

Chapter-1

Introduction

Bangladesh is a small country with a large population about 160 million, situated between 88°10' and 92°41' East longitudes and between 20°34' and 26°38' 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%).

The turkey (*Meleagris gallopavo*) a well known bird in western countries, but in the rest of the world especially in developing countries it is yet to be established on commercial point of view. Commercial turkey farming is becoming popular in Bangladesh and farmers started to show interest in rearing turkey birds. The bird is quite suitable for upliftment of small and marginal farmers as it can be easily reared with little investment for housing, equipment and management. One of the main objectives in turkey breeder production is to increase the number of poults produced. Egg yields in turkeys are lower than that of other poultry species. In addition to low egg yield, unsatisfactory egg fertility and hatchability constitute a major problem for turkey breeding enterprises (Ozcelik et al., 2009). Egg weight, fertility and embryonic mortality would influence overall hatching performance provided management conditions are not the limiting factors. Egg weight, fertility, hatchability and late embryonic mortality varied greatly between traditional and modern breeding management system (Lariviere et al., 2009). Variations in fertility, hatchability, embryonic mortalities and survivability may be due to poor egg holding period, imbalanced nutrition, stressful conditions the parent flock was exposed to rearing condition. Low fertility and high

embryonic mortality values have been reported in traditional chicken rearing (Hocking et al., 2007). This can be explained by poor management practices, mating behavior or reproductive physiology in flocks often maintained in small groups.

Since scanty published literature is available on hatching performance of turkey birds under different rearing systems in Bangladesh. Considering the above, the present study was conducted to know the management of turkey farm, and to determine the effects of rearing system on the reproductive performance of turkeys as well as to identify the suitable rearing system for rearing turkeys.

CHAPTER: II

Material and methods

2.1 Study area

The study was conducted to observe the reproductive performance of turkey at Joydebpur Sadar, Gazipur during the period of February– March 2018. The place was selected on the basis of availability of turkey farm and my internship spot. The areas included for the study cover towns, villages, hamlets and isolated ranches along the highways.

2.2 Farm selection

A total of 50 commercial and household farms was selected to conduct the study. The climatic condition was cold at that time. Turkey farmers were selected randomly both in town and villager areas. Temperature ranged from 18-20degree Celsius. Because it was late winter season.

2.3 Data collection

Data were collected from the farmers by visiting and approaching the turkey farm raisers. The farmers were asked directly via interview on turkey rearing, and additional data were collected by me. Information on age and sex of farmer, turkey population data and distribution, housing and management system, uses of turkey and productivity of the birds were collected. Apart from these, data on egg weight, infertile eggs, early embryonic mortality, late embryonic mortality, poult weight, livability etc., were collected from the different type of turkey farms through my surveying process.

Following data were collected during study period-

2.4 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.

2.4.1. Beltsville small white:

This variety was developed at Agricultural University Research Station, Beltsville, USA. It closely resembles the Board 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.

2.4.2. Board breasted white:

This is a cross between Board 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.

2.4.3.. Board 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.

2.5 Turkey egg production:

The turkey will start lay from the 30th week of age and its production period is 24 weeks from the point of lay. Under proper feeding and artificial lightening management turkey hens lay as much as 60-100 eggs annually. Nearly 70 percent of the eggs will be laid in the afternoon.

2.6 Management practices in Turkey:

2.6.1 Brooding

In turkey 0 -4 weeks period is called as brooding period. However, in winter brooding period is extended upto 5-6 weeks. As a thumb rule the turkey poults need double hoverspace as compared to chicken. Brooding day old poults can be done using infra red bulbs or gas brooder and traditional brooding systems.

Points considered:

- The floor space requirement for 0-4 weeks is 1.5 sq.ft. per bird.
- The brooder house should be made ready atleast two days before the arrival of poults. • The litter material should be spread in a circular manner with a diameter of 2 mtrs.
- Poult guard of atleast 1 feet height must be provided to prevent the poults from wandering away from source of heat.
- Starting temperature is 950F followed by weekly reduction of 50F per week upto 4 weeks of age
- Shallow waterers should be used.

2.6.2 Litter materials:

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

2.6.3 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 should be placed for brooding to get 60-80% hatchability and healthy poults.

(b) Artificial Incubation:

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

Table:1

	Temperature (Degree F)	Relative humidity (%)
Setter	99.5	61-63
Hatcher	99.5	85-90

2.6.4 Rearing systems:

I observed two system free range and intensive system.

Free range system of rearing:

Advantages:

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

Disadvantages:

- High mortality
- Low production

Intensive system of rearing:

Advantages:

- Improved production efficiency.
- Better management and disease control.

2.6.5 Housing:

- Housing protects turkeys from sun, rain, wind, predators and provides comfort.
- In hotter parts of the country the long axis of the house run from East to West.
- The distance between two houses should be at least 20 meters and the young stock house should be at least 50 to 100 meters away from the adult house.
- The width of the open house should not exceed 9 meters.
- The height of the house may vary from 2.6 to 3.3 meters from the floor to roof.
- An overhang of one meter should be provided to avoid the rainwater splash.
- The floor of the houses should be cheap, durable and safe preferably concrete with moisture proof.

Floor, feeder and drinkers space requirement of turkeys:**Table:2**

Age	Floor Space (Sq .Ft)	Feeder Space (cms) (Linear feeder)	Waterer Space (cms) (Linear waterer)
0-4 weeks	1.25	2.5	1.5
5-16 weeks	2.5	5.0	2.5
16-29 weeks	4.0	6.5	2.5
Turkey breeder	5.0	7.5	2.5

2.6.6 Feed: The methods of feeding are mash feeding and pellet feeding.

- The energy, protein, vitamin and mineral requirements for turkeys are high when compared to chicken.
- Since the energy and protein requirements for the both sexes vary they must be reared separately for better results.
- Feed should be given in feeders and not on the ground.
- Whenever change is made from one diet to another it should be carried out gradually.
- Turkeys require a constant and clean water supply at all times.
- Provide more number of waterers during summer.
- Feed turkeys during the cooler parts of the day during summer.
- Provide shell grit at the rate of 30-40 gm per day per bird to avoid the leg weakness

Body weight and feed consumption:

Table: 3

Age in weeks	Average Body Weight (Kg)		Total feed consumption (Kg)		Cumulative feed efficiency	
	Male	Female	Male	Female	Male	Female
Up to 4 th week	0.72	0.63	0.95	0.81	1.3	1.3
Up to 8 th week	2.36	1.90	3.99	3.49	1.8	1.7
Up to 12 th week	4.72	3.85	11.34	9.25	2.4	2.4
Up to 16 th week	7.26	5.53	19.86	15.69	2.8	2.7
Up to 20 th week	9.62	6.75	28.26	23.13	3.4	2.9

Note: FCR of 2.13 with feed consumption of 140gm/day on feed with 4,400 k.cal/kg. ME (Thayee et.al, 1985)

Green feeding:

In intensive system, greens can be fed up to 50% of the total diet on dry mash basis. Fresh Lucerne is first class green feed for turkeys of all ages. Apart from the Desmanthus and Stylo can be chopped and fed turkeys to reduce the feed cost.

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.

2.6.7 BREEDING PRACTICES:**Sexing:****Tom Turkey:**

1. Toms are heavier. Matured toms have black bread attached to the skin of the upper breast region.
2. Dew bill or snood, a fleshy protuberance near the base of the beak, which is relatively large, plumb and elastic.
3. Pink or red fleshy protuberances on the head called as caruncles will appear in toms usually by about fifth week and is referred to as shooting the red.
4. Male poults strut even at day old and continue throughout the life.

Hen turkey:

1. The dew bill or snood is relatively small, thin and non-elastic
2. The bread and caruncles are absent.

Natural mating:

The mating behavior of tom is known as Strut, wherein it spreads the wings and makes a peculiar sound frequently. In natural mating the male; female ratio is 1:5 for medium type turkeys and 1:3 for large types. On an average 40-50 poults is expected from each breeder hen. Toms are rarely used for mating after first year due to reduced fertility. There is a tendency in toms to develop affinity towards a particular female, so we have to change the toms for every 15 days.

Artificial insemination:

The advantage of artificial insemination is to maintain high fertility from turkey flock through out the season.

Collection of semen from Tom:

- The age of tom should be 32-36 weeks for semen collection.
- The tom should be kept in isolation at least 15 days before semen collection.
- The tom should be handled regularly and the time required to collect the semen is 2 minutes.
- As the toms are sensitive to handling, the same operator should be used to get maximum volume of semen.
- Average semen volume is 0.15 to 0.30ml.
- Use the semen within one hour of collection.
- Take the collection three times weekly or on alternative days.

Insemination in hens:

- Artificial insemination is done when the flock attains 8-10% egg production.
- Inseminate the hens every three weeks with 0.025-0.030ml of undiluted semen.
- After 12 weeks of the season it may be better to inseminate every fortnight.
- Inseminate the hen after 5-6' O clock in the evening.
- The average fertility should be 80-85% over a 16 week breeding season.

2.6.8 Catching and handling, Debeaking, desnooding, Toe clipping.

Catching and handling of turkeys:

Turkeys of all age group can be easily driven from one place to another with the help of a stick. For catching turkeys a darkened room is best, wherein they can be picked up with both legs without any injury. However, mature turkeys should not be kept hanging for more than 3-4 minutes.

Debeaking

Poults should be debeaked in order to control feather picking and cannibalism, especially if they are raised in confinement. Debeaking is done at 10 days of age to prevent cannibalism.

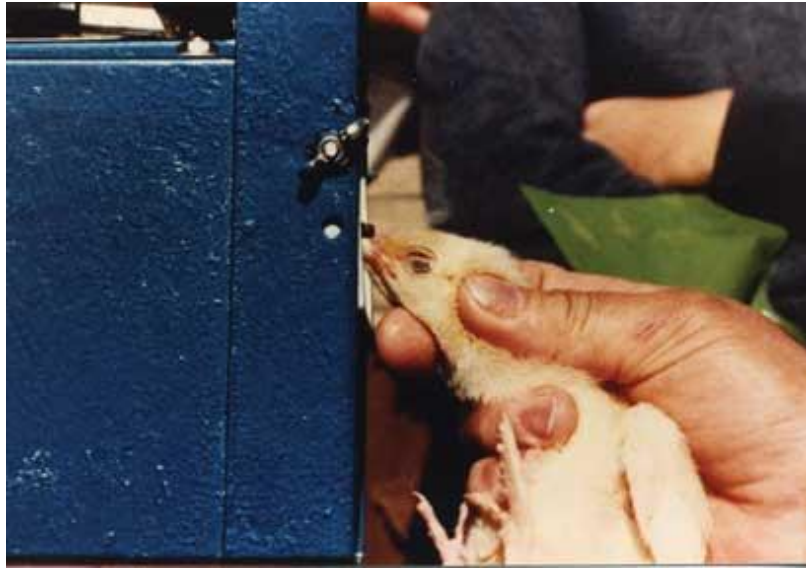
Desnooding

The removal of the snood or dew-bill (the tubular fleshy appendage on top of the head near the front) is referred to as “desnooding”. It helps to prevent the head injuries from picking or fighting and may reduce the spread of erysipelas should this disease get started in the flock. The snood can be removed at one-day-old by thumbnail and finger pressure. After about 3 weeks, it can be cut off close to the head with sharp, pointed scissors.

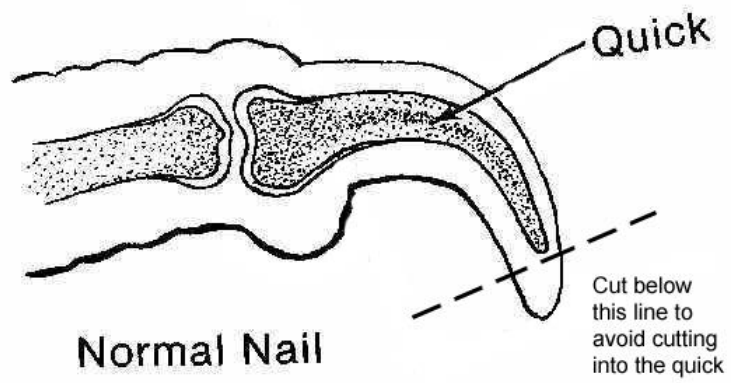
Toe Clipping

Toe clipping or removal of toenails is usually done at the hatchery, but toes of turkeys as old as 5 weeks can be clipped when turkeys are debeaked. Toe clipping can improve the grade of processed turkeys. Turkeys in large groups, especially when excited, often step on each other causing scratches or skin tears on the backs and sides. The problem is aggravated with increased flock sizes and densities, especially when turkeys are reared in confinement.

The most common form of toe clipping involves cutting the inside and middle toe (front) on each foot. Toes can be cut with surgical scissors, a nail clipper or a modified hot-blade debeaker.



Debeaking



Toe clipping

2.6.9 Marketing of turkeys:

A market study shows that a male turkey sold at 24 weeks of age weighing 10 -15 kg. Selling price is 500 tk/kg.

Price of per egg is 400-700tk.

Table:4

Economic Parameters in Turkey Farming

Male – Female ratio	1:5
Average egg weight	65gms
Average day old poult weight	50gms
Age at sexual maturity	30weeks
Average egg number	80 -100
Incubation Period	28 days
Average body weight at 20 weeks	4.5 – 5 (f) 7-8(m)
Egg production period	24 weeks
Marketable age	Male Female
	14 -15 weeks 17 – 18 weeks
Marketable weight	Male Female
	7.5 kg 5.5 kg
Food efficiency	2.7 -2.8
Average feed consumption upto marketable age	Male Female
	24 -26 kg 17 – 19 kg
Mortality during brooding period	3-4%

2.7 Diseases in turkey:

Table :5

Common Diseases of Turkey	Cause	Symptoms	Prevention
Arizonosis	<i>Salmonella Arizona</i>	Poults unthrifty and may develop eye opacity and blindness. Susceptible age 3-4 weeks	Elimination of infected breeder flock and hatchery fumigation and sanitation.
Blue comb disease	<i>Corona virus</i>	Depression, loss of weight, frothy or watery droppings, darkening of head and skin.	Depopulation and decontamination of farm. Give rest period.
Chronic respiratory disease	<i>Mycoplasma gallisepticum</i>	Coughing, gurgling, sneezing, nasal exudates.	Secure <i>Mycoplasma</i> free stock
Erysipelas	<i>Erysipelothrix rhusiopathidae</i>	Sudden losses, swollen snood, discoloration of parts of face, droppy	Vaccination
Fowl cholera	<i>Pasturella multocida</i>	Purplish head, greenish yellow droppings, sudden death	Sanitation and disposal of dead birds.
Fowl pox	<i>Pox virus</i>	Small yellow blisters on comb and wattles and scab formation	Vaccination
Haemorrhagic enteritis	<i>virus</i>	One or more dead birds	Vaccination
Infectious synovitis	<i>Mycoplasma gallisepticum</i>	Enlarged hocks, foot pads, lameness, breast blisters	Purchase clean stock
Infectious sinusitis	<i>Bacteria</i>	Nasal discharge, swollen sinuses and coughing	Secure poults from disease free breeders
Mycotoxicosis	<i>Fungal origin</i>	Haemorrhages, Pale, fatty liver and kidneys	Avoid feed spoilage
New Castle disease	<i>Paramyxo Virus</i>	Gasping, wheezing, twisting of neck, paralysis, soft shelled eggs	Vaccination
Paratyphoid	<i>Salmonella pullorum</i>	Diarrhea in poults	Prevention and flock sanitation

2.8 Vaccination schedule maintained by the farmers

Table:6

VACCINATION SCHEDULE FOR TURKEYS

1 day	Antibiotics	Inject subcutaneous in neck
10 days	Coryza (if endemic) Newcastle	Drinking water
14 days	Coryza (if endemic)	Drinking water
23-24 days	Hemorrhagic enteritis	Drinking water
6 Weeks	Newcastle	Drinking water
7 Weeks	Cholera (M9)	Drinking water
9 Weeks	Cholera (varying sero-types)	Drinking water
14 Weeks	Cholera (varying sero-types)	Drinking water

2.9 Analytical techniques:

The data were put on the master sheet in Microsoft Office Excel 2007 and were arranged in tabular form. The data were analyzed statistically by following standard procedures (Snedecor and Cochran, 1989) for comparing the means and to determine the effect of rearing systems.

Chapter-3

RESULT & DISCUSSION

The reproductive characters of turkey rearing under different farming systems : The data of reproductive traits of turkey such as early embryonic mortality, total egg hatchability, late embryonic mortality, fertility , hatched weight of poult and poult dead in shell etc., were shown in the Table 7. Apart from these, the egg weight, infertile egg, early embryonic mortality, fertile egg hatchability and survivability of turkey are shown graphically through Figures (1 to 5).

Table 7: Effect of rearing systems on reproductive traits of turkey collected from the different farms:

Reproductive traits	Framing systems		
	Free range	Semi intensive	Intensive
Early embryonic mortality (%)	6.63	5.69	3.76
Total egg hatchability (%)	52.85	56.84	77.38
Late embryonic mortality (%)	6.57	4.91	3.36
Fertility (%)	68.85	70.55	90.95
Poults hatched weight (gm)	42.08	47.18	47.82
Dead in shell (%)	7.30	7.59	7.62

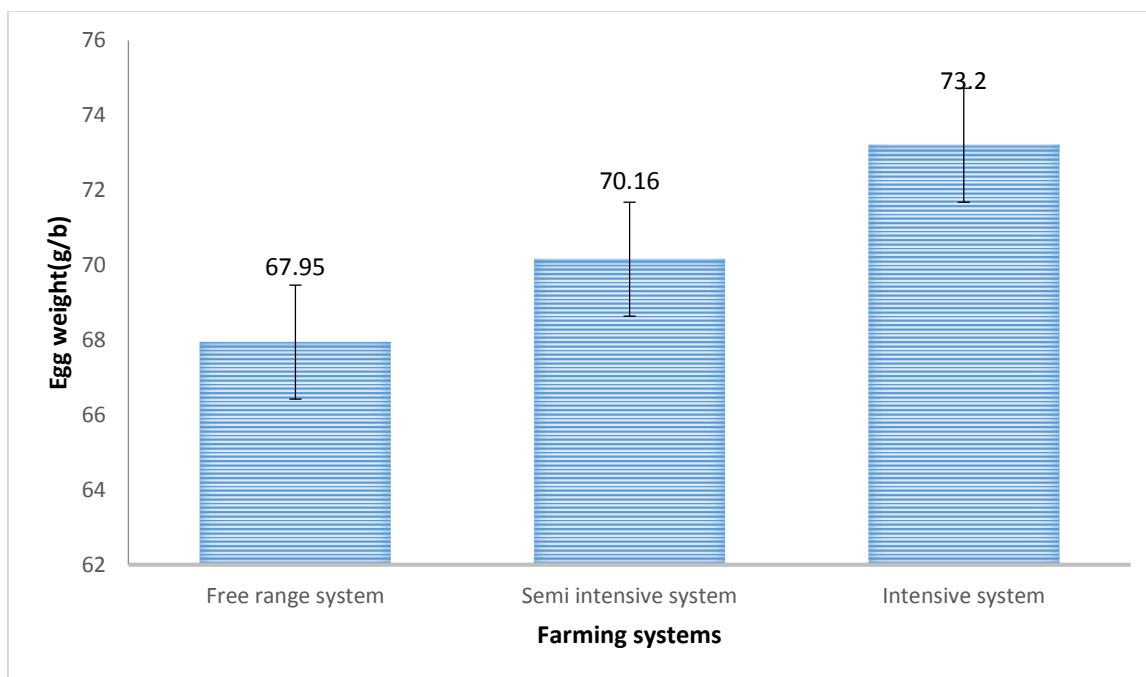


Fig 1: The average egg weight of turkey from different farming systems.

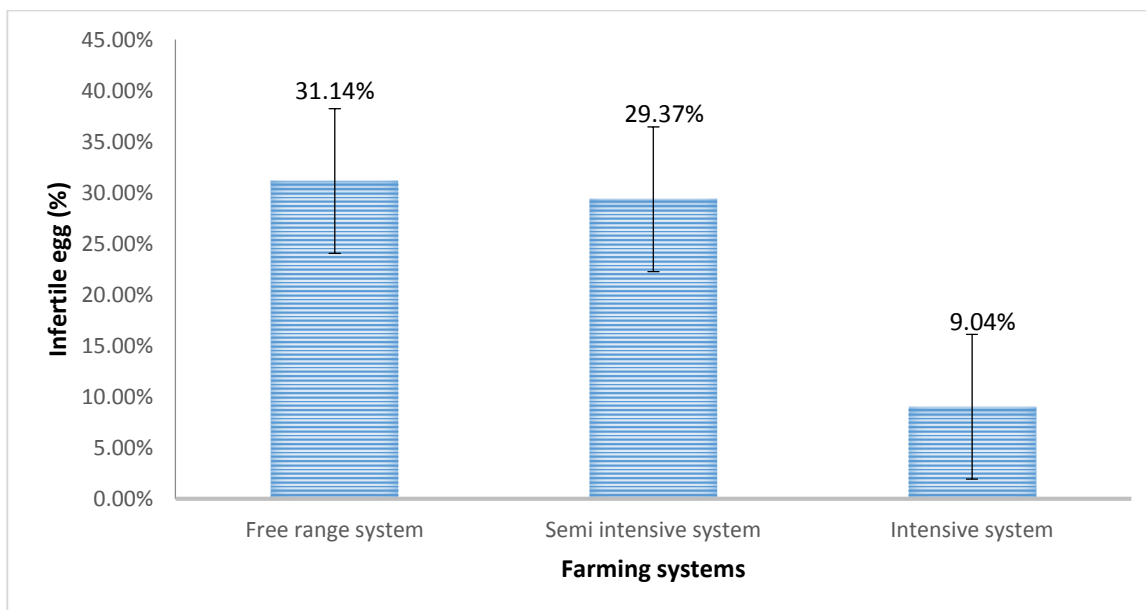


Fig 2: The average infertile egg (%) of turkey from different farming systems.

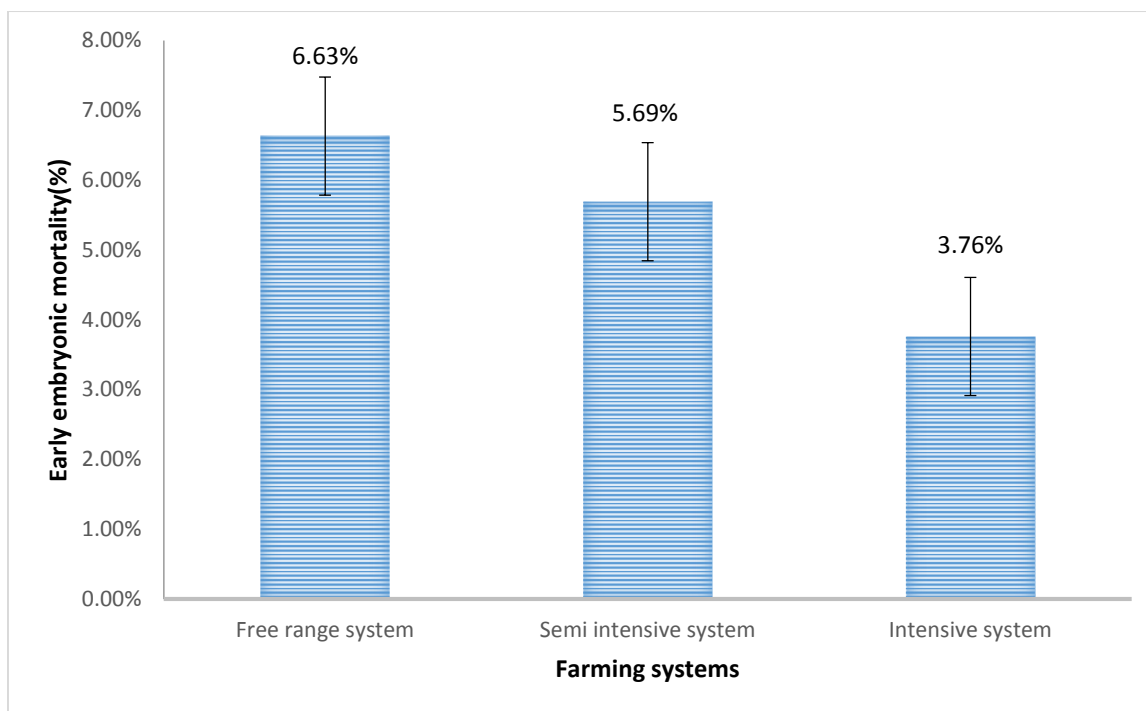


Fig 3: The early embryonic mortality (%) of turkey from different farming systems.

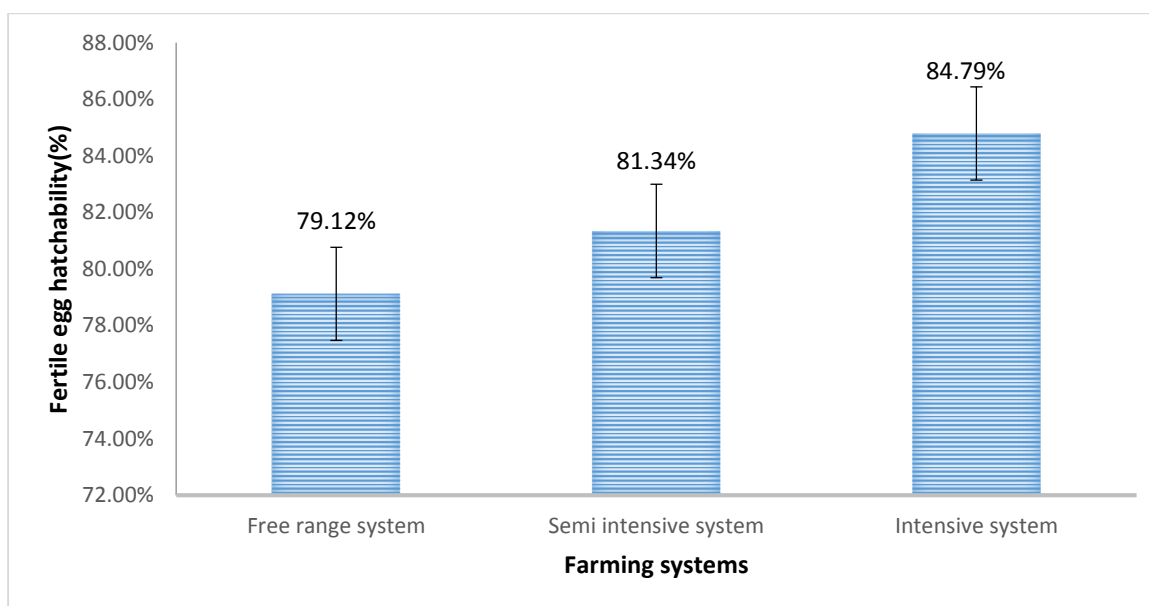


Fig. 4 : Fertile egg hatchability(%) of turkey of different farming conditions

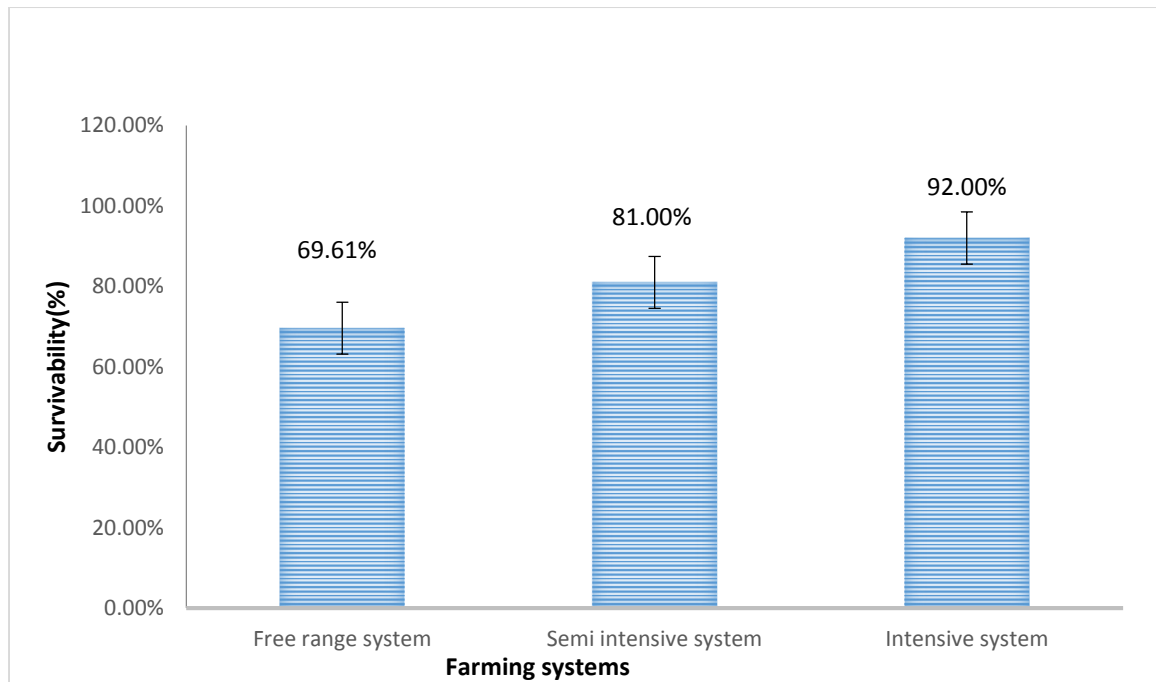


Fig 5. The survivability (%) of turkey under different farming systems.

The effect of rearing system on egg weight, percentage of infertile eggs, embryonic mortalities, dead in shell, total egg hatchability, fertile egg hatchability, fertility, poult hatched weight and poult survivability of turkey are presented in Table 7 and Fig.(1 to 5). The average egg weight in the free range, semi intensive and intensive system were found to be 67.95 , 70.16 and 73.20, respectively. The average egg weight between each rearing system differed from one to another The highest average egg weight was found in intensive system of management followed by semi intensive and free range system. Ramlah (1996) also reported increased egg weight in hens reared under intensive system of management as compared to semi intensive or free range. The mean egg weight obtained in the present study is in accordance with the findings of Ozcelik et al. (2009), who reported the mean weight of turkey eggs ranged 67.4 to 70.3 g. The average percentage of infertile eggs in the free range, semi intensive and intensive system were found to be 31.14, 29.37 and 9.04, respectively. The mean percentage of infertile eggs were also differed between farming systems. The highest infertile eggs were found in turkeys reared in free range system followed by semi intensive system and intensive system of management. Mroz et al. (2010) reported that the number of infertile eggs is low in turkeys, but it may reach 10% at the beginning and towards the end of the laying season. The mean percentages of early and late embryonic mortalities in the free range, semi intensive and intensive system were found to be 6.63 and 6.57, 5.69 and 4.91 and 3.76 and 3.36, respectively. Early and late embryonic mortalities percentage of all treatment groups showed a difference between them.

Lowest percentages of embryonic mortalities were found in turkeys reared under the intensive system of management. The highest percentages of embryonic mortalities were found in free range system followed by semi intensive system of management.

Hocking et al (2007) also reported that high embryonic mortality values in traditional chicken rearing. This can be explained by poor management practices, mating behavior or reproductive physiology in flocks often maintained in small groups. A number of factors including storage condition system of husbandry and rearing technology, mating system have been shown to influence the hatchability of poultry eggs (Brah and Sandhu, 1989, Gebhardt-Henrich and Marks, 1991). The present findings were also in conformity with above findings. The mean \pm SE percentage of turkey poult hatched weight in the free range, semi intensive and intensive system were found to be 42.08, 47.18 and 47.82, 47.51, respectively.

The percentage of hatched weight of poults was found higher in intensive system followed by semi intensive system and free range system. The difference between poult hatched weight in semi intensive and intensive system showed no basic difference between farming systems. Shanaway (1987) reported hatching weight constitutes 63.5% of egg weight in turkey egg. The present results also in conformity with above results. The mean of survivability of turkey poults in the free range, semi intensive and intensive system were found 69.61, 81.71 and 92.06, respectively. Turkey poults survivability of intensive system being significantly higher followed by semi intensive system and free range system. This may be due to good management practices and feeding of poults under intensive system of management. It is well documented that mortality is influenced by several factors such as exposition to cold weather during the first three weeks, heat stress in the end of the growing period, problems in water distribution, as well as inappropriate housing and bird density. Severe rearing losses, with high mortality in young indigenous turkey have been reported under traditional management systems (Wilson, 1986).

Chapter-4

Conclusion

From an overview of the results obtained in this study revealed that, rearing system has can affect the reproductive traits of turkeys. Turkeys reared under intensive system of management suitable for to obtain better reproductive performance followed by semi intensive and free range system of management.

Chapter -5

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