**Chapter-I**

**INTRODUCTION**

The flightless Ostrich (Struthio camelus ) is the largest living bird species on the Earth which are belongs to [order](https://en.wikipedia.org/wiki/Order_%28biology%29) [Struthioniformes](https://en.wikipedia.org/wiki/Struthioniformes) (Brand and Sheila, 2008). The species name Struthio camelus comes from the Greek words meaning 'camel sparrow' (Gotch, 1995). The ostrich is endemic to Africa but can be seen worldwide in zoos and wildlife refuges. It is highly adapted for a terrestrial life, having very long and powerful legs that, together with the elongated neck, make up a considerable part of the bird's height (John, 2008).

Ostriches have many unique behavioral characteristics that suit their morphology. Ostriches have three stomachs. Unlike all other living birds, the ostrich secretes urine separately from faeces. Ostriches are primarily herbivores, feeding on nuts, flowers, seeds, and leaves.  Occasionally, ostriches will eat insects such as locusts.  Ostriches have beaks and no teeth; they eat pebbles with their food which aids in grinding it down (Gilman *et al*, 1903).

Ostriches can go without drinking for several days, using [metabolic water](https://en.wikipedia.org/wiki/Metabolic_water) and moisture in ingested plants, but they enjoy liquid water and frequently take baths where it is available. They can survive losing up to 25% of their body weight through [dehydration](https://en.wikipedia.org/wiki/Dehydration) *(*Perrins et al, 1996*).* While eating or drinking, ostriches will frequently raise their long necks in the air to look for potential predators.

Ostriches normally spend the winter months in pairs or alone but during breeding seaseon or extreme rainless period they typically travel in nomadic groups of 5 to 12 individuals.  An alpha male is in control of these herds and will mate with the dominant female.  Territories can range from 2 to 15 square kilometers depending on the area (Donegan and Keenan, 2002).

Ostriches will sometimes lie completely flat on the ground, with the neck stretched to the extreme. This behavior helps to camouflage the ostrich in the savanna grasses, and is particularly effective for females with brown coloration.  If ostriches detect predators they will usually run away, but if cornered or too slow they can deliver powerful kicks with their legs that can severely injure or kill an animal (Brown *et al*, 1982).

A unique behavior shown by ostriches is their method of temperature regulation.  In the savanna, temperatures vary greatly between day and night.  The ostrich uses its wings to either cover or uncover its upper legs.  In the winter, the ostrich will cover its body with its wings to trap heat in and maintain a high body temperature.  During the summer, the ostrich will relax its wings from its body in order to allow heat to dissipate (Hill *et al*, 2012).

Ostriches perform a complex mating ritual consisting of the cock alternating wing beats until he attracts a mate, when they will go to the mating area and he will drive away all intruders. They graze until their behavior is synchronized, then the feeding becomes secondary and the process takes on a ritualistic appearance. The cock will then excitedly flap alternate wings again, and starts poking on the ground with his bill. He will then violently flap his wings to symbolically clear out a nest in the dirt. Then, while the hen runs circle around him with lowered wings, he will wind his head in a spiral motion. She will drop to the ground and he will mount for copulation (Perrin and Christopher, 1987).

Ostrich communication is rather limited because they are fairly independent animals. Ostriches primarily whistle, growl, or boom.  In general, most common ostriches are rather silent. Communication increases during mating season when males are competing and trying to impress females (Wood and Gerald, 1983).

Contrary to popular belief, ostriches do not bury their heads in the sand. The myth probably originates from the bird's defensive behavior of lying low at the approach of trouble and pressing their long necks to the ground in an attempt to become less visible. Their plumage blends well with sandy soil and, from a distance, gives the appearance that they have buried their heads in the sand (Willmer and Pat, 2009).

Today, Ostriches are classified as a species of least concern by the IUCN Red list. They have a large range, but their numbers are declining. They are threatened by habitat loss due to human development and agriculture. They are still hunted for their feathers, skin, meat and fat (Roots and Clive, 2006).

**Objectives of this study:**

1. To know the care, management and biosecurity measurement of Ostrich
2. To observe the overall behavior of Ostrich.
3. To observe the production performances of the Ostrich.

**Chapter- II**

**MATERIALS AND METHODS**

**2.1. Study Period:**

The study was carried out from 10th July 2016 to 10th August 2016.

**2.2 Study Area:**

The study was conducted at MD Ruhul Amin Farm which is located at Bashkhali of Chittagong. The farm was established at 5th February of 2013. Its total area is about 9.0 acres. The land of the farm is covered with small bushes and few trees. The farm is surrounded by a boundary fence of about 6 feet high.

**2.3 Study population:**

The study was carried out on the management of Ostrich (Struthio camelus). 29 Ostrich consisting of adult male (10), adult females (13) & Chick (6) were present at the time of the study.

**2.4 Collection of Data:**

The following data were collected from the farm-

 ***2.4.1. Housing Pattern­:***

- Total Area of the enclosure.

-Fence materials and height.

***2.4.2. Feeding Pattern­:***

-Feed ingredients.

-Daily ration and Frequency of feeding.

-Daily intake of feed nutrients.

-water supplement

***2.4.3. Medication data:***

- Vaccination

 - Antibiotic therapy

 - Anthelmentics

 ***2.4.4. Productive and Reproductive profile­:***

 - Weight measures of different aged of Ostrich

 - Information about puberty

 - Length of estrous cycle

- Gestation period

 - Age at first fawning

 - Litter size

 - Weaning period

 - Mortality and other traits

**2.5 Data analysis:**

All data were entered into Microsoft Excel 2007 and data management was done.

**Chapter-III**

**RESULTS AND DISCUSSIONS**

**3.1. Housing of Ostrich:**

***3.1.1 Housing of Mature Ostrich:***

The MD Ruhul Amin Farm which is located at Bashkhali of Chittagong provided semi intensive system for rearing of their Ostriches. In 9 acres of place they rear 29 Ostrich in semi-intensive method. The entire farm is surrounded with a boundary about 6 feet height. There are also two small huts in the farm where the birds take shelter during rainy or sunny day. The entire area is covered with small bush. The birds are able to roam freely to a certain extent, thus obtaining some of their nutritional requirements from the pasture.

The owner faces some advantage by rearing in semi-intensive system. These include the followings-

* Relative ease in identifying good producing birds
* Collecting and transporting the eggs
* Savings in feed
* The freedom provided to the birds to choose their mates

Similar report is done by **Guittin,** who reported that Semi-intensive rearing of Ostrich is the most widely used method and even during intensive keeping of ostriches in controlled environment houses it is advisable to let them out to minimize occurrence of leg problems **(Guittin, 1986).**

***3.1.2 Housing of Young Ostrich:***

The young chick does not possess an egg tooth and grows its way out of the relatively strong egg shell possibly aided only by its strong legs and using its third phalange. It can survive without food and water for six or more days depending on its egg yolk reserves. It is recommended that during this period the birds learn to find the food and water which should be easily accessible.

In MD Ruhul Amin Farm the young ostriches are housed indoor and floor space per bird is maintained 1 sq. meter**. Shanawany (1999)** reported that 0.5-1.0 sq. mete per bird is required from 2-5 week of age and then the bird should allow to paddock.

**3.2 Feeding of Ostrich:**

Ostriches, like all birds, are Monogastric. The ostrich has some interesting anatomical features. It has no crop; the Oesophagus is like a pouch where food accumulates until the bird lifts its head to swallow. The last part of the gullet widens to become the glandular stomach (proventriculus) which joins the muscular stomach (gizzard).

**Table 1: Composition of Ostrich feed in MD Ruhul Amin Farm:**

|  |  |
| --- | --- |
| Name of the ingredient | Amount |
| Maize | 52 kg |
| Rice polish | 7 kg |
| Soybean meal | 27 kg |
| Full fat soya | 3.4 kg |
| Protein concentrate | 5.5 kg |
| Soybeal oil | 2 Litre |
| Salt | 400 gm |
| Limestone | 1 kg |
| DCP | 800 gm |
| Metionine | 100 gm |
| Lysine | 70 gm |
| Bioserf | 100 gm |
| SQzyme SSF | 30 gm |
| Square premix broiler | 200 gm |
| Hemicosal dry | 200 gm |
| Hemicomoltox | 200 gm |
| Hedox dry | 12 gm |

The owner fed above mentioned feed alone with by adding Kalmi shak, more maize, salt and oil to the adult birds.

**Table 2: Nutritional requirement amount of Ostrich:**

|  |  |  |
| --- | --- | --- |
| **Name of Nutrient** | **Supplied amount in farm** | **Required amount** |
| ME (Mj/kg) | 12.55 | 10-11 |
| CP ( gm/100gm) | 22 | 18-20 |
| CF (gm/100gm) | <5 | 6-10 |

Feeds were calculated as individual basis then given altogether for the Ostrich. In morning, feed were supplied around 10.00 AM and around 4.00 PM in the evening session. The Nutrient supply of the farm is ME 12.55 Mj/kg. CP and CF are 22 gm/100gm and <5 gm/100gm respectively which are almost same as reported by **Shanawany (1999).**

**3.3 Vitamin-mineral supplementation:**

 AD3E (Vitamin A, D & E preparations) - 15 ml

 Calphos vet (Calcium and Phosphorous preparations) - 20 ml

 DB vitamin (Vitamin and mineral multi-preparations) - 25 ml

 Normal saline - *2* gm/liter.

Here AD3E, Calphos vet and DB vitamin were supplied as vitamin mineral source, for 10 days consecutively and then made an interval of ten days and again continue. Normal Saline was given in summer season to reduce stress.

**3.4 Water supplement of Ostrich:**

After hatching, therefore, the chick's need for water is greater than its immediate need for food. For this reason it may be useful to withhold feed for two to three days after hatching, first, to ensure that the bird find water.

In the Farm water is given two times in a day. In morning water were supplied around 11.00 AM and 5 liter in 4.00 PM. During hot sunny day the water amount is increased.

**3.5 Vaccination Schedule of Ostrich:**

Ostriches naturally come from an environment characterized by relatively low microbial counts and low population densities. Intensification in ostrich farming has led to appreciably higher pressure on the animal to produce optimally under semi-intensive to intensive conditions. The birds are increasingly exposed to more organisms which could negatively affect their total well-being and production. Thus well management should provide to prevent diseases in ostrich farm.

**Table 3: Vaccination schedule of Ostrich in MD Ruhul Amin farm:**

|  |  |  |
| --- | --- | --- |
| Age (day) | Name of vaccine | Route |
| 1 | Marek’s disease | Neck S/C |
| 7 | BCRDV | Eye drop |
| 90 | RDV | Neck S/C |

Vaccination of marek’s and ND are done at 1st, 7th and 90th day respectively and boostering of ND vaccine is done every 6 month interval. Similar report of vaccination of Ostriches is done by **Burger (1996).**

**3.6 Medication of ostrich:**

To control parasites the farm owner provides proper anthelmentic to Ostriches at the 45th day.

Ostriches are the only birds susceptible to anthrax caused by Bacillus anthracis leading to septicemia. Also other bacterial disease outbreak occurs if poor hygienic management. Omphalitis, Air sacculitis, Botulism, Necrotic enteritis and Tetanus are the common bacterial diseases of Ostrich. Proper antibiotic therapy is given if any bacterial infection occurs.

**Table 4: Medication of Ostrich in MD Ruhul Amin farm:**

|  |  |
| --- | --- |
| Name of disease | Treatment |
| Omphalitis and yolk sacculitis | Antibiotic containing Ampicillin andChoramphenicol |
| Botulism | Botulism Antitoxin |
| Anthrax | Penicillin 2-3 lakh |
| Necrotic enteritis | streptomycin at a level of 0.5 g/litre ofdrinking-water |
| Campylobacteriosis | Enrofloxacin such as Enroflox® 1ml/2 L of drinking water |

**3.8 Productive and Reproductive profile­:**

The wild ostrich is sexually mature at four to five years old, while the domesticated ostrich is mature at two to three years; the female is mature slightly earlier than the male.

Some domestic ostriches may start their first breeding season (producing fertile eggs) as early as 18 months of age. After the sexual maturity the male begins the process of nest building well before mating.

In MD Ruhul Amin farm the owner assist the bird for nest building by digging 3m×3m diameter shallow hole in the ground and filling it with coarse sand.

The floor or bottom of the nest should be flat to prevent the eggs from rolling and knocking against each other. Similar process is reported by **Shanawany (1999).**

The productive and reproductive traits of the ostrich were observed during the study period and the findings of the study are discussed in a tabular form below­-

**Table 5: Productive performance in MD Ruhul Amin farm:**

|  |  |
| --- | --- |
| **Chick** | **Adult ostrich** |
| **Day old** | **3-months old** | **6-months old** | **12-months old** | **Male** | **Female** |
| 700-750 g | 25-30 kg | 55-60 kg | 90-110 kg | 100-145 kg | 95-140 kg |

In this study the adult males and females weight were 100-145 kg and 95-140 kg respectively, which is more or less similar to the findings of **Shanawany (1999).**

Severe weather or climatic fluctuations influence the level of productivity. This influence is more pronounced during the second or third cycle. Heavy rain or sudden cold spells adversely affect laying ability and birds may go off lying during such periods. The feed consumed by the ostrich hen is used mainly for maintenance and egg production. If there is any marked deficiency in any of the required nutrients, egg productivity will decline or even stop completely. Breeding birds should be introduced to their breeding paddocks at least 30 days before the onset of lying.

In the MD Ruhul Amin farm colony mating system is done where there is more than one male in the paddock involve in mating with females.

**Table 6: Reproductive performance of Ostrich:**

|  |  |
| --- | --- |
| **Reproductive Criteria** | **Description** |
| 1. Breeding season | May/June to January because the peak production period of ostriches is stimulated by the lengthening of daylight. |
| 2. Sexual maturity | Males | 3 years of age |
| Females | 2 years of age |
| 3. egg production | 50-60 eggs/female/breeding season |
|  4. incubation period | 42 days |
|  5. Egg weight | 1.4-1.9 kg |
|  6. Egg length | 17-19 cm |
|  7. Egg width | 14-15 cm |

 The ostrich breeding season, age of sexual maturity, egg production, incubation period and egg weight in the farm are same as reported as **Button** **(1995).**

**3.9 Management of ostrich chicks:**

Environmental stresses can have a devastating impact on the of ostrich chicks. Attention to factors such as temperature, humidity, proper nutrition, access to water, handling and disease prevention will minimize stress during the vital first few weeks of the ostrich's life.

**Table 7: Brooding temperature of Ostrich in MD Ruhul Amin farm:**

|  |  |
| --- | --- |
| **Age (Day)** | **Temperature (**˚**F)** |
| First 5 hour | 96 |
| 5th hour-3 day | 95 |
| 4-7 day | 95-90 |
| 2nd week | 90-85 |
| 3rd week | 85-80 |
| 4th week | 85-75 |
| After 4th week | 75 |

The brooding temperature in MD Ruhul Amin farm is started from 96˚F which is gradually decreased upto 75˚F. It is slightly higher than reported as **Shanawany (1999).**

**Limitations**:

1. Lack of time was the main limitation.
2. The farmer was not co-operative to give information.

 3. The entry in the farm was strict, so proper data couldn’t collect.

 4. There was poor and incomplete record keeping system in the farm.

**Chapter-IV**

**CONCLUSION**

The study was carried out to know the overall management of Ostrich at MD Ruhul Amin farm of Bahkhali in Chittagong, giving more emphasis on housing, feeding, productive and reproductive profiles. Total 29 Ostrich were kept in 9 acres of Semi-intensive system farm in a bushy area which is surrounded with 6 feet height fence. Available feeds supplied to young Ostrich were similar to broiler feed where adult are fed layer feed alone with Kalmi shak, More maize oil and salt. In this study it was found that the average birth weight of males and females Ostrich were ranging from 700gm to 800gm and adult male and female weight were ranging from 100-145 kg and 95-140 kg respectively. It was also observed that the Sexual maturity, egg production, incubation period and Egg weight of Ostrich were 3 years in male 2 years, 50-60 eggs/female/breeding season, 42 days and 1.4-1.9 kg respectively. Farm veterinarian did regular health monitoring with regular deworming, Medication and vaccination.

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