SOCIO-ECONOMIC CONDITION OF TURKEY FARMING IN GOPALGANJ AND FARIDPUR DISTRICTS

A THESIS

BY

PABITTRO CHANDRO ROY

Registration No. 1705035

Semester: July-December, 2018

MASTER OF SCIENCE (M.S.)

IN

POULTRY SCIENCE

DEPARTMENT OF DAIRY AND POULTRY SCIENCE

HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY, DINAJPUR - 5200

DECEMBER, 2018

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DEPARTMENT OF DAIRY AND POULTRY SCIENCE

HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY, DINAJPUR - 5200

DECEMBER, 2018

Dedicated to
My
Beloved Parents
And
Teachers

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'The Author

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ABSTRACT

The aim of the study is to review the socio-economic condition of turkey farming in some parts of Bangladesh. The study was also conducted to observe the problems of turkey farming and its future prospects in Gopalganj and Faridpur districts of Bangladesh. The survey focused mainly on characterization of farming system, flock size, feeding, price of turkey chick, feed price, marketing, disease prevalence, mortality and others problems and prospects of turkey farming and assess the potentiality of turkey rearing in the different areas of Gopalganj and Faridpur district in Bangladesh. Data were collected randomly from 30 turkey rearing farmers using a pre-tested interview schedule during August to October 2018 from different areas of Gopalganj and Faridpur district. The result revealed that most of the farmers (46%) were young age, about (2%) farmers were illiterate, about (50%) farmers himself were responsible for turkey rearing. Most of the farmers reared turkey in intensive system and some farmers reared turkey in semi-intensive and freerange system. About (14%) farmers used rice husk, 6% use saw dust and 10% use both rice husk and saw dust for bedding material of their bird house. Most of the farmers (13%) mentioned that the most prevalent disease was mycoplasmosis (44%), colibacillosis (30%), fowl cholera (14%) and mortality was low average (11%). About (73.33%) farmers maintain vaccination schedule properly and 20% of them maintain vaccination schedule but improperly and 6.67% farmers did not maintain any vaccination schedule. The price of turkey poults range was about 100-250 tk.and about 43.33% farmers sell adult birds at the age of 16-17 weeks. It was also observed that many factors responsible in limiting the spread of turkey farming such as low marketing facilities, poor fertility and hatchability, insufficient capital, theft, inadequate housing and lack of technical information on turkey production and disease attacks were deterrents to indigenous turkey production and appear to be the most significant limiting factors to back yard raising of turkeys. It was concluded that necessary technical information and others supports about turkey rearing should be supplied to interested turkey farmers and proper steps should be taken for creating marketing facilities of turkey. Government should play a vital role to solve these problems.

Key words: Turkey farming, present socio-economic condition, problems, prospect, Gopalganj, Faridpur

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CHAPTER-I
INTRODUCTION

Bangladesh is an agro-based developing country. Livestock is an important sub-sector of agriculture. One of the major components of livestock sub-sectors is poultry. Bangladesh is considered as one of the most appropriate countries in the world for rearing poultry. The poultry industry plays a crucial role in economic growth and simultaneously, creates numerous employment opportunities (Shamsuddoha and Sohel, 2003). Regardless of religion and age almost all people are fond of poultry meat. People of any age can take poultry meat without hesitation for less content of fat compared to other meats. We have to increase the animal protein production to make our nation sound and healthy. Protein intake is recommended to be in the range of 0.8 to 1.6g/d per kg body weight for human (Anonymous, 1998) requires minimum 20.44 kg protein per person (average 70 kg body weight) per year. It indicates that it is a crying need to increase the meat production according to the requirement. Poultry farming has turned out to be promising dynamic enterprise with enormous potential for rapid poverty reduction in Bangladesh. Poultry farming provides a substantial economic contribution and generates self-employment opportunities for the unemployed youth generation. A noticeable development has been taken place in poultry farming in Bangladesh. The growth trend of the poultry population of Bangladesh over the past few years.

The overall contribution of the broad livestock in GDP (2017-18) at constant price was 1.54 percent (BER, 2017). In agriculture sector, contribution of crops, livestock and forestry were 11.24, 2.57 and 1.71%, respectively. Commercial or intensive poultry farming has now turned into a profitable business in Bangladesh. Poultry industry in Bangladesh has made significant progress during the last two decades where commercial poultry started in 1980 in Bangladesh.

Bangladesh is still now one of the lowest meat consuming countries in the world. Here present adequate facilities for rearing many high yielding poultry species and fulfill consumer demad.

Turkey is a new rearing poultry species in Bangladesh and its farming has increased at remarkable number in some recent years for its demand in Bangladesh. Turkey is an important poultry species as well as agricultural species. Now a day's turkey meat mostly used as bird meat and occupying a vital position next to others poultry species like chicken, duck, quail in contributing the most evolving sector, which is playing a significant role in the economic and nutritional status of varied population. In 2004, turkey represented 6.5% of the world poultry meat production.

Bangladesh is a developing country. Poverty is the main problem in our country and poverty alleviation in Bangladesh is a topical issue. These can be achieved through an increase in economic growth and this is possible by engagement of many skilled, semi-skilled labor in production ventures. As a result may increase per capita income and also increase ability for purchasing and ultimately, provision of food for the teeming population (Mundi, 2000). The people of Bangladesh don't get proper amount of protein according to their requirement. There is therefore a protein: calorie deficiency in Bangladesh. To solve these problem or for creating income source and supplying more protein many people of Bangladesh have chance to involve in turkey farming.

Many poultry species like turkey, quail and guinea fowl are underrated, but these birds are highly productive. Turkey is one of the high meat yielding and greater potential bird than the chicken, nevertheless turkey production has not been fully exploited in the developing countries (Shingari and Sapra 1993, Peters *et al*. 1997, Perez-Lara *et al.*2013). Turkey thrives better under arid conditions, can tolerate heat, better ranges farther and has higher quality meat (Fisinin and Zlochevskaya 1989, Yakubu *et al.*2013). These birds are nondescript, have multi-colored plumage and sometimes appearing as pure black or white. The body of turkey is well decorated with glossy feathers that's are attractive to peoples.

Turkey is suitable for rearing in Bangladesh because it can match with environment here, not only this it can be reared in harsh environment. Generally turkey is easily adapted at almost all condition. Free ranging system and intensive system can be used for turkey rearing. Turkey is good foragers. So it can be reared with minimum feed cost. For this turkey farming is gaining popularity in Bangladesh as well as for its quality lean meat and good productivity. Another cause of gaining popularity in the country is due to its high

yield potentiality, less susceptibility to diseases than broiler, consumer's preference, low mortality rate. Although proper management and appropriate level of input use are important for achieving such higher yield and results. Bangladesh's poultry population is estimated at 195 million (Government of Bangladesh's Livestock Department 2006), of which local chickens, turkey, duck particularly at family level, still represent an appropriate system for supplying the fast-growing human population with high quality protein and providing additional income (Gueye, 2003).

Very few research works had been done on the potentiality, productivity and profitability of turkey rearing and very little effort has been directed at increasing their productivity under free ranging and intensive conditions. To increase the productivity of turkey the present situation, problems and prospects are needed to be assessed for economic rearing of turkey in Bangladesh. Therefore, the present experiment was undertaken to know the present condition and existing production system of turkey and observe the problems and prospects of turkey farming in the areas of Gopalganj and Faridpur district.

The objectives of this study were therefore to:

- To study the socio-economic condition of turkey farming at Gopalgonj and Faridpur district in Bangladesh.
- To observe the problems and prospects of turkey production.

CHAPTER-II
REVIEW OF LITERATURE

2.1 History of turkey birds

Turkey is a newly introduced poultry species in Bangladesh**.** Now a day's farmers are rearing turkey for commercial purpose as meat source and as an ornamental birds with a limited extent without having prior experience. Mainly interested farmers started turkey farming by importing day-old turkey chicks (Poult) from neighboring country 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 less study conducted previously regarding turkey production in Bangladesh.

Fig. 1. Turkey Birds

2.2 Some terms related to turkey

- Caruncle-brightly colored growths on the throat region. Turns bright red when the turkey is upset or during courtship.
- Gizzard- a parts of a bird’s stomach that contains tiny stones. It helps them grind up food for digestion.
- Hen-a female turkey.
- Poult- a baby turkey or a chick.

- Tom- a male turkey. Also known as a gobbler.
- Snood- the flap of skin that hangs over the turkey's beak. Turns bright red when the turkey is upset or during courtship.
- Wattle—the flap of skin under the turkey's chin.
- Scientific genus and species—*Meleagris gallopavo*.

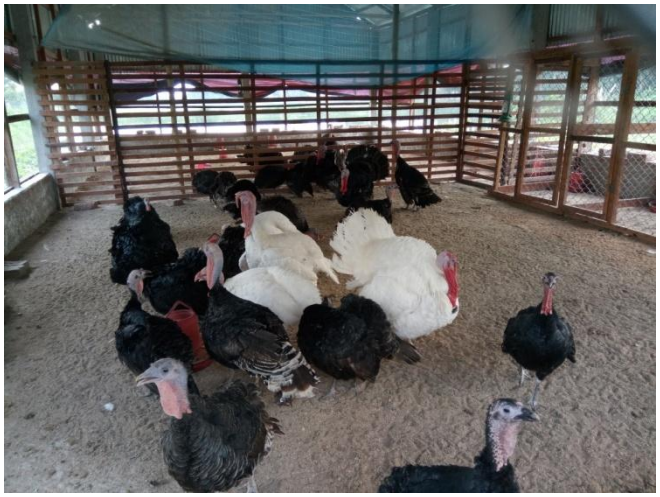

Fig. 2: Turkey Farm

The turkey has similar phenotypic appearance with chicken but larger in size with pendulous crop that decorates its body and creates its higher market demand than others exotic breed. As an important segment of livestock production, the turkey industry in Bangladesh is considered a great propable avenue for the economic growth and simultaneously creates numerous employment opportunities. It is a probable farming sector for farmers to be benefited.

Domestic turkey is a popular form of poultry and it is raised throughout temperate parts of the world, partially because industrialized farming has made it very cheap for the amount of meat it produces. Female domestic turkey are referred to as hens, the chicks may be called poults or turkey lings. In the united state, the males are referred to as toms, while in the United Kingdom and Ireland, males are stags. The fleshy protuberance at the beak is the snood and the one attached to the underside of the beak is known as a wattle.

The modern domestic turkey is descended from one of six subspecies of wild turkey: Meleagris gallopavo, found in the area bounded by the present Mexican states of Jalisco, Guerrero, and Veracruz. Ancient Mesoamericans domesticated this subspecies, using its meat and eggs as major source of protein and employing its feathers extensively for decorative purposes. Domestic turkey were taken to Europe by the Spanish. Many distinct breeds were developed in Europe (e.g. Spanish Black, Royal Palm). In the early 20th century many advances were made in the breeding of turkey, resulting in breeds such as the Beltsville Small White.

Mohammad, *et al.* (2017) conducted the study to investigate 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.

MacDonald, *et al.* (2016) explained that wild turkeys (Meleagris gallopavo silvestris) were extirpated from Ontario, Canada, in the early 1900s due to unregulated over-hunting and habitat loss. Despite a successful reintroduction program and strong population numbers, information regarding the health of wild turkeys in Ontario is scarce. A 22-yr (1992-2014) retrospective study was performed to evaluate diagnostic data, including the

cause(s) and contributors to death, in wild turkeys submitted to the Ontario-Nunavut node of the Canadian Wildlife Health Cooperative (n = 56). Noninfectious diagnostic findings (39/56; 69.6%) were more common than infectious, with emaciation recognized most frequently (n = 19; 33.9%) followed by trauma (n = 11, 19.6%). The majority of deaths due to emaciation occurred in winter and spring (17/18; 94.4%), which is consistent with lack of access to or availability of food resources. Morbidity and mortality due to infectious diseases was diagnosed in 16 (28.6%) wild turkeys. Avian poxvirus was the most common infectious cause of disease (n = 7; 12.5%), followed by bacterial infections (n = 5; 8.9%), the most common of which was Pasteurella multocida . Zinc phosphide toxicosis (n = 7; 12.5%) occurred in two incidents involving multiple birds. This study aims to provide baseline data that can be used for reference and comparison in future wild turkey disease surveillance and population monitoring studies.

Moreki, (2015) indicated that turkeys are native to the New World. They have been regarded as traditional thanksgiving and Christmas fare since the Pilgrims hunted wild turkeys to grace their tables on the first Thanksgiving Day. Although commercial turkey production does not occur in Botswana, the consumption of turkey meat has increased over time in the past six years as epitomised by increased imports from overseas via the Republic of South Africa (RSA). Recent report (April 2005 to March 2006) estimated turkey meat consumption in Botswana to be about 536.5 tons. This represents 1.3% of total annual chicken meat. The interest in turkey rearing has increased substantially in Botswana, hence the need to prepare this manuscript for use by poultry extension agents to guide turkey hobbyists, as well as, prospective farmers on turkey management.

Adebiyi, *et al.* (2014) evaluated that the effect of supplementing diets with vitamin E and selenium on fertility, hatchability and survivability of indigenous turkey was undertaken using 48, thirty two weeks old turkeys. They were randomly allotted to four treatments and each treatment was in triplicate of one tom to three hens per replicate. T_1 (control-the basal diet), T_2 (250mg/kg vitamin E supplementation), T_3 (0.30mg/kg selenium supplementation) and T_4 (combination of 125mg/kg vitamin E and 0.15mg/kg selenium supplementation) in a completely randomized design. Data collected on parent stock were average egg produced (AEP), average egg weight (AEW), feed intake, number of poult hatched (ANPH) while average hatched weight (AHWP), survivability, average survival weight (ASWP), weekly weight gain, weekly feed intake and feed conversion ratio (FCR)

were taken for the poults. The AEP (T1-28, T2-9.0, T3-10.5, T4-3.5) varied significantly (p0.05) variation among treatments. Percentage hatchability is significantly higher for birds on T4 (91.67%) compared with those on Treatments 1 (39.44), 2 (48.21) and 3 (33.33). No significant difference (p>0.05) was observed for AHWP, feed intake and FCR of the poults. Percentage survivability (T1-61.5%, T2- 85.0%, T3-66.67%, T4-90.0%) was improved significantly (P<0.05) by the treatments. Birds on T4 (205.97g) had significantly (p<0.5) higher value of ASWP than those on T1 (181.0g). From the study it can be concluded that supplementing parent turkey diet with vitamin E and selenium at 125 mg/kg and 0.15 mg/kg of the diet respectively improved percentage hatchability and percentage survivability of their poults.

Scott, *et al.* (2013) showed that as populations of wild turkeys (Meleagris gallopavo) have increased, the number of complaints about damage has increased. We conducted a literature review to determine real and perceived damage caused by wild turkeys in North America. Wild turkeys can cause damage to agricultural crops, such as corn (Zea mays L.), soybeans (Glycine max [L.] Merrill), wheat, and hay crops but the majority of actual damage is usually minor or caused by other wildlife, thus estimates of damage by wild turkeys often are inflated. Occasionally, wild turkeys damage specialty crops, turfgrass, or ornamental flowers that may have higher value than common agricultural crops. We also investigated effects wild turkeys may have on other species of wildlife and found no evidence of widespread negative effects.

Davies, *et al.* (2013), a review was undertaken to obtain information on the major welfare issues associated with turkey farming. In the hatchery there are some negative effects of long term storage of turkey fertile eggs on post-hatch growth and quality of chicks. There is a view that free range turkeys housed on deep litter in naturally ventilated sheds with natural light and access to forage and shelter belts is beneficial to bird welfare. However, an increase in mortality in the last few weeks of growth can be caused by very hot or cold environmental temperatures. Turkey welfare can be compromised at high stocking density. The selection of fast growing strains of turkeys has resulted in leg and locomotory problems. Mortality rates in turkeys caused by gait problems range from 2 to 4%. However, intermittent lighting improves bird activity and a decrease in locomotory problems. Under commercial conditions, domestic turkeys are often aggressive towards other birds. Beak treatment is used to prevent injuries caused by cannibalism, bullying,

and feather and vent pecking with infrared beak treatment the most common trimming method used. However birds that have been severely beak treated can develop chronic pain. The barren environment of turkey houses has been identified as a major cause of poor animal welfare and responsible for cannibalism. Use of straw bales in the shed and elevated platforms gives the bird the chance to explore the environment and reduce pecking. Foot pad dermatitis (FPD) is a common condition in turkeys and is largely caused by wet litter. Apart from bird flu, Blackhead is one of the most serious poultry diseases in turkeys. Mortality can reach 70% in some flocks. Good management is essential to maintain turkey health and welfare including taking action to minimise contact of turkeys with wild birds and other animals. Pick-up of turkeys from sheds for transport to processing plant can result in welfare concerns. Mortality has long been a concern in relation to turkey transport. During this procedure the heads or wings of the birds can be injured against the solid sides of the crates, birds are exposed to temperature extremes, sudden acceleration and braking of the vehicle, vibration, fasting, injuries, social disruption and noise.

Dalton, *et al.* (2013) observed that injurious pecking is a serious concern for commercial turkey production and welfare. The behaviour is thought to represent re-directed ground foraging, but the development and causes are poorly understood with little supporting literature. In the initial development of the behaviour, early lighting regimes and social facilitation may play contributing roles. Other factors such as the availability of foraging material, diet composition, stocking densities, and group dynamics may also affect levels of injurious pecking. Given that commercial turkeys are grouphoused, alternative breeding techniques, like group selection based on social effects, might successfully reduce moralities from pecking without detracting selection pressure from economic traits. However, to better suit their behavioural needs, any genetic attempts to adapt turkeys to perform less injurious pecking should be done in combination with environmental and dietary improvements.

Pandian, *et al.* (2013) explained that the present study was carried out in turkey birds maintained at Institute of Poultry Production and Management, TANUVAS, Chennai, spread over 3 years (2009-2010 to 2011-2012). Causative agents were listed and per cent mortality was calculated during different seasons. There are four seasons, viz. winter,

summer, southwest monsoon and northeast monsoon. Brooder and grower turkey (0-20 weeks) and adult turkey (21-68 weeks) were reared in deep litter system of management. The overall mortality pattern during brooder and grower period (0-20 weeks) revealed that in southwest monsoon the mortality was the highest (53.81 %), followed by 22.39 % during summer, 17.93% in northeast monsoon and the lowest (5.86%) in winter. The overall mortality due to omphalitis was high (28.71%) and significantly ($P<0.05$) influenced by season. Colibacillosis, hepatitis and turkey pox incidences were also significantly ($P<0.05$) influenced by season and the overall per cent mortality incidences were 18.88, 17.23 and 5.81 respectively. Debility and non specific causes for mortality were 15.15 and 14.18 per cent respectively. The causes of mortality in layer turkey observed were hepatitis (40.56 %), Staphylococcal infection (18.56%), pneumonia (6.21%) and non specific (34.66%) in that order from high to low. The mortality during laying period due to hepatitis was higher during winter (67.30%) and southwest monsoon (46.96%). The incidences of pneumonia and Staphylococcal infections were observed only in monsoon.

Muhammad, *et al.* (2012) reported that the turkey (Meleagris gallopavo) is an important agricultural species and the second largest contributor to the world's poultry meat production. Genetic improvement is attributed largely to selective breeding programs that rely on highly heritable phenotypic traits, such as body size and breast muscle development. Commercial breeding with small effective population sizes and epistasis can result in loss of genetic diversity, which in turn can lead to reduced individual fitness and reduced response to selection. The presence of genomic diversity in domestic livestock species therefore, is of great importance and a prerequisite for rapid and accurate genetic improvement of selected breeds in various environments, as well as to facilitate rapid adaptation to potential changes in breeding goals. Genomic selection requires a large number of genetic markers such as e.g. single nucleotide polymorphisms (SNPs) the most abundant source of genetic variation within the genome.

Muhammad, (2012) indicated the turkey is an important poultry species that is largely used as a meat type bird as egg production of this species is very low. Turkey is the second largest contributor to the world's poultry meat production after chicken. Understanding the etiology and biology underlying production and health traits is very

important for the genetic improvement of these traits in the desired direction and to avoid undesired side-effects. The aim of the research described in this thesis was to interrogate the genetics of turkey traits related to meat production and to investigate the genetic diversity of commercial and heritage turkey populations. Different analyses were performed that included the estimation of genetic and (common) environmental variances for growth (body weight as well as growth curve traits), breast meat yield and meat quality traits in turkeys. I describe the construction of a single nucleotide polymorphism (SNP) based linkage map of turkey and its comparison with the physical map of chicken to investigate genome structural differences between these highly important poultry production species. Two inter-, and 57 intra-chromosomal rearrangements between these two species were confirmed or discovered which is a low number in comparison to mammals and lead to the conclusion that turkey and chicken have highly conserved genomic structure. I used the linkage map of turkey together with individual phenotypes to map quantitative trait loci (QTL) in the same population for the traits described above. Results showed quantitative trait loci on 21 of the 27 turkey chromosomes covered by the linkage map. Forty-five quantitative trait loci were detected across all traits and these were found in 29 different regions on the 21 chromosomes. The next step, after the analyses on the reference population was to investigate the genomic variation in turkeys Next generation sequencing was used to investigate genome variation and the discovery of genome-wide signatures of selection in the turkey respectively. Sequencing was performed on 32 individuals from eleven different turkey populations (seven commercial, three heritage and a South Mexican wild population). Analysis of next generation sequencing data resulted in the detection of 5.49 million putative SNPs compared to the reference genome. The average frequency of heterozygous nucleotide positions in individual turkeys was 1.07 Kb-1 which is substantially lower than in chicken and pigs. The SNPs were subsequently used for the analysis of genetic diversity between the different populations. Genetic diversity analysis using pairwise Nei's genetic distance among all the individuals from the 11 turkey populations showed that all of the 8 commercial lines branched from a single node relative to the heritage varieties and the ancestral turkey population, indicating that commercial lines appear to share a common origin.

Lee, *et al.* (2009) reported that information regarding survival and cause-specific mortality of eastern wild turkeys (Meleagris gallopavo silvestris) is vital to their management, especially in small or isolated populations. Between January 2003 and August 2005, we used radio telemetry to investigate survival and cause-specific mortality of 87 [44 male (24 adult and 20 juvenile) and 43 female (34 adult and 9 juvenile)] wild turkeys in northern Indiana. We estimated annual and seasonal survival using the Kaplan-Meier product-limit method. Mean male and female annual survival estimates were 0.257 and 0.777, respectively. Annual survival estimates were different between sexes within years, but were homogenous within sexes between years. Survival estimates did not differ among seasons for either sex. However, differences in survival estimates between sexes were detected in the spring, fall and winter seasons. Hunter harvest (46.2% male mortality) and predation (33.3% female mortality) were the leading known causes of mortality for male and female wild turkeys, respectively. Predators (canids, birds and unknown mammals) were responsible for 28.6% of mortality for both sexes combined. Although predation on adult birds was not severe, high mortality of male turkeys in the form of legal spring harvest, in addition to other causes of mortality, warrants concern for small, exploited populations in highly fragmented landscapes like those of northern Indiana.

Angela Gillingham, *et al.* (2008) observed that the wild turkey (Meleagris gallopavo) is an invasive species currently causing heated debate in California. Not only is there a question as to whether or not the bird is actually invasive, as a very similar species of wild turkey was present in California about 10,000 years ago, but there is considerable dissent over whether or not turkeys actually cause any ecological damage. I conducted this study under the auspices of the California State Department of Parks and Recreation (DPR) in order to address the potential impact of wild turkeys on habitat selection in native ground-dwelling avifauna, using the California quail (Callipepla californica) as the basis for comparison. Results show that both turkeys and quail are significantly selective about their preferred habitat types ($p < 0.01$). Results also demonstrate that turkeys and quail are coexisting within the same macrohabitat types without significant detrimental effects on either bird. The birds utilize very different microhabitat types, and given the size difference between them, it is highly unlikely that turkeys will begin to occupy the dense, bushy vegetation preferred by quail. Turkeys also appear to have narrower

preferences for both microhabitat and macrohabitat than quail, and are therefore limited in the areas they can colonize. There is a great deal of dietary overlap, however both birds have such diverse feeding preferences that barring any extraordinary environmental disasters, it is also unlikely that turkeys will monopolize available food sources.

David, *et al.* (2005) explained that during the 1997-98 fall hunting season, samples from 154 Wild Turkeys were donated by hunters to the Nebraska Game and Parks Commission (NGPC) Genetic and Forensic Laboratory. Assistance was provided by the Veterinary Diagnostic Center, and the Harold W. Manter Laboratory of Parasitology, University of Nebraska, Lincoln, for this survey of infectious diseases and internal parasites. One hundred and thirteen sinus swabs were cultured for pathogenic bacteria, and fecal samples were examined for parasite ova and protozoa. One hundred and six gastrointestinal samples were examined for helminth parasites. Intestinal coccidiosis was present in 42 birds. Salmonella was isolated from fecal samples from four birds. Mycobacterium avium (avian tuberculosis) infection was suspected in one bird. No evidence of Pasteurella multocida (fowl cholera) or Histomonas meleagridis (blackhead) were seen. Thirty-three species of helminth parasites belonging to 4 taxa were identified: 13 species of Cestoda, 12 species of Nematoda, 7 species of Trematoda, and 1 species of Acanthocephala. Four helminths, not previously documented in North American Wild Turkeys, but known to exist in Europe, were identified in these birds.

Soysal *et al.* (2004) reported that animal genetic resources are components of biological diversity and are important in meeting the food requirement of countries of the world. Countries are competing with one another in the race for development. There is a paradox between economic development and ecology and one of the elements of pollution is the growing tendency in the falling number of animal breeds. Turkey has a great potential for animal genetic resources and animal production. Development of this country's animal production in the last twenty years brought about a risk of extinction in farm animal genetic diversity. Several examples and the risk potentials in Turkey have been presented. Cattle population decreased from 18 million down to 11 million within 30 years through several cattle improvement projects in an attempt to increase the productivity of the native breeds. Also sheep and goat population decreased in the last 20 years. Several reasons, including genetic erosion from farm animal genetic sources in Turkey, have been

given. But today there is a structure of the global strategy for management of farm animal genetics resources in Turkey. The conservation of Animal Genetic Resources in Turkey, in accordance with the UN convention on Biological Diversity (CBD), the FAO and several NGO's, are explained in the text.

Frederick, *et al.* (2003) reported that the seminar on Accelerating Growth and Poverty Reduction organized Dhaka University and the World Bank gave one last chance to reflect on Bangladesh's efforts to reduce poverty and achieve prosperity for its people, before completing my assignment as the World Bank's Country Director. My first visit to Bangladesh for the World Bank was in June 1985, and except for five years in Turkey during the mid-1990s, I've been involved with Bangladesh in some capacity since then. In this presentation, I'd like to draw on my longer term perspective on Bangladesh's development, concluding with some observations about the country's reform priorities.

Hopkins, *et al.* (1990) evaluated that wild turkeys trapped as part of a relocation program by the Arkansas Game and Fish Commission were tested for selected infectious diseases and parasites. The 45 birds were trapped at four locations in Pope, Scott, and Montgomery counties (Arkansas, USA). Forty-four blood samples for serology, 27 blood smears and 12 fecal samples were collected. Of the serum samples tested, 20 of 44 (45%) were positive for Pasteurella multocida by enzyme-linked immunosorbent assay (ELISA), 42 of 44 (95%) were positive for Bordetella avium by ELISA, and 15 of 44 (34%) were positive for Newcastle disease virus antibody by the hemagglutination inhibition test. All serum samples were negative for Mycoplasma gallisepticum, Mycoplasma synoviae, avian paramyxovirus 3, avian influenza, hemorrhagic enteritis, Marek's disease, avian encephalomyelitis, laryngotracheitis, Salmonella pullorum and Salmonella gallinarum. Haemoproteus meleagridis was found in eight of 27 (30%) and Leucocytozoon smithi in nine of 27 (33%) blood smears; all smears were negative for Plasmodium hermani. Enteric parasites included Ascaridia dissimilis, Heterakis gallinarum, Eimeria dispersa and Raillietina spp. This study was an attempt to document the health status and disease exposure of wild turkeys in Arkansas to aid in managing and preventing the spread of disease agents to wild turkeys and other species of birds.

CHAPTER-III
MATERIAL AND METHODS

3.1 Steps of the study

Following steps were followed to conduct the survey.

3.1.1 Data collection method

Among different method of data collection survey method was preferred.

3.1.2 Selection of the study area

The survey was conducted in two districts of Bangladesh: Gopalganj and Faridpur. These districts were considered representative in terms of availability of turkey. At least four upazilas were selected from each district based on the concentration of turkey rearing. The areas included for the study were towns, villages, hamlets and isolated ranches along the highways.

3.1.3 Sampling procedure

Before selecting survey samples, a list of upazilas and villages was prepared in consultation with government officials, the local offices of non-governmental and poultry dealers/agents. Farms were selected randomly from the sample frame. Data and information were collected from a specific locality at the same time to avoid survey errors.

3.1.4 Sources of data

The study used both primary and secondary data. The main source of primary data were the 30 farmers from whom both qualitative and quantitative data were collected. Secondary data and information were collected from different journal.

3.1.5 Period of data collection

The information for this study was gathered from August to October 2018. Collection of data was done through several visits each of the turkey farms by the researcher.

3.2 Following data were collected during study period-

3.2.1 Breeds of turkey in Bangladesh

Turkeys are not classified into breeds, however seven standard varieties are available, Bronze, White Holland, Bourbon red, Narragansett, Black, Slate, Beltsville small white.

3.2.2 Broad breasted white

This is a cross between broad breasted bronze and White Holland with white feathers. This variety was developed at the Cornell University. White plumage turkeys seems to be suitable Indian-Agro climatic conditions as they have better heat tolerance and also good and clean in appearance after dressing.

3.2.3 Beltsville small white

This variety was developed at Agricultural University Research Station, Beltsville, USA. It closely resembles the broad breasted white in color and shape but smaller in size. Egg production, fertility and hatchability tend to be higher and broodiness tends to be lower than heavy varieties.

3.2.4 Broad breasted bronze

The basic plumage color is black and not bronze. The females have black breast feathers with white tips, which help in sex determination as early as 12 weeks of age.

3.3 Management Practices in Turkey

3.3.1 Rearing systems

Turkeys were reared mainly under free range or intensive system.

3.3.1.1 Free range system of rearing

Advantages:
- Low investment.
- It reduces the feed cost by fifty percent.
- Cost benefit ratio is high.

In the free range system, turkeys were moved freely in day time and shelter were provided during night at the rate of 3-4 sq. ft. per bird. They were protected from predators during scavenging by monitoring. Planting of trees was desirable for providing shade and cooler environment. The range rotation were not practiced which cause incidence of parasite infestation commonly. Palatable forage for turkey was found in some farming area.

3.3.1.2 Free range feeding

Since turkeys are very good scavengers, it can consume earthworms, small insects, snails, kitchen waste and termites, which are rich in protein and that will reduce the feed cost by fifty percent. Some farmers allowed their turkey for free range feeding during day time. But the disadvantage was calcium deficiency causing leg weakness and lameness in free ranging birds. So, calcium should be supplemented at the rate of 250gm per week per bird in the form of oyster shell.

3.3.1.3 Intensive system of rearing

Advantages: • Better management and disease control

• Improved production efficiency.

3.3.2 Feeding

As there is no special feed for turkey, chicken feeds were suppied to turkey. The methods of feeding were mash feeding and pellet feeding. The energy, protein, vitamin and mineral requirements for turkeys are high when compared to chicken. Feeds were given in feeders and not on the ground in commercial farm. Whenever change was made from one diet to another it was carried out gradually. Besides ready feed other natural feedstuffs was supplied to turkey.

Fig. 3: Feeding management of Turkey

3.3.3 Watering

Turkeys were provided with a constant and clean water supply at all times. Some farmers provided more number of waterers during summer. In most cases the source of water was tape water. Only a few farmers used tube well water.

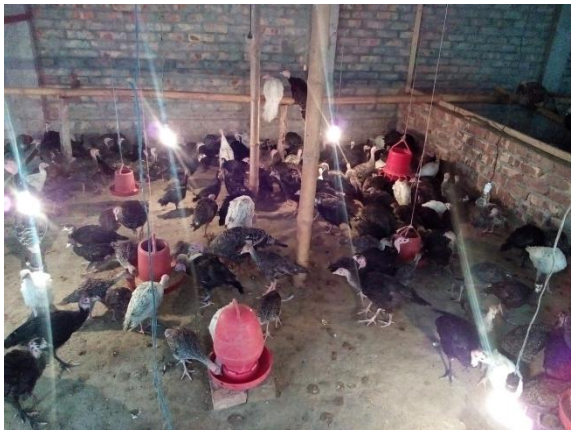

Fig. 4: Watering management of Turkey

3.3.4 Incubation

The incubation period is 28 days in turkey. There are two methods of incubation.

(a) Natural incubation with broody hens:

Naturally turkeys are good brooders and the broody hen can hatch 10-15 numbers of eggs. Only clean eggs with good eggshell and shape were placed for brooding to get 60-80% hatchability and healthy poults.

(b) Artificial Incubation:

In artificial incubation, eggs were hatched with the help of incubators. The temperature and relative humidity in setter and hatcher were as follows:

Temperature(Degree F)		Relative humidity (%)
Setter	99.5	61.63
Hatcher	99.5	85-90

Eggs were turned at hourly intervals daily. After laying eggs were collected frequently to prevent soiling and breakage.

3.3.5 Brooding

In turkey 0-4 week's period is called as brooding period. However, in winter brooding period is extended up to 5-6 weeks. Turkey poults needed double hover space compared to chicken. Most of the farmers followed traditional brooding systems.

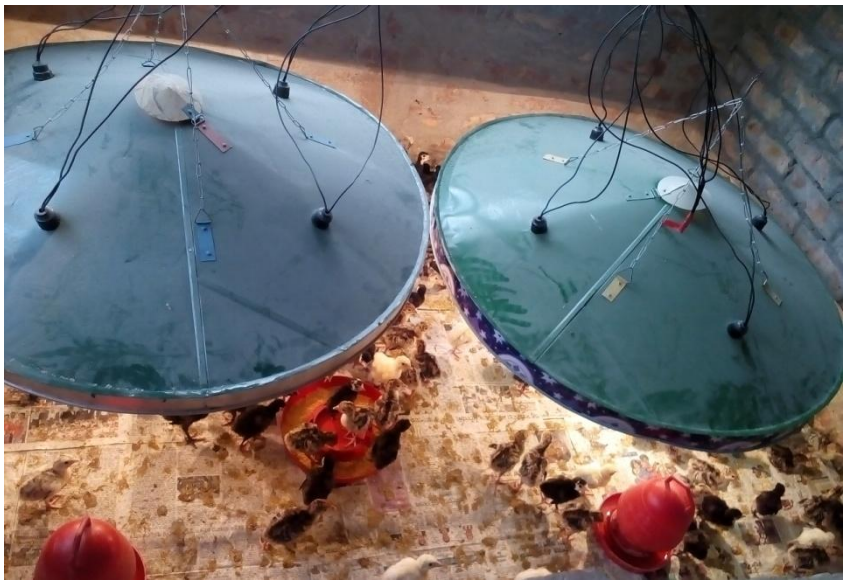

Fig. 5: Brooding of poults

3.3.6 Debeaking

Debeaking means removing the beak at about one half the distance from nostril to the tip of the beak. Poults were debeaked to control feather picking and cannibalism. Debeaking were done at day old or 3-5 weeks of age.

3.3.7 Detoeing or toe clipping

Clipping was done at day old by removing the tip of the toe just to the inside of the outer most toe pad including the entire toenail.

3.3.8 Litter materials

The common litter materials used for brooding were rice husk, wood shavings saw dust, chopped saw etc. The thickness of the litter material was 2-3inch at the beginning and increased to 3-4 inch in course of time by gradual addition. The litter was raked at frequent intervals to prevent caking.

3.4 Common diseases found on Turkey

During the study, diseases that were commonly found in turkey- Chronic respiratory disease, Fowl cholera, Fowl pox, Colibacillosis, New Castle disease, Black head disease, Coccidiosis, Haemorrhagic enteritis, hypocalcemia**.**

3.5 Some conditions that also observed they were-

a) Pendulous crop:

Crop of turkey is different from chicken and it is called pendulous crop. Pendulous crop is otherwise known as baggy or sour crop. Weakening of the crop and supporting tissues causes dropped crop so that feed and water accumulate in the organ and pass out slowly or not at all resulting in foul smelling semi liquid accumulation affecting the crop lining and treatment always useless.

b) Breast blisters:

Breast blisters are much more common in toms than in hens. They are believed to be caused by continuous irritation of the skin that covers the breastbone.

c) Cannibalism:

Feather picking is a mild form of cannibalism to which turkeys are addicted, especially during the growth period. It can be prevented almost completely by debarking.

3.6 Vaccination Schedule of turkey

Day Old	ND – B1 Strain
4th & 5th Week	Fowl Pox
6th Week	ND
8 – 10 Week	Cholera Vaccine

3.7 Sampling techniques

Samples of representative farm were collected in such a way that the information to be collected must satisfy the purpose of study. A random sampling was followed. It was pre-tested for judging for suitability of schedule for respondents. After compilation of the pre-tested survey some new information was included and some excluded from the draft schedule. Then the draft schedule was improved, rearranged, modified in the light of the actual practical experience. Attention was given to the general form of the interview schedule to see that the question followed a logical and appropriate sequence care was taken in-wording question to ensure that they were unambiguous and easily understood. These questions were most easy and informative for livestock socioeconomic condition.

3.8 Compilation of data

After completion of final primary data collection, all interview schedules were compiled, coded, tabulated and analyzed according to the objectives of the study.

3.9 Problems faced during data collection

In collecting data the researcher had to face some problems. These are presented below:

1. Most of the respondents hesitated to give their actual information about their farm history.
2. Most of the respondents were doubtful about the purpose of the study because the have no previous ideas.
3. There was the limitation of time. All of the necessary information were collected within the shortest possible of time.
4. In reply to question, the respondent used local units of measurement, which were often difficult to convert these to standard units.
5. Most of the farmers did not keep any records of their business, therefore it was difficult to recall and the researcher had to depend upon their memory.

6. Sometime the respondent did not co-operate willingly with the researcher as their have no direct benefit by supplying information. However the researcher very ardent in developing relations with the respondents and data were collected with fervor and contentment.

3.10 Data processing and analysis

Data collected from the field were entered into computers using MS Excel. For the analysis of the data, a combination of descriptive statistics (mean, standard deviation, averages, percentages) and some mathematical techniques were used to obtain meaningful results.

CHAPTER-IV
RESULTS AND DISCUSSION

4.1 Member involved in turkey reared

In taking care and management of turkey, wife, son, daughter and brother of the farmers were responsible. Table shows that 50.01% of farm owners were responsible to take care of turkey rather than son, daughter and others.

Table: 1. Member involved in turkey reared.

Members	No.	%
Husband	15	50.01
Wife	10	33.03
Son and daughter	2	6.67
Brother	3	10.00

4.2 Age of turkey farmers

Age of the turkey farmers ranged from 26 to 55 years. The farmers were stratified into 3 age categories; namely young <32, middle age 33-50 and old >50 (Table 2). The average age of turkey farmers was 38.77 years.

Table: 2 Age of turkey farmers

Age group of turkey farmers (years)	Turkey farms		Mean (age)	Standard deviation
	No.	%		
Young age(<32)	14	46.67	38.77	6.6
Middle age(33-50)	13	43.33		
Old age(>51)	03	10.00		

4.3 Education of turkey farmers

In the study area, it was showed that 6.67% farmers were illiterate followed by 23.33% had primary education, 33.33% had up to secondary education and rest 36.67% had above secondary level of education (Table 3).

Table: 3 Education of turkey farmers

Educational qualification of turkey farmers	**Turkey farms**	
	No.	**%**
Illiterate	02	6.67
Up to primary (1-5)	07	23.33
Up to secondary (6-10)	10	33.33
Above secondary (11-above)	11	36.67

4.4 Size of the turkey farm

According to flock size of the birds, the farmers were classified into three categories; namely very small, medium and large. Average number of birds per farm was 61.8 with standard deviation of 34.26**.** The (Table 4) revealed that 56.67**%** farm size were small, 33.33% medium and 6.67% farms were large category.

Table: 4 Size of the turkey farm

Size of the farm (Numbers)	**Turkey farms**		Mean	Standard deviation
	No.	%		
small(<70)	17	56.67	61.8	34.26
Medium (71-150)	10	33.33		
large (>151)	02	6.67		

4.5 Reading system

It was observed some free ranging and maximum intensive rearing system during survey.

Table: 5. Bedding materials

Name of the bedding materials used	Turkey farms	
	No.	%
Rice husk	14	46.67
Sawdust	06	20.00
Mixture of sawdust and rice hull	10	33.33

Variation of bedding materials in the house was observed. It was shown that 46.67% farmers used rice husk for bedding materials and 20% farmers use saw dust and rest 33.33% use mixture of rice husk and sawdust for bedding materials in turkey house. (Table 5). Beside these also observed some farmers used sand, ash, paper as bedding materials and some of the farmers used curtain, ash and paper in turkey house.

4.6 Prevalence of disease in the study area

It was observed that most prevalent diseases of turkey farms were Mycoplasmosis, Colibacillosis, Fowl pox, Fowl cholera and Haemorrhagic enteritis in the study areas. About 43.33 % farmers stated that their turkey were affected with Mycoplasmosis, 30% farms were affected with Colibacillosis and 16.67% farms were affected with Fowl pox, 13.33% farms were affected with Fowl cholera and Haemorrhagic enteritis was found in 6.67 percent farms respectively (Table 6).

Table: 6 Prevalence of disease in the study area

Disease	No. of farms	%
Chronic respiratory disease	13	43.33
Colibacillosis	6	30.00
Fowl pox	5	16.67
Fowl cholera	04	13.33
Haemorrhagic enteritis	02	6.67

4.7 Mortality of turkey

The farmers were categorized into three groups according to their birds mortality; namely low (<10%), medium (10-20%) and high (>20%) (Table 7).Table shows that about 63% farmers reported that their birds mortality was 01-10%. About 10% of the farmers reported that their birds mortality was above 20%

Table7. Mortality of turkey

Mortality rate	Turkey farms		Mean	Standard deviation
	No.	%		
Low (<10%)	19	63.33	11.6	4.42
Medium (10-20%)	8	26.67		
High (>20%)	3	10.00		

4.8 Source of turkey poults or replacement stock

It was reported that day old turkey poults or adult chick are not available in every farms. Turkey poults found at some large poultry farms. Most turkey farmers of Gopalgang and Faridpur districts collected poults from large farms and dealer. Some farmers collect poult from hatchery. Beside this some farmers have small incubator for hatching egg.

4.9 Vaccination of the turkey

Among total 30 farms the 73.33% farmers vaccinated their birds regularly, 20.00% vaccinated irregularly and 6.67% farms did not vaccinate their birds. (Table 8)

Table: 8 Vaccination of the turkey

Category	Turkey farms	
	No.	%
Vaccinated regularly	22	73.33
Vaccinated irregularly	6	20.00
Non-vaccinated	2	6.67

4.10 Price of turkey poults

The price of turkey poults ranged from 100 taka/ poult to 250 taka/ poult with mean of 153.33 taka/ poults and standard deviation of 28.82 Tk. (Table 9).

Table: 9 Price of turkey poults

Taka/ turkey poults	Turkey farms		Mean	Standard deviation
	No.	%		
100-150	10	33.3	153.3	28.82
151-200	16	53.3		
201-250	4	13.3		

4.11. Feed price

The feed price of turkey poult ranged from 37 taka/kg to 41 taka/kg with mean of 38.17 and standard deviation of 1.16 Tk. (Table 10).

Table: 10 Feed price of turkey poults

Taka/kg feed	Turkey farms		Mean	Standard deviation
	No.	%		
37	05	16.67	38.17	1.16
37.50	08	26.67		
38	11	36.67		
40	04	13.3		
41	02	6.67		

4.12 Market age of the turkey

From the following table it was reported that the market age of the birds ranged from 14 wks to 18 wks or more with mean of 16.33 weeks and standard deviation of 1.46..The market age of the birds varying depends on the consumer demad, feed consumption and weight gain of the birds and due to fluctuation of the market price of the birds. (Table 11).

Table: 11 Market age of the turkey

Market age (weeks)	Turkey farms		Mean	Standard deviation
	No.	%		
14-15	8	26.67	16.33	1.46
16-17	13	43.3		
18>	9	30.00		

4.13 Feed Conversion Ratio

The Feed Conversion Ratio was varied from one farm to another. These variations was due to management, quality of feed and disease prevalence in the study area. The average FCR was 2.68 with standard deviation of 0.09 in the study areas.(Table 12)

Table: 12 Feed Conversion Ratio

FCR Range	Turkey farms		Mean	Standard deviation
	No.	%		
2.50-2.60	7	23.33	2.68	0.09
2.61-2.70	12	40.00		
2.71-2.80	6	20.00		
2.81-2.90	5	16.67		

4.14 Market weight of the turkey

The market weight of the birds ranged from 4.5 kg/bird to 7.5 kg/bird .The average weight of the birds was 6.18 kg/bird with standard deviation of 0.73 kg (Table 13).

Table: 13 Market weight of the turkey

Body weight/bird	Turkey farms		Mean	Standard deviation
	No.	%		
4.5-5.5	7	23.33	6.18	0.73
5.5-6.5	12	40.00		
6.5-7.5	11	36.67		

4.15 Market price of adult turkey meat

Price variation was found in different region of study area. The market price of per kilogram turkey meat was ranged from 250 tk. to 350 tk. The average price is 255tk/ kg with standard deviation of 32.75 (Table 13).

Table: 14 Market price of adult turkey meat

Taka/kg meat	Turkey farms		Mean	Standard deviation
	No.	%		
250-280	18	60.00	275.33	32.75
285-315	10	33.33		
320-350	2	6.67		

4.16 Problems of turkey farming

4.16.1 Marketing facilities low

From the present study it was known from farmers that marketing of turkey is one of the major problems to spread the turkey farming in their districts. Most of the people here are not known about turkey and its egg and meat quality. As a result market of turkey is not as like as broiler and layer in Bangladesh. Beside these there is no well-organized market for turkey and its products. For marketing advertisement facilities is low. Farmers buy or sell turkey mainly through personal communication. As meat source sales of turkey is

very low, farmers sell it manytime as ornamental birds. Now a days turkey meat is being sold in different big hotel in many district including Gopalganj and Faridpur of Bangladesh, but most of the consumer were not habituated of taking turkey meat resulting demand of turkey is decreasing. 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.

4.16.2 Low fertility and hatchability

Many farmers lose their interest to continue turkey farming due to low fertility as well as hatchability of turkey egg, it was found during survey of many farms. Adutl male turkey or tom was not available in the farm for fertilization. The time of sexual maturity of male turkey is lengthy, it reaches sexual maturity at about 30 weeks of age. Beside these artificial incubation technique was not followed in many farms. 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.*1993). Age of breeder is important factor which affects egg weight, internal and external quality egg, hatching performance and the quality of poult. It was also reported that as hen age increases, the weight of egg increases and both shell quality and internal egg quality decrease (Erensayin, 2000). Turkey lay 80-100 eggs per year. Low egg yield, unsatisfactory fertility and hatchability constitute a major problem for turkey breeding enterprises (Ozcelik *et al*. 2009).

4.16.3 Poor management

Most of the farmers did not know about turkey farming according to scientifically accepted methods. They did not know about proper space requirement needed for small and adult turkey bird, on assumption they gave space. Many farmers did not know clearly about actual feed habit, resulting found low feed conversion ratio. Moreover, they were not aware of using of suitable bedding marials and their management.

4.16.4 Inadequate technical information and support

The farmers did not have adequate access to necessary information about turkey rearing and in case of problems they did not get enough technical support from different government and non-government agencies. Mbanasor and Saamson (2004) also repoted

that there was obvious lack of information on specific requirement for turkey production in Nigeria. Beside this farmers of Bangladesh did not get enough financial or loan facilities from govertment sector for farming.

4.16.5 No available special feed for turkey

Feed for broiler and layer chicken are available in the market of Bangladesh, but there is no any feed mill manufacture turkey feed. So homemade feed and ready feed prepared for broiler or layer was the source of turkey feed ,as a result farmers have to supply this feed to turkey. They did not know the scientific requirement of energy, protein and other nutrients for different categories of turkey. Similar things was happened in Nigeria (Ojewola *et al.* 2002) 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. Farmers did not have expertise to formulate balanced ration for turkey. Turkey birds are good forager known to many farmers but which type of forage suitable for turkey, it did not know clearly. Etuk EB (2007) reported that lack of knowledge of limitations of feed ingredients used in turkey feeds leads to poor growth.

4.16.6 Capacity building facilities low

Farmers who are engaged with turkey farming have no opportunity to capacity building in terms of getting information, receiving traing participation in seminar and workshop. As turkey birds is new in Bangladesh, most of the concern stakeholder are not aware enough about turkey farming. Therefore, farmers are using traditional procedure for rearing turkey, as a result production not reached at satisfied level.

4.17 Prospects of turkey farming

4.17.1 Higher consumer and market demand

Turkey birds was totally unknown to the people of Gopalganj and Faridpur districts. But at present familiarity of this bird is increasing among the people in these districts also to other districts of Bangladesh. Many people knows about taste of turkey meat and its quality than prior, as a result consumer demand is increasing day by day. Price of turkey meat is higher than other poultry species. Beside this as ornamental birds turkey is being

sold at higher price. Christian people have a tradition to eat turkey meat in Christmas day and they need large number of turkey. So there is a opportunity for turkey marketing as many Christian people live in Bangladesh. As the amount of meat production is higher and tasteful than broiler and sonali, a tendency grows in many people to use turkey meat in different functions.

4.17.2 Low disease prevalence

Turkey are mostly affected by mycoplasmosis or chronic respiratory disease, fowl cholera, pox and hemorrhagic enteritis which are less fatal than other diseases. Turkey is more disease resistant in comparison to other poultry species like chicken, duck and quail. Sampath (2012) reported that turkeys are resistant to marek's and infectios bronchitis. Mortality of turkey is very low in comparison to other poultry birds.

4.17.3 Adapted to the climate condition of Bangladesh

There are very few birds which can survive in harsh condition from that one of adaptable bird is turkey. Turkey is a bird which is suitable for rearing in harsh or hot humid climate condition like climate of Bangladesh. But turkey farming has not been explored in Bangladesh due to unknown reason. In fact, turkeys are adaptable to wide range of climate conditions and can be raised successfully almost anywhere in the world if they are well fed and protected against diseases and predators. The turkey meat is considered by many as a luxury meat and turkey considered as luxury bird. Moreover, it has an aesthetic value due to their beauty (Ogundipe and Dafwang, 1980). Anandh *et al.* (2012) reported the commercial turkey farming is becoming popular in India. For this reason turkey is becoming popular in developing countries like Bangladesh and tendency for commercial turkey farming among people is increasing day by day.

4.17.4 Availability of educated farmers

Educated farmers are needed to understand the technical information related to productions. They are able to receive technical knowledge on selection, breeding, brooding, feeding, housing etc. Most of the surveyed farmers are comparatively educated and they were self- starter. So there is huge possibility to develop turkey entrepreneurs in Bangladesh.

4.17.5 Low feeding cost

Turkeys are good foragers and it could reduce feeding cost at remarkable amount for its rearing. 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). Other poultry species need two thirds feed cost of total cost for production; from this point of view turkey farming is more profitable than others. Solivon (1984) reported that turkey rearing is profitable as long as poults are properly feed and taken care of and cost of production is cheap as almost 50% of the feed they eat green vegetables and field grasses as supplement to commercial feeds. As production cost is low, there is great opportunities to anyone for turkey farming with minimum capital.

4.17.6 Source of income and protein

Turkey meat is tasteful and contents less fat. Turkey meat could be an alternative for consumers, while broiler meat market is facing problem of higher diseases and lower taste. So it could be an effective alternative source of protein. Turkey bird has a promising potential to be an alternative to livestock in meat production (Nixey, 1986). Moreover small and marginal farmers can starts turkey farming 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 opportunities for unemployed youths to starts farming and earn money. The amount of meat production of turkey is higher than other poultry species like chicken, duck, quail etc. So it may fulfill consumer demand as protein source. As it rearing cost is low and higher production, many starts to concern it as alternative source of others animal protein. Many unemployed person may start the turkey farming as the source of income. 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.

4.17.7 Opportunities to use artificial reproduction technique

Natural mating generally causes fertile egg in most of the poutry species like chicken, duck, pigeon etc. But fertility result is low in case of natural mating of turkey. So there is an opportunities to promote AI technique in turkey for the production of commercial hatching eggs. As a result the rearing cost of male turkey or tom will decreases at remarkable amount. (Etches, 1996), reported that well developed pectoral muscle in turkeys, has prevented turkey toms to mate naturally.

CHAPTER-V

CONCLUSION AND RECOMMENDATIONS

Turkey production in Bangladesh is still at primitive stage. But there is greater scope for turkey rearing in Bangladesh. As turkey can be reared in free range and intensive or semi-intensive system especially in rural areas for economic enhancement of unemployed youths, landless, marginal and small farmers. Turkey rearing methods require low investment in facilities and equipments and it is viable and sustainable bird both for backyard and commercial venture in economic point of view. The climate condition of Bangladesh is adaptable and suitable for turkey rearing. Turkey production status is still at lower stage due to poor housing, breeding, feeding and management practices as well as low marketing facilities, inadequate availability of technical information, credit facilities, training opportunities. To improve turkey production necessary technical information should be suppied to farmers by giving them training about proper housing, feeding, breeding and managements of turkey. Government should provide adequate loan facilities to turkey farmers. Marketing problems can be solved by identifying marketing strategies and problems. Market outlet should be created where turkey rearers can dispose off their birds. Enough advertisement is needed to familiar about quality of turkey meat to the people of Bangladesh. Every turkey farmers should take proper steps for creating marketing facilities. Government should play a vital role to spread turkey farming and marketing of its products.

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APPENDICES

INTERVIEW SCHEDULE

Department of Dairy and Poultry Science

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Questionnaire (English version) for conducting survey to assay "Present socio-economic condition, problems and prospect of turkey farming in some selected areas of Gopalganj and Faridpur district in Bangladesh"

Date:…….

1. Farmers information:

Farmer's name…… Mobile no……

Father's /Mother's/Husband's name……

Village…… Post office…….Union……

Upazilla……..

2. Age…….years

3. Occupation:

Main occupation…….. Secondary occupation……..

4. Educational qualification:

a. Illiterate b. Up-to primary

c. Above primary up-to secondary d. Above secondary

5. Did you take any training before starting poultry farming? (√) Yes / No

If yes then from where……..

a. GO b. NGO c. University d. Others

6. Major income sources: Secondary income……

1. From cultivable land.....tk/year
2. From livestock…….tk/year
3. From poultry……tk/year
4. From fishery……..tk/year
5. From service……tk/year
6. From business…….tk/year
7. From others sources……tk/year

7. Counseling:

I. From where do you take your technical support? ……..
None / NGO/ Technical graduate / Private Expert / Dealer

8. Cost benefit:

Are you benefited? : (Yes / No)

- Capital: Own capital / Loan
- Labor use……Man/turkeys
- Feed cost……tk
- Litter cost……tk
- Day old turkey chick cost.....tk

9. Do you have the power supply? (√)Yes / No

10. Source of land:

1. Homestead
2. Own land under own cultivation
3. Own land give to other /Gopalganj/Faridpur

4. Land taken from others / Gopalganj/Faridpur

5. Land taken from others or lease

6. Lease

11. Farm size on basis of no. of birds reared by the farmer (√):

I. Small (<70

II. Medium(71-150)

III. Large(151-above)

12. Information about poultry reared in the farm:

Type of birds	No. of shed	No. of birds / shed	Sources of DOC	Price of DOC (tk/turkey chick)
turkey				

13. What kind of problems do face in case of collecting quality turkey chick?

……

……

……

14. Information about feed:

What type of feed is generally being used? (√)

1. Readymade formulated feed / 2. Own mixed feed

Do you follow any feeding standard? (√) [1.Yes / 2.No]

Do you use growth promoter? (√) [1.Yes / 2.No]

Have you any feed mixing machine ? (√) [1.Yes / 2.No]

Do you use unconventional feed? (√) [1.Yes / 2.No]

Cost of feed:

1. Readymade …….tk/kg / 2. Hand mixed……..tk/kg

Do you face any problem? If yes, please mention the problems [1. Yes /2. No]

……

……

15. Do you follow the vaccination schedule regularly? (√) [1. Yes /2.No]

Name of the vaccine used……

……

- From where do you collect your vaccine? (√)
  [1. GO / 2. NGO / 3.Dealer / 4. Private Experts / 5. Others]

16. Marketing and means of transportation of final products

- Marketing age of birds……weeks
- Who are the purchaser of your products?…….
  ……
- Do you take it to the near market? (√) [1. Yes, / 2. No]
- Please mention the problems you faced during marketing
  ……
  ……..

17. Litter:

- What are the litter materials used as litter sources?
  ……
- Sources of litrer …….
- Are these materials available the entire year round? [1. Yes, /2. No]
- What do you do with the litter after use?
- [1=Dump,2=Use in agriculture,3=Fish feed,4=Others]

18. Production:

- How many batches do you rear in a year?.....
- At how many days do you sell your birds ?.....days
- What is the average body weight of the birds?

  -Weight at 1st day……...…….gm

  - Weight at selling days……gm
- Total feed intake of the birds…….kg
- Total body weight of the birds.....kg
- Feed Conversion Ratio (FCR):……

19. Mortality……. %

20. Some management queries:

a) Rearing system: (√) 1.Cage, 2.Litter
b) Ventilation type: (√) 1.Natural air flow system 2.Mechanical air movement
c) Brooding system:(√) 1.spot brooding; 2.whole house brooding; 3.partial house brooding;
d) Brooding period……days
e) Lighting system……..
f) Numbers of feeder and drinker uses/100 turkeys: .....feeder .....drinker

Please mention some diseases which appear on frequent basis on your farm

……

…….....……..

From your point of view socio-economic impact of poultry farming in our personal life……

…….....……