi-intensive system with little investment for housing, equipment and management. It may create good opportunity for unemployed youths to start farming and earn income. Turkey bird has a promising potential to be an alternative to livestock in meat production (Nixey, 1986). In the context of competitive feeding and management cost different countries searched such alternative source for protein. Okoruwa et al. (2006) reported that with the continued rise in the cost of production of cattle, sheep and goat, which are the primary sources of animal protein in Nigeria, it has become very necessary to explore efficient and less common but potential sources of animal protein for economic viability. Male and female British United Turkey reached, at 16 weeks of age, 14.60 kg and 10.25 kg, respectively (BUT, 2005). Moreover, the turkey has high dressing percentage that could amount to 87% of slaughter weight (Turkey management guide, 2012).

Opportunity to use artificial reproduction technique

As natural mating is not resulting fertile egg, so there is an opportunity to promote AI technique in turkey for the production of commercial hatching eggs. It will decrease cost for rearing more tom. It is reported that a well-developed pectoral muscle in turkeys, has prevented turkey toms to mate naturally (Etches, 1996), and making AI a necessity. Fertility could be improved in turkeys by using AI. In addition, efficiency of use of semen could be increased because each tom can produce enough sperm to inseminate approximately 30 hens (Childress, 2003).

Availability of educated farmers

Most of the surveyed farmers are comparatively educated and they were self-starter. So there is huge possibility to develop turkey entrepreneurs in Bangladesh. They will be able to receive technical knowhow on selection, brooding, breeding, feeding, housing etc. on turkey rearing easily.

CONCLUSION AND RECOMMENDATION

In fact, turkey production is still at primitive stage in Bangladesh which is characterized by poor housing, feeding, breeding and healthcare practices as well as inadequate availability of scientific information, technical services, credit facilities, training and marketing opportunities. So, to improve the turkey production, vigorous public extension service, training for farmers, opening of different avenues for research on turkey and identifying marketing strategies, are immediately needed in Bangladesh.

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