PROJECT ON "POVERTY ALLEVIATION THROUGH SCIENTIFIC TURKEY FARMING IN SELECTED RURAL AREAS OF KANCHEEPURAM DISTRICT OF TAMILNADU"
DEPARTMENT OF BIOTECHNOLOGY, NEW DELHI - 110 003
AND
INSTITUTE OF POULTRY PRODUCTION AND MANAGEMENT TAMILNADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY, NANDANAM, CHENNAI - 600 035.
SCIENTIFIC TURKEY FARMING

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2010
FOREWORD

Nutritional status of the population is an important aspect in a developing country like India. To satisfy the nutritional requirements, consumption of animal protein like meat, milk and egg is essential. Turkey provides one such nutritious meat. The meat is tender and contains lesser amount of cholesterol than other meats. Of late, in Tamilnadu, turkey farming is fast gaining momentum. Turkey rearing is gaining popularity among the self help groups, marginal and landless farmers as a profitable self employment avenue. In the year 2004-05 a total of hundred turkey farms were established successfully by the University in Theni district of Tamilnadu, through a Government of Tamilnadu sponsored project. The project "Poverty alleviation through scientific turkey farming in selected rural areas of Kancheepuram district of Tamilnadu" envisages providing livelihood to the rural poor women living below poverty line. This book "Scientific turkey farming" published under the project sponsored by the Department of Biotechnology, elaborates on housing of turkeys, management, feeding, flock health, bank credit and insurance. It is written in a simple and lucid manner for the farmers to understand. It also offers a valuable insight to those who wish to venture into turkey farming. I congratulate the authors of this book.

Dr. P. Thangaraju,
Vice Chancellor
Tamil Nadu Veterinary and Animal Sciences University
Madhavaram Milk Colony
Chennai-600 051.
PREFACE

The Department of Biotechnology in association with Institute of Poultry Production and Management a constituent unit of Tamilnadu Veterinary and Animal Sciences University is implementing a project "Poverty alleviation through scientific turkey rearing in selected rural areas of Kancheepuram district of Tamilnadu". The project envisages introducing a profitable enterprise - Turkey farming to augment the living standards of the poor self help group women in rural areas. The women are encouraged to take up the enterprise as means of a sustainable livelihood. The self help group women from the lower strata of the society were selected, trained in scientific turkey farming and supplied with critical inputs. I am sure that the project will certainly go a long way in empowerment of rural women. Turkey rearing will not only facilitate the development of the economic status of the rural poor but also their nutritional security. This book covers various methods of scientific turkey farming, which has been explained in an easy language. I congratulate the authors of this book.

Dr. D. Thyagarajan
Director
Centre for Animal Production Studies
Madhavaram Milk Colony
Chennai-600 051.
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1. TURKEY FARMING – PRESENT STATUS

In India, sixty percent of the population is dependant on agriculture and allied activities. However the contribution of this sector to the gross domestic product is less than 20%. Although India is self-sufficient in food grains production, it is yet to attain nutritional security. This can be overcome by augmenting the production of protein rich animal products like milk, egg and meat. Livestock and poultry farming are potential income generating activities in rural areas which can improve the economic status of the rural poor.

Among poultry, turkey occupies an important position next to chicken in the world. They are reared only for meat and its meat is the leanest among poultry. Turkey farming is very popular in western countries and the major turkey producing countries are United States of America, Canada, Germany, France, Italy, Netherlands and the United Kingdom. The annual per capita consumption of turkey meat in the above said countries ranges from 4-8 kg per year.

In many European countries roast turkey has long been a customary Christmas dish. In the United States the bird is especially associated with Thanksgiving. Turkey production has thus tended to be seasonal, although in the United States and some other countries, ready-to-cook, lean, boned turkey is available in rolls any time of the year.

According to the United Nations - Food and Agriculture Organization (FAO), world turkey meat production was estimated at 5,797,748 tonnes in 2006. The U.S.A. stood first with a turkey meat production of 3,259,700 tonnes.

Turkey Farming In India

In India, turkey is reared mainly for meat. It is growing in stature as an important poultry enterprise. They are capable of growing in any agro-climatic conditions. It is reared mostly in rural areas in backyard. Scientific practices are yet to be adopted in a large scale. In urban areas consumption of turkey meat is gaining popularity. Kerala and Tamil Nadu are the leading states in turkey production. Indigenous and non-descriptive turkeys are found in good numbers in Kerala, Tamil Nadu, eastern districts of Uttar Pradesh and other parts of India. The three commonly found varieties of turkey in India are Broad breasted bronze, Broad breasted White and Beltsville Small White. White turkeys seem to be more suitable for Indian conditions. Presently, elite turkey stocks are maintained in Tamil Nadu Veterinary and Animal Sciences University, Chennai; Central Avian Research Institute, Barielly; Central Poultry Development organization, Hesserghatta and other state government farms.

Turkeys are no longer seasonal "crop". It is being produced round the year and all sections of the society consume it without any taboo. They can be reared with a minimum investment. They are marketed between 16 to 24 weeks of age depending upon the requirement and market condition. Turkey farming is a prospective micro entrepreneurial avenue and can definitely improve the economic status of small and marginal farmers. Farmers who have been not able to hold on to the changing trends in broiler and layer industry are also switching on to turkey rearing as an alternate farming. Therefore it is necessary to promote turkey farming in a large way.

Turkeys can easily be started by hatching eggs or by raising young pouls. They can be grown and home processed without the use of expensive processing equipment, or they may be sold to live markets.
Advantages of turkey farming:

- Turkey meat is considered a delicacy.
- The meat is tender, tastier and contains lesser fat than chicken.
- They are more disease resistant than chicken.
- They are more ideally suited for semi intensive or range system of rearing.
- Number of vaccinations are fewer.
- The meat is always sold at a premium price.
- The egg is nutritious and contains quality protein.
- Turkeys are good foragers - the feed cost can be minimized.

Disadvantages of turkey farming:

- Critical inputs like day old turkey poults, hatching eggs, and turkey feed are not easily available.
- Management of turkey poults are more difficult than chicks.
- Tom turkeys are heavy in size. So they are not able to mate the hens frequently and hence the fertility rate is low in turkeys.
- Feed conversion efficiency of turkeys is much lesser than chicken (8-24 weeks).
- Heavier body weight of turkeys, restrict the retail sales of turkey meat to a large extent.
2. VARIETIES OF TURKEY

Turkeys are native to North America. They belong to the order Galliformes, along with chickens. There are two species of wild turkey: the North American Wild Turkey (*Meleagris gallopavo*) and the Central American Ocellated Turkey (*M. ocellata*). The modern domesticated turkey was developed from the North American Wild Turkey by the indigenous people of Mexico (Aztecs). Turkeys were taken to Europe by the Spanish, who found them as a favourite domesticated animal among the Aztecs. The Aztecs used turkeys as a source of protein (meat and eggs) and the feathers for decoration.

The “breeds” of turkeys often referred to are actually varieties that originated from the North American wild turkey. The seven standard varieties recognized by the American Poultry Association are Bronze, White Holland, Bourbon Red, Narragansett, Black, Slate and Beltsville Small White. The two varieties that are not recognized are Broad-Breasted Bronze, Broad-Breasted White. (also called Large White). The most commonly raised commercial variety is the Large White. The Broad-Breasted Bronze, similar in size and conformation, is less popular because of a preference for white feathering.

The major primary breeders of turkeys in the world are:

- British United Turkeys
- Hybrid Turkeys
- Nicholas Turkey

They offer 10 parental strains Big 6, Big-9,BUT-8, BUT-9,BUT-10, Hybrid converter, Hybrid Grade maker, Hybrid XL, Nicholas 900& Nicholas 300.

**Broad Breasted Bronze:**

The plumage colour is black with an iridescent sheen of red, green and bronze. The beak is light horn at tip and dark at base. The colour of the throat wattles is red changeable to bluish white. The beards are black. The shank and toes are dull black in young and smoky pink in mature birds. Of all meat animals, the Broad Breasted Bronze uniformly produces well flesched carcass.

**Body weight:**

- Male : 16 kg
- Female : 9 kg

![Broad Breasted Bronze](image-url)
Broad Breasted White:
This was developed in 1950 in Cornell University of America. This is a hybrid of Broad Breasted Bronze and White Holland. The plumage is solid white in colour. The beak is light pinkish horn. The colour of throat wattle is red changeable to pinkish white. The fertility rate of this variety is higher than both the parents. Commercial rearing of turkey is mainly based on this variety.

Body weight:
- Male: 15 kg
- Female: 8 kg

Beltsville small white
This was developed in United States Agricultural Research Institute. This variety was popularized all over the world from 1941 to 1962. This resembles Broad Breasted White variety in its colour and external appearance but, is smaller in size. The egg production rate, fertility, and hatching ability are higher in this variety than the others; but the brooding ability of this variety is lower when compared to others.

Body weight:
- Male: 8 kg
- Female: 4 kg

White Holland
This variety of turkey was developed from Bronze variety. The plumage of this variety appears solid white in colour.
Body weight:

Male : 15 kg  
Female : 8 kg

**Narragansett**

This variety was developed in Rhode island of America by crossing between country and wild turkeys. The plumage of this variety is grayish black in colour with white markings. The colour of throat wattle is red changeable to bluish white. The beard is black. In adults the shank and toes are deep salmon.

Body weight:

Male : 15 kg  
Female : 8 kg

**Bourbon Red**

This variety was developed in Kentucky, America. The plumage is brownish red with white wing and tail markings. The beak is light horn at tip and dark at base. The colour of throat wattle is red changeable to bluish white. The shank and toes are reddish pink in adults.

Body weight:

Male : 15 kg  
Female : 8 kg

**Black:**

This variety of turkey is reared in Spain, Italy, and France. The plumage colour is metallic black. The beak is slate black. The colour of throat wattle is red changeable to bluish white. The beard is black. The shank and toes are pink in adults.
Body weight:
Male : 15 kg
Female : 8 kg

Economic traits
(Beltsville Small White Variety)

<table>
<thead>
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<th>Male : female sex ratio</th>
<th>1:3 or 1:4</th>
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<tr>
<td>Average egg weight</td>
<td>70 g</td>
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<td></td>
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</tr>
<tr>
<td>Female</td>
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3. SYSTEMS OF REARING AND HOUSING

SYSTEMS OF REARING:

Basically there are three systems of rearing the birds. System of rearing will depend on the amount of money that can be invested, place of rearing, number of birds, etc. The three types are as follows:

1. Free range system:

   In this system of management, the birds are free to move about in an open area. (Unrestricted movement) The birds have more time to access the open area. The maximum stocking density is 1000 hens per hectare (Each hen will have an area of 10m²). Shelters or natural shades are recommended for range production. If shelters are provided they must in adequate numbers/space to prevent over crowding.

Disadvantages:

- Management problems encountered, especially during disease outbreaks.
- Large area is required to rear the birds.
- High proportion of dirty eggs.

2. Semi Range System:

   This system most often uses an existing farm building usually open fronted with an adjoining yard. The maximum stocking density is not greater than 4000 hens per hectare of ground available to the hens or one hen per 2.5 m². This system probably survives mainly for small domestic flocks, where it is more convenient to set aside a small amount of land for their exclusive use than to have them roaming at large.

Advantages:

- This system avoids the need to shut up birds at night.
- Capital costs low.
- Hens have continuous daytime access to open air runs.
Disadvantages:
- Build up of disease.
- High proportion of dirty eggs.

3. Intensive rearing system:
   a. Deep Litter:

   The maximum stocking is not more than seven hens per square meter of floor space.

Advantages:
- Management problems encountered are less.
- High proportion of clean egg production.

b. Cage system:

   Cage rearing system can be adopted in day old turkey poults till they attain 8 weeks of age.
LOCATION OF FARM AND HOUSING:

Before starting a farm, care has to be taken on location of the farm, site selection, system of rearing, type and pattern of the houses, etc. Poultry need housing mainly to protect them from predator, theft, adverse climatic conditions and management and to provide ideal conditions for optimum performance. An ideal or a well-constructed poultry house is one which helps conserve the bird’s energy, make for economy in feed, increase egg production, improve fertility, promote health and growth and keep the mortality at low level.

Site Selection:
The following points have to be borne in mind before site selection:

- A virgin area is most preferred to all other areas.
- The farm has to be located away from residential and industrial area.
- The site selected is to be at least 1 km away from other nearby poultry farm to avoid infection.
- The farm is to have good access to market area; the road has to be motorable, for easy transportation of farm input and output.
- A three-phase electricity supply is to be always available to the farm.
- The selected land has to be elevated and rectangular to the extent possible.
- More than sufficient potable (drinking) water is to be always available for farm and farm personnel use.
- The selected site is not to be situated in low lying or water logging area.
- Sufficient space has to be available for future expansion.

Basics of Building Design:

- **Roof Type** - Gable type or Shed roofs are most preferred over other roofs. Monitor opening in the gable roof is also helpful to allow escape of hot humid air.
- **Foundation** - Adequate foundation for the building other than pole building is to be provided.
- **Floor** - Concrete floor is highly desirable for cage and floor types for ease in cleaning and for effective disinfection.
- **Walls** - Solid portion of the wall is constructed with durable material impervious to moisture.

Design for Individual Building:

Orientation and Spacing:

East-West Orientation is preferred. To achieve maximum air movement, houses have to be perpendicular to the prevailing wind direction.

Distance between the buildings:

Spacing between the buildings is of great importance to prevent disease spread and better ventilation (minimum 30 feet).
Building Width:

In naturally ventilated houses, the width can not be more than 30 feet. Narrower houses are preferred in hot humid climates.

Building Length:

This can be of any convenient length. In long buildings, doors are often required to be constructed in the side walls at the suitable distances for services and bird removal.

Height of the shed:

The height of the farm house depends upon the type of roofing. Normally, in all types of roofing the height of the house has to be about 10 to 12 feet. But in katcha roofing the height of the roof has to be 15 feet. In cage house the height has to be above 15 feet. The height of the side wall along with the net has to be 6 to 7 feet.

Sidewalls:

The height of the sidewall has to be 1.5 feet. Nets/welded mesh has to be fitted for a height of 5 feet above the side walls. The width of the side walls has to be 4.5 inches.

Roof overhang:

The roofs need to have an overhang of 3 feet on all sides to prevent rain from blowing inside the house. It is necessary to slope the overhang toward the ground.

Doors:

The doors have to open outwards in one direction only.

Lighting facility:

The lights fixed have to be 7 to 8 feet above the floor level. The maximum distance between two 60 watts bulbs has to be 10 feet. The distance between two tubes has to be 15 feet.

Types of houses:

- Brooder house (0 to 8 wks)
- Grower house (9 to 24 wks)
- Layer house (above 24 wks)
- Cage housing of turkey (0 to 8 wks)

POULTRY FARM EQUIPMENTS:

The equipments used in poultry houses have to be simple, easy to use and durable. their cleaning and disinfections have to be easy. The equipments can be listed as follows:

Brooder Equipment:

Brooder equipments are used to provide warmth and light and to rear the poult during the first few weeks of life. The brooders consist of a heating source, reflectors to reflect the heat and light towards the chicks. Depending on the heating source or fuel, different types available are:

- Electrical brooders
- Gas brooders
Coal/charcoal brooders
Kerosene wick stove brooders

The electrical brooders use infrared bulbs, incandescent bulbs, heating filaments or coils with thermostat device or special focus bulbs, which reflect the heat downwards. Gas brooders are used wherever gas is cheaper or in farms where "bio-gas" is produced by using cage droppings or cattle dung. Coal, charcoal, wood, lignite and kerosene wick stoves are used as brooders in places where electricity is not available or costly and where power failure is quite common. A centralised heating system is adopted in environmentally controlled poultry houses. Here the entire brooder house is heated to 32°C using electricity, gas, etc. as fuel.

For effective utilization of heat and light generated from the brooders, some sort of reflecting device, usually made up of polished or enamel coated metal are used, to focus the heat towards the poults. Metal canopy (open umbrella shaped), hover or even metallic lampshades; with adjustable stands or hanging devices are used for this purpose.

Chick guards:

Chick guards are thin sheets of metal, hard board, cardboard or bamboo mat of 35 to 45cm height and of varying lengths. They are used to restrict the movement of chicks, so that the chicks can be kept closer to the brooders and prevent them from chilling. Moreover, it is used to round off the sharp corners, and thereby prevents trampling of chicks during nights, vaccination, debeaking and catching.

Feeders:

Feeders are equipments used to feed the birds, by placing feed in them. They may be conventional, semi-automatic or automatic of various designs and shapes such as linear, circular of hanging type, made up of either metal or plastic.

Waterers:

Waterers or drinkers are used to provide water to the birds. Like feeders, waterers are available in different sizes, designs and shapes. They may be conventional, semi-automatic or automatic channels, through, cups, nipples or basins, made up of metal, plastic or both.

Debeakers:

Automatic de-beaking equipment is available.

Vaccinators:

- Automatic Vaccinator
- Fowl pox Vaccinator
- Needle with syringe
- Sterilizing apparatus
- Vaccine container
Miscellaneous Equipments:
- Nest
- Shovels
- Sprayer
- Buckets
- Egg filler flat
- Trolleys
- Incinerator
- Flame gun (or) Blowlamp
- Weighing machines / balance
- Measuring jar or cylinder
4. POULT MANAGEMENT

Great care has to be provided for the management of turkey poults. Turkey poults are capable growing very fast. As a result, upto 8 weeks of age they are fed with high protein diet to enable them grow faster. Feed containing vitamins and anticoccidials are also to be provided. Turkeys are termed as poults from day-old to 8 weeks of age; from 9 weeks to 24 weeks they are called as turkey growers; and from 24 weeks when they start laying eggs they are called as turkey layers / breeders.

Day-old poults, weigh 45-50 grams. They are transported to the turkey farm within 24 hours of hatch. Boxes of live poults are to be handled in a level position and never thrown. Poults are removed by tilting the box slightly and pushing the birds out carefully, or by inclining the box slowly and then withdrawing it from under them with a smooth, swift movement. When removed by hand (with the hands forming a scoop) the poults must not be squeezed. They are not be dropped more than 15 cm on a hard floor or 30 cm on a soft floor.

Importance of brooder house management

Livability is the keyword as it relates to turkey brooder house management. Percent livability in the brooder house is a good indicator of future flock performance. Economic loss from early poults mortality is not confined to poults cost as greater economic loss often is experienced in the future performance of the surviving poults.

In a brooding and growing program from 0-8 weeks old, following livability is expected:

Hen poults—97% livability
Tom poults—95% livability

Before procuring the poults the following points are to be considered. To compensate the mortality in the turkey poults, 5% extra poults are to be procured at the beginning. Begin with good quality poults. Secure poults from breeders tested negative for Salmonella and PPLO.

Poults quality assessment

It is important to assess the quality of each hatch received. They may be different due to the following factors:

- Age of breeder flock
- First egg poults
- Breeder nutrition
- Heat stress
- Hatchery profile
- Hatchery sanitation
- Age of egg set
- Egg handling, storage and sanitation

When poults arrive, check a representative sample for the following:

Dehydration can be a major factor in mortality during the first three days in the farm. Good hatchery managers pull the hatch at a time appropriate for the majority of poults. It is necessary to have poults hatch over the shortest time possible.

Signs of dehydration

- Skin over the legs are not be tight.
- Blood vessels in the leg are not be standing out and prominent.
The skin has to move freely over the keel.

Birds are not supposed to “hit” the drinkers.

**Navel**

- They have to be closed and dry. Open navel favor the entry of bacteria.
- Abdomen of the poult is not supposed to be mushy when picked up. This indicates a navel infection.

**BROODING SYSTEMS**

Pouls can be started successfully either on the floor or in batteries.

**Facility and equipment recommended for brooding of turkeys**

<table>
<thead>
<tr>
<th>Item</th>
<th>Age of Poult</th>
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<tbody>
<tr>
<td></td>
<td>0-4 weeks Brooding</td>
</tr>
<tr>
<td>Space</td>
<td>0.5 - 0.6 square feet per poult</td>
</tr>
<tr>
<td>Brooders</td>
<td>1 per 100 poult</td>
</tr>
<tr>
<td>Waterers</td>
<td>2 per 100 poult</td>
</tr>
<tr>
<td>jars</td>
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</tr>
<tr>
<td>Feeders *</td>
<td>5 cm per poult</td>
</tr>
<tr>
<td>Trough</td>
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<tr>
<td>Round</td>
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</table>

* Recommendations based on linear inches of feeding space. Trough feeders provide feeding space on both sides, so a feeder 3 feet long provides 6 feet of feeding space. Measure the outer circumference of round feeder pans to determine available space.

**Floor brooding:**

**Preparing for pouls**

Thoroughly clean, disinfect the brooder house and equipment one week before the pouls arrive. Clean out old litter and accumulated manure and remove dust from sidewalls and ceilings. The entire interior should also be thoroughly washed down. Pressurized washers are especially useful for cleaning walls, ceilings and hard-to-reach areas. Water under high pressure can also be used.

Follow the cleanout with a good disinfectant spray. Disinfectants do not penetrate accumulated dirt or manure, so they are not substitute for a thorough cleaning. Rinse the house down again if recommended on the disinfectant label and allow the house to dry completely. Airing the house for several days also helps to eliminate moisture in the house.
Put down 2 inches of litter, have all equipment in place and make sure it is operating properly 2 or 3 days before the poults arrive. Early preparation allows time to make necessary repairs and adjustments. Operate brooders at the proper temperature at least 24 hours before poults are delivered, to warm house and so that the thermostats can be adjusted. Feed and water have to be available, so that the poults start eating and drinking immediately after arriving.

Place poults under the brooders as quietly as possible. Do not make sudden loud noises that might cause them to crowd. Check the poults quietly and frequently, especially just before and after dark.

**Litter material**

Litter material has to be clean, dry, absorbent and dust-free. Paddy husk, ground nut hulls and other commercial litters can be used, depending on cost and availability. Any organic litter will support mould growth if it gets more moisture content.

Do not use excessively fine litter materials that poults are likely to consume. Litter consumption can increase mortality due to crop impaction. Litter can be covered with rough paper for the first few days to keep the poults from eating litter. Litter is not to be covered with smooth-surfaced materials since these cause serious leg problems. The paper has to be removed when the poults are 14 days old.
Remove any wet or caked litter and add new litter to maintain a depth of 5 cms. Stirring litter helps to maintain its quality as poults get older.

**Brooders**

New turkey farmers can brood 75 to 100 poults under each hover although some experienced farmers can brood more. Allow at least 12 square inches of floor space per poul under hover which confine heat. Radiant brooders have smaller hovers but extend the heat area outward.

Popular brooding systems are heated by electricity or gas. Choose a system which relies on the least-costly fuel available. There is more risk of fire with open flame brooders and they are to be kept in good operating conditions.

Experienced turkey farmers can select the optimum brooding temperatures by observing poults. Poults huddle together under the hover when temperature is too low and will move out against the brooder guard ring when temperature is too warm. Poults that consistently stay on one side of the brooding area are trying to escape a drafty area. Comfortable poults will spread uniformly under and around the edge of the brooder. Poults are the most accurate “thermometer”, but growers need some experience to interpret the reaction of poults.

Place a thermometer at the edge of the hover, about 7.5 cms above the litter. Brooding temperature has to be 100°F for the first week and lowered by 5°F each following week down to 75°F.
Brooder Guards

Brooder guards are barrier placed 3 to 5 feet from the edge of the brooder to confine poults near the heat source. Guards can either be removed after a week or enlarged and retained for a second week.

Brooder guards have to be 30-45 cm high. An open mesh material (mesh as large as three-fourths of an inch) lightweight hardware cloth or chicken wire can be used during warm weather. Solid materials such as metal sheets, corrugated paper, tarred paper or plywood have to be used during cold weather. The solid wall protects poults from drafts and helps retain heat near the hover area. Support the brooder guards as needed to keep them in place.

Equipments

The figure illustrates a typical initial arrangement of brooding equipment. Place feeders around the hover in a pattern resembling spokes of a wheel so feeders do not hinder movement of poults to or from the heat source. Small trays of feed and some feeders has to be very close to the edge of the hover or extend slightly under the hover to help poults find feed. Fill water fountains and place them along the edge of the hover.

Use contrast colour tray feeders for 3-4 days, or until the poults are eating well. The trays can then be gradually removed and the feed troughs and waterers can be gradually moved away from edge of the hover. Keep the feeder troughs full for the first 4 days. The level of feed in troughs can then be reduced to not more than two third full to control feed wastage. After the first week, raise feeders at weekly intervals so the lip of the feeder is the same height as the poult’s back. Be sure that all equipment, feed and management changes are made gradually. Proper attention is given to prevent poults from crowding or piling on top of each other in the corners of the floor pens.

BATTERY BROODERS

Battery brooders are commonly used when smaller groups of poults are started at frequent intervals. Some farmers feel that the added expense of battery brooding is justified because poult’s get off to a good start. Poults in battery brooders can be watched closely during these critical early days of brooding. The close confinement and smaller numbers of poults per group reduce crowding problems and may help poults find feed and water earlier.
Construct the battery room to provide adequate ventilation so that the room temperature can be maintained at about 70°F. Temperature in the warmer part of the battery has to be maintained according to the same schedule as for floor brooding. Provide 18-24 square inches of battery floor area per poult, depending on how long they stay in the battery brooder.

If the wire floor has mesh of one-half inch or larger, cover it with a coarse cloth or crinkled paper for the first few days to prevent leg injuries. Hocks frequently become caught in one-half inch wide floors. Battery brooders are heated electrically. High mortality can result from piling, especially as darkness approaches.

Light

Recommended lighting standards have generally called for relatively bright lights (10-15 foot candles) around the clock for the first 2 weeks. Thereafter, a 16-hour day is to be provided and light intensity need to be gradually reduced to 1 foot candle.

Brooding sanitation

- Clean all waterers with a brush and disinfect them daily. Do not spill water in brooder area.
- Move portable feeders and waterers daily to help eliminate damp or wet litter.
- Remove or stir damp or caked litter daily to prevent mould buildup.
- Maintain proper ventilation.
- Remove and record dead birds from the house in time.
- Use foot bath for disinfecting shoes and boots of caretaker at entrance of brooder house.
- Servicemen have to use disinfecting pan or keep rubber boots just inside brooder house.
- Do not allow visitors in brooder house.
- Keep all animals, rats, dogs, birds, etc. out of brooder house.

Methods to control mortality due to starve out condition:

Young turkey poults are not capable of taking feed properly. Therefore, in poults, starve out deaths are more common. In order to avoid this, feed can be kept in coloured plastic plates. One or two trainer chicks (chicken) can be allowed along with the turkey poults so that
the poults start taking the feed along with the chicks. Colored marbles or pebbles are placed in feeders and waterers to attract poults towards them. Since turkeys are fond of greens, some chopped green leaves can also be added to the feed to improve the feed intake. The brooder diet has to contain amino acids like lysine and methionine in recommended level. To prevent the occurrence of paralysis in turkeys, calcium and phosphorus have to be added in the diet during the first eight weeks of age.

Cannibalism:

Cannibalism is one of the vices seen in turkeys. This habit causes injury to the feathers, toes and vent.

Reasons

- Less floor space.
- Increased brooding temperature
- High energy diet
- Deficiency of salt in diet

Preventive measures

- Proper managerial practices.
- Diet should contain adequate nutrients.

Debeaking:

Debeaking controls feather picking and cannibalism. All confined birds and most range turkeys are debeaked. Debeak poults at 6-10 days of age. Leave at least one-eighth of an inch of the beak ahead of the nostril. Commercial electrical debeakers use a red-hot iron bar to cut and cauterize the beak. Ranged turkeys can be debeaked later if picking or serious fighting occurs. Make sure feeders have at least one-half to three-fourths of feed for debeaked turkeys.

Desnooding:

Desnooding removes the snood, a fleshy appendage located just behind the top of the base of the upper beak. Removing snoods of male poults reduces fighting, prevents head injuries and prevent or reduce the incidence of erysipelas. Male poults are usually desnooded at the hatchery on request of the grower.

Toe Clipping:

Removal of the toenails of turkeys is usually done at the hatchery, but toes of turkeys as old as 5 weeks can be clipped. Toe clipping can improve the grade of processed turkeys. Turkeys in large groups, especially when excited, often step on flock mates and cause scratches or skin tears on the backs and sides. Increasing flock sizes and densities aggravate the problem, especially when turkeys are reared in confinement.

The most popular form of toe clipping involves cutting the inside and middle (front) toe on each foot. Although toes can be cut with surgical scissors or a nail clipper, a modified hot-blade debeaker cauterize the cut and reduce bleeding. Make cuts just inside of the outer toe pad to remove the root of the nail and prevent regrowth.
General management tips

Practice good management

The turkey poult, like the young of any species, requires attention. Close observation of poult movement and sound will reveal much about poult comfort and health. Most poult mortality can be traced to inattention, poor sanitation, infrequent visits to the brooder house, faulty equipment, inadequate ventilation, or poor management practices.

Poults that become sick or crippled during the brooding period seldom recover fully. Injured poults have trouble competing for feed, water and hover space. They cannot escape being walked on or picked on by other poults. Injured or sick poults usually die or develop poorly and have lower feed efficiency. Sick and crippled poults have to be culled since they will provide growers with little return.

Provide market turkeys with a complete ration, formulated to meet their nutritional needs. Provide a constant supply of fresh, clean water. Adequate feeder and waterer space is needed. Remove wet feed promptly before moulds develop. Use chlorinated water.

Walk among the flock daily and watch for sources of potential trouble such as malfunctioning equipment and dead, sick or crippled birds. Look for changes in the activity patterns of the birds. Daily records of feed and water consumption and flock mortality can be used to help spot trouble early. Check temperature regularly and adjust equipment when necessary. Clean the fans and light bulbs regularly. Foul air indicates that ventilation has to be improved.

A good health program prevents diseases. Good sanitation, recommended vaccination and proper use of medications are important factors in sound health program. Accurate and early diagnosis of sick birds is a key step in controlling the spread of diseases. Commercial producers usually start several flocks each year. When turkeys are about 8 weeks old, they are moved from the brooder house to grower houses.
5. GROWER MANAGEMENT

Good grower management of turkeys require appropriate growth and good flock uniformity. Poor flock uniformity lead to a variable onset of egg production.

MANGEMENTAL REQUIREMENTS:
Floor space requirement of grower turkey

<table>
<thead>
<tr>
<th>Age in weeks</th>
<th>Floor space (sq feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 to 12</td>
<td>2 - 2.5</td>
</tr>
<tr>
<td>13 to 20</td>
<td>3 - 3.5</td>
</tr>
<tr>
<td>21 to 24</td>
<td>4 - 4.5</td>
</tr>
</tbody>
</table>

Feeder and Waterer space requirement of grower turkey:

<table>
<thead>
<tr>
<th>Feeding space</th>
<th>Watering space</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - 7.5 cm</td>
<td>2.5 cm</td>
</tr>
</tbody>
</table>

Number of feeders and waterers required for 100 grower turkeys:

<table>
<thead>
<tr>
<th>Age in weeks</th>
<th>Length of linear feeders</th>
<th>Number of feeders</th>
<th>Area of circular waterers</th>
<th>Number of waterers</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 to 24</td>
<td>120 cm</td>
<td>3</td>
<td>112 sq.cm</td>
<td>2</td>
</tr>
</tbody>
</table>

Feeding:

After 8 weeks of age the turkeys are to be fed with grower mash. Feed properly balanced ration, so that they are capable of laying good number of eggs later. (See chapter 7)
Lighting programme:

Turkeys start their reproductive cycle in response to light stimuli. For good egg production it is essential that turkey females are brought from a long day length to a short one and back again to a long day length to trigger their reproductive cycle, i.e., to mimic the natural change in day length from winter to spring.

**Step down programme for females during growing:**

From brooding until the end of week 11 the light intensity has to be kept constant at around 30 lux, with a day length of 14 hours. It is important to check this periodically with a light meter and to clean light bulbs or tubes regularly to remove the dust that accumulates on them reducing their effectiveness. Replace always burnt out or damaged bulbs/tubes immediately. From 18 weeks of age breeder females must be reared under a short day length to ensure that they can be stimulated into egg production by an increase in day length when transferred to the laying houses. During the conditioning period, the day length is decreased to 6/7 hours and the light intensity increased to between 50 and 60 Lux.

**Lighting programme for grower turkey**

<table>
<thead>
<tr>
<th>Age (weeks)</th>
<th>Hours</th>
<th>Lux level Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-11</td>
<td>14L:10D</td>
<td>30 lux</td>
</tr>
<tr>
<td>12</td>
<td>13L:11D</td>
<td>Slowly increase from 30 lux to 50/60 lux over this period</td>
</tr>
<tr>
<td>13</td>
<td>12L:12D</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>11L:13D</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>10L:14D</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>9L:15D</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>8L:16D</td>
<td></td>
</tr>
<tr>
<td>18-28/29</td>
<td>6/7L:17/18D</td>
<td>50-60 lux</td>
</tr>
</tbody>
</table>

**Other managerial practices:**

- Growers that are stunted, crippled etc., have to be culled periodically.
- All vaccines are to be given in grower stage.
- To remove the ectoparasites, delousing is done before they start laying. If it is done after the start of lay, there will be a disruption of egg production.
- Delousing is done on the day of bright sunlight. Only after complete drying, the birds are allowed in the sheds. To prevent the birds from accidently consuming the drug, neck of the bird has to be held and the remaining part to be immersed in the solution. For medicated bathing malathion and sumithion can be used at the rate 0.2%.
- The birds which are grown in deep litter system have to be dewormed once in two months.
- The litter has to be raked regularly.
6. BREEDER MANAGEMENT

The ultimate objective of breeding turkeys is the efficient production of quality meat. This has to be combined with a further objective of efficient chick production in the parent generation. This combination is a challenge for the primary breeder. The negative correlation which exists between these characteristics means that it is difficult to make genetic progress in both fields at the same time.

MANAGEMENTAL REQUIREMENTS:

<table>
<thead>
<tr>
<th>Requirements</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor space</td>
<td>5 sq ft</td>
</tr>
<tr>
<td>Feeding space</td>
<td>7.5 cms</td>
</tr>
<tr>
<td>Watering space</td>
<td>3.5 cms</td>
</tr>
<tr>
<td>Nest space / 5 hens</td>
<td>One nest 14X24X24 inches</td>
</tr>
</tbody>
</table>

Number of feeders and waterers required for 100 breeder turkeys

<table>
<thead>
<tr>
<th>Age in weeks</th>
<th>Area of circular feeders</th>
<th>No. of feeders</th>
<th>Area of circular waterers</th>
<th>No. of waterers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above 24 wks</td>
<td>120 sq. cm</td>
<td>4</td>
<td>110 sq. cm</td>
<td>2</td>
</tr>
</tbody>
</table>

SEX DETERMINATION:

<table>
<thead>
<tr>
<th>Characters</th>
<th>Tom</th>
<th>Hen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body size</td>
<td>Heavy</td>
<td>Relatively small</td>
</tr>
<tr>
<td>Caruncles</td>
<td>Pink / red fleshy protuberances on the head</td>
<td>Absent</td>
</tr>
<tr>
<td>Snood or dew bill</td>
<td>Fleshy protuberance near the base of the neck; relatively large, plumb and elastic</td>
<td>Relatively small, thin and non - elastic</td>
</tr>
<tr>
<td>Beard</td>
<td>Blackish and seen in the breast region.</td>
<td>Absent</td>
</tr>
<tr>
<td>Strut (sound produced by turkey)</td>
<td>Sturt - day-old through adult</td>
<td>Absent</td>
</tr>
</tbody>
</table>

SELECTION OF BREEDER FLOCK:

The external appearance forms the basis for the selection of breeding stock. The selected birds are to be of good health and vigour. They are to be free from all diseases and disabilities. They are also to be free of defects such as crooked keel bone, back or legs and split wings. These defects may be transmitted to the next generation. Since the turkey is prized for its meat quality, emphasis should be placed on its dressed out appearance. Birds which have a broad breast are more preferred and such types of turkeys are mostly reared. Such broad breasted birds are called 'beef type' turkeys. Such turkeys have short neck and legs. To increase the body weight of the turkey flock; birds are to be selected at a particular age and body weight.
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 1:4 for medium type turkeys and 1:3 for large types. 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 the toms have to be changed every 15 days.

The hens start laying eggs by about 24 to 28 weeks of age. The production is economical till 52 weeks of age. A hen produces 80 to 100 eggs a year. About 50 to 60 turkey poult's are obtained from a hen in a year. Nearly 70 percent of the eggs are laid in the afternoon. Eggs are collected frequently to increase hatchability and eliminate the chance of floor eggs and eggs being broken in the nests.

FEEDING:

Breeder rations have to be fortified with minerals and vitamins for obtaining better fertility and hatchability. (See chapter- 7)

LIGHTING:

Breeder turkeys are raised under specific lighting programs. Toms are raised with 12 hours of daylight per day to ensure good semen production at the right age. Hens are raised on a normal
commercial lighting program (14 hours of light per day) until 16 weeks of age. Then the lighting is reduced on a gradual basis down to 6 hours per day by the time the birds are 20 weeks of age. They are maintained at 6 hours per day until 30 week of age when they are taken up overnight to 14 hours of light per day. This is called photo stimulation, which stimulates egg production. When hens are brought into production in naturally ventilated (open or curtain sided) housing during periods of long natural day length, then this day length has to be maintained throughout the laying period.

**FERTILITY AND HATCHABILITY:**

Fertility and hatchability for a flock are expressed as percentages in relation to total eggs set. Hatchability is also be expressed in percentage in relation to fertile eggs set. Varieties, strains, family as well as individuals within a family differ with respect to fertility and hatchability. Age of birds, season, light, nutritional and health status of the flock and managerial conditions affect fertility and hatchability. Very high or low temperature in the breeding house affect fertility and hence hatchability. Flocks in high rate of lay have better fertility and hatchability than poorly producing flocks.

**BROODY CONTROL:**

In the wild, the turkey female begins to lay eggs in the spring stimulated by the increasing day length. Once hen turkey has laid a clutch of eggs (10 to 15) a natural desire to incubate them takes over and hen will sits on the eggs until they hatch some 28 days later. This is known as broody behaviour, caused by a build up of natural secretions of the hormone prolactin in the bloodstream. Once a female becomes broody it ceases to lay eggs, which is not desirable in commercial production where high egg numbers are required. Broody control describes the husbandry techniques used to prevent turkey females from becoming broody. Females should be encouraged to lay their eggs in the nest boxes, as those which lay their eggs on the floor can be more difficult to treat. Pens have to be evenly lit and designed with as few corners as possible to discourage floor layers.

**ARTIFICIAL INSEMINATION IN TURKEYS:**

Artificial insemination helps in increasing fertility of the turkeys during the breeding period.

**Collection of semen from Tom:**

- The age of tom has to be 32-36 weeks for semen collection.
- The tom has to be kept in isolation at least 15 days before semen collection.
- The tom has to be handled regularly and the time required to collect the semen is 2 minutes.
- As the toms are sensitive to handling, the same operator has to 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.
- Collect semen thrice a week 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 laying it is better to inseminate every fortnight.
- Inseminate the hen in the evening.
- The average fertility should be 80-85% over a 16 week breeding season.

Culling of unproductive turkeys:

<table>
<thead>
<tr>
<th>Characteristics for distinguishing a layer from a non layer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External characteristics</strong></td>
</tr>
<tr>
<td>Comb and wattles</td>
</tr>
<tr>
<td>Caruncles</td>
</tr>
<tr>
<td>Beak</td>
</tr>
<tr>
<td>Eyes</td>
</tr>
<tr>
<td>Ear-lobes</td>
</tr>
<tr>
<td>Pelvic bones</td>
</tr>
<tr>
<td>Abdomen</td>
</tr>
<tr>
<td>Crop</td>
</tr>
<tr>
<td>Vent</td>
</tr>
</tbody>
</table>
Diagram of a Tom and Hen Turkey

Male Turkey (Tom)
- Nod's
- Snood
- Throat Wattle
- Caruncles
- Eye
- Ear Opening
- Wing Coverts
- Secondary and Primary Wing Feathers
- Beard
- Breast
- Hook
- Shank
- Spur
- Toenails
- Toes

Female Turkey (Hen)
- Eye
- Snood
- Nod's
- Ear Opening
- Beak
- Throat Wattle
- Caruncles
- Breast
- Wing Coverts
- Secondary and Primary Wing Feathers
- Hook
- Shank
- Rudimentary Spur
- Toenails
- Toes
7. FEEDING MANAGEMENT

The quality of turkey poults, management and disease resistance of the turkeys together determine the productivity of the turkeys. Even though the managerial practices are good, if optimal nutrients are not provided, the expected growth and productivity do not occur. For better growth of turkey poults, higher level of crude protein, minerals and vitamins are required than broilers. Turkeys require more of vitamin A, D, niacin and choline than broilers.

Feeding and disease resistance:

Disease resistance is an important part in turkey rearing. The disease resistance in birds also varies according to the nutrient content in feed. Protein should be present in required quantity. Vitamin A and E should also be present in sufficient quantities, especially when some fungal toxins are present in the feed; as these toxins reduce the disease resistance of the birds and make them more susceptible to diseases.

Feeding and hatchability:

In hatcheries, the quality of the turkey poults produced depends upon the nutrient content of the feed of the breeders. For quality chicks to be produced, the breeders are to be fed with sufficient crude protein, vitamins and minerals.

Feeding turkey poults (0 to 8 weeks):

The nutrient requirement of male and female turkey poults vary and hence it is advisable to separate male and females immediately after hatching.

Immediately after hatching, the poults are to be provided with feed. Feed is to be provided at least four times a day. The feed for turkey poults are to be kept in a place with good lighting facility. For first day, feed can be spread over the newspaper. Thereafter feed should be kept in plastic plates. For first four weeks, the feed provided has to contain 28% crude protein and 2800 k cal of energy. From 5 to 8 weeks of age, the feed has to contain 26% crude protein and 2800 k cal energy.
Feeding turkey growers (9 to 24 weeks):

Turkey grower feed has to contain a crude protein content of 22% to 14% crude protein, and 3000 to 3300 kcal of energy depending on age as given in table.

Feeding turkey growers

Feeding turkey breeders (after 24 weeks):

Breeder turkeys have to be provided with 14% crude protein and 2600 kcal energy. The feed given to turkey males has to contain only 12-13% crude protein.

Feeding turkey breeders

Methods to reduce cost of rearing in turkeys:
Greens 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 this Desmanthus and Stylo can be chopped and given to turkeys to reduce the feed cost.
<table>
<thead>
<tr>
<th>Dietary Nutrient Requirement of Turkeys (% or unit/Kg; 90% DM)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males-Age (wk):</strong> 0 to 4</td>
</tr>
<tr>
<td><strong>Females-Age (wk):</strong> 0 to 4</td>
</tr>
<tr>
<td><strong>Status:</strong> Holding</td>
</tr>
<tr>
<td><strong>Dietary energy, ME/kg:</strong> 2,800</td>
</tr>
<tr>
<td><strong>Protein and amino acids:</strong></td>
</tr>
<tr>
<td>Protein %</td>
</tr>
<tr>
<td>Arginine %</td>
</tr>
<tr>
<td>Glycinine+serine %</td>
</tr>
<tr>
<td>Histidine %</td>
</tr>
<tr>
<td>Isoleucine %</td>
</tr>
<tr>
<td>Leucine %</td>
</tr>
<tr>
<td>Lysine %</td>
</tr>
<tr>
<td>Methionine %</td>
</tr>
<tr>
<td>Methionine+cystine %</td>
</tr>
<tr>
<td>Phenylalanine %</td>
</tr>
<tr>
<td>Phenylalanine+tyrosine %</td>
</tr>
<tr>
<td>Threonine %</td>
</tr>
<tr>
<td>Tryptophan %</td>
</tr>
<tr>
<td>Valine %</td>
</tr>
<tr>
<td>Linoleic acid %</td>
</tr>
<tr>
<td><strong>Micronutrients:</strong></td>
</tr>
<tr>
<td>Calcium %</td>
</tr>
<tr>
<td>Nonphyte phosphorous %</td>
</tr>
<tr>
<td>Potassium %</td>
</tr>
<tr>
<td>Sodium %</td>
</tr>
<tr>
<td>Chlorine %</td>
</tr>
<tr>
<td>Magnesium mg</td>
</tr>
<tr>
<td>Trace minerals</td>
</tr>
<tr>
<td>Manganese mg</td>
</tr>
<tr>
<td>Zinc mg</td>
</tr>
<tr>
<td>Iron mg</td>
</tr>
<tr>
<td>Copper mg</td>
</tr>
<tr>
<td>Iodine mg</td>
</tr>
<tr>
<td>Selenium mg</td>
</tr>
<tr>
<td><strong>Fat-soluble vitamins:</strong></td>
</tr>
<tr>
<td>Vitamin A IU</td>
</tr>
<tr>
<td>Vitamin D₃ IU</td>
</tr>
<tr>
<td>Vitamin E IU</td>
</tr>
<tr>
<td>Vitamin K mg</td>
</tr>
<tr>
<td><strong>Water-soluble vitamins:</strong></td>
</tr>
<tr>
<td>Vitamin B₁₂ mg</td>
</tr>
<tr>
<td>Biotin mg</td>
</tr>
<tr>
<td>Choline mg</td>
</tr>
<tr>
<td>Folic acid mg</td>
</tr>
<tr>
<td>Niacin mg</td>
</tr>
<tr>
<td>Pantothionic acid mg</td>
</tr>
<tr>
<td>Pyridoxine mg</td>
</tr>
<tr>
<td>Riboflavin mg</td>
</tr>
<tr>
<td>Thiamin mg</td>
</tr>
</tbody>
</table>
### Average Feed Intake/Average Body Weight/Feed Conversion Ratio

(Beltsville small white variety)

<table>
<thead>
<tr>
<th>Age in weeks</th>
<th>Average feed intake (gram)</th>
<th>Average body weight (gram)</th>
<th>Feed conversion ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 4 weeks</td>
<td>650</td>
<td>270</td>
<td>2.40</td>
</tr>
<tr>
<td>Upto 8 weeks</td>
<td>2670</td>
<td>970</td>
<td>2.75</td>
</tr>
<tr>
<td>Upto 12 weeks</td>
<td>5010</td>
<td>1545</td>
<td>3.25</td>
</tr>
<tr>
<td>Upto 16 weeks</td>
<td>7880</td>
<td>2245</td>
<td>3.50</td>
</tr>
<tr>
<td>Upto 20 weeks</td>
<td>11080</td>
<td>2885</td>
<td>3.80</td>
</tr>
<tr>
<td>Upto 24 weeks</td>
<td>14700</td>
<td>3475</td>
<td>4.25</td>
</tr>
</tbody>
</table>

**Note:**

\[
\text{Feed conversion ratio = \frac{\text{Average feed intake (gram)}}{\text{Average body weight (gram)}}}
\]

### Suggested Turkey Rations

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Turkey pre brooder ration (0 to 4 weeks)</th>
<th>Turkey brooder ration (5 to 8 weeks)</th>
<th>Turkey grower ration (9 to 24 weeks)</th>
<th>Turkey breeder ration (above 24 weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>44</td>
<td>47</td>
<td>43</td>
<td>30</td>
</tr>
<tr>
<td>Cumbu</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Deoiled rice bran</td>
<td>-</td>
<td>-</td>
<td>22</td>
<td>40</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>45</td>
<td>36</td>
<td>14.5</td>
<td>8</td>
</tr>
<tr>
<td>Sunflower oil cake</td>
<td>-</td>
<td>7</td>
<td>11.5</td>
<td>-</td>
</tr>
<tr>
<td>Dry fish</td>
<td>9.5</td>
<td>9</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Mineral mixture</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>2</td>
</tr>
<tr>
<td>Dicalcium phosphate</td>
<td>1</td>
<td>0.5</td>
<td>0.5</td>
<td>-</td>
</tr>
<tr>
<td>Calcite</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Shell grit</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
8. SUMMER AND WINTER MANAGEMENT

Turkeys are susceptible to high temperature and cold. During the months of April, May and June the environmental temperature remains high; as a result, the temperature within the house increases, which in turn cause stress to the birds. The optimum temperature and relative humidity inside the house has to be 75 ° F and 60 – 70%; respectively. Although most places in Tamil Nadu are affected by a rise in temperature, the coastal areas where both the temperature and relative humidity are high are the most affected.

**Effect of high temperature:**

When the birds are 'heat stressed' they have difficulty in achieving a balance between body heat production and body heat loss. As the temperatures increases, the rate of panting increases (method of heat loss). If heat production becomes greater than 'maximum heat loss' either in intensity (acute heat stress) or over long periods (chronic heat stress), birds die (Heat stroke). The body temperature of the birds must remain very close to 41°C (106°F). If body temperature rises more than 2-4°C above this, the birds die.

*When* the environmental temperature increases, feed intake decreases and water intake increases. There is a decrease in egg production because of lower feed intake. In addition, the thickness of the egg shell also decreases resulting in the formation of leathery eggs. The quality of the egg albumin and yolk decreases, therefore the chances of spoilage of stored egg increases. During peak summer the infestations caused by lice, ticks and other ectoparasites are also high. When humidity and temperature are high, the occurrence of coccidiosis is also more.

**Measures to prevent heat stress:**

- Clean, sanitized drinking water has to be made available to the birds continuously.
- Provide feed during the cooler parts of the day.
- Optimal floor space has to be provided.
- Roof can be painted with white paint so that a reduction in temperature can be achieved in the shed.
- Paddy straw, dried Palmrya or Coconut leaves can be spread over the roof which helps to reduce the temperature.
- Sprinklers can be used to sprinkle water over the roof which helps in reducing the temperature.
- Foggers can also be used in cage houses.
- The mesh has to be cleaned regularly so that there is no hindrance in ventilation and air flow which further helps in the reduction of the temperature.
- During summer, the feed intake decreases and the energy requirement of the birds also decreases. So the amount of nutrient intake has to be adjusted by increasing the nutrient density of the feed.
- Trees can be planted in and around the shed, so that it provides shade to the birds.

The winter season is from October to February, which coincides with the monsoon season in Tamil Nadu. During this period rain and wintry conditions affect the birds. Turkey poult's of 1 to 5 weeks old are the ones which are most vulnerable.
Management during winter season:

- Artificial heat can be provided.
- Care should be taken to avoid huddling. This causes stampede of poults resulting in mortality.
- The sides of the shed can be closed using curtains or gunny bags as this minimizes the loss of heat from the house and prevent seepage of rain water inside the sheds.
- During winter, in order to maintain constant body temperature the feed intake of the birds increases. The feed provided during this season has to contain more energy.
9. FLOCK HEALTH AND BIOSECURITY

When there is low threshold level of management of turkeys or when the disease resistance is low, there are chances of the birds to be infected. But, for certain diseases, turkeys are more resistant than chicken. The mortality suffered by most turkey flock is high in the first two weeks of age. Reasons for mortality is significantly due to “starve-outs” and yolk sac infections. Some of the other causes of mortality apart from diseases are cold shock, drug toxicity and poor ventilation.

Etiology:
- Pathogenic microorganisms (viruses, bacterial and fungi) and parasites
- Nutritional deficiencies
- Metabolic disorders
- Environment

Transmission of infectious diseases:
- Contagious from diseased or carrier birds
- Contagious from other animals (insects, rodents, and free-flying birds)
- Airborne
- Contact with contaminated materials (e.g. litter, feed)
- Egg transmission
- Carcasses of dead birds that have not been disposed of properly
- Contaminated water source

Signs of disease:
- Reduced intake of feed and water
- Low rate of growth/egg production
- Abnormal droppings
- Abnormal physiological indicators: temperature >107° F, pulse rate of >400 per minute and rate of breathing of >36 per minute
- General droopiness and ruffled feathers

Measures to prevent disease outbreak:
* Application of a stringent quarantine program
* Control of vehicles and visitors to the farm
* Good quality poults should be procured from hatchery
* Poults are not be bought from a breeder farm which is affected by diseases
* Feed and water supplied to the birds should be hygienic
* There has to be no water logging in sheds during rainy season
* Vaccinations are to be done for the diseases which are prevalent in the region
* Deworming to be done once in two months to remove the endo parasites
★ Dipping to be done to remove the ecto parasites
★ Plant for a preventive medication program
★ The birds which show the symptoms of disease are to be isolated and treatment has to be started immediately
★ Post mortem has to be performed to identify the exact cause and necessary steps should be taken to avoid the spread of the disease
★ Dead birds and unhatched eggs are to be removed immediately and buried or burned
★ The sheds are to be rodent proof
★ After the sale of each batch of turkeys, the litter and other wastes have to be removed and the shed is to be disinfected properly
★ The use of monitoring procedures to keep a check on the disease organism status of the farm, to check on the effectiveness of cleaning and sanitation procedures and to test the immunity levels to certain diseases in the stock to check the effectiveness of the vaccination program

Measures to be taken during outbreak:
★ Quick disposal of dead birds.
★ All sanitation measures of drinking water to be adopted.
★ Spraying of disinfectant in the shed.
★ Separation of working personnel of infected pen from healthy pens.
★ Personnel hygiene before and after entering in the infected pens.
★ Use Vitamin E and C to overcome stress.
★ Frequent change of infected litter.
★ Quick separation and disposal of sick and ailing birds.

Measures to be taken after breakout:
★ Infected flock after recovery is to be disposed off quickly.
★ emptied sheds and infected equipment are to be thoroughly cleaned and disinfected before reusing the same.
★ Disinfected sheds can be kept empty for 2-3 weeks before housing the birds.
★ Infected litter has to be burned or buried properly.

Vaccination Schedule:

<table>
<thead>
<tr>
<th>Day Old</th>
<th>ND – B1 Strain</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th &amp; 5th Week</td>
<td>Fowl Pox</td>
</tr>
<tr>
<td>6th Week</td>
<td>ND – (R2B)</td>
</tr>
<tr>
<td>8th - 10th Week</td>
<td>Cholera Vaccine</td>
</tr>
<tr>
<td>Disease</td>
<td>Cause</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Arizonaiosis</td>
<td><em>Salmonella Arizona</em></td>
</tr>
<tr>
<td>Blue comb disease</td>
<td><em>Corona virus</em></td>
</tr>
<tr>
<td>Chronic respiratory disease</td>
<td><em>Mycoplasma gallisepticum</em></td>
</tr>
<tr>
<td>Erysipelas</td>
<td><em>Erysipelothrix rhusiopathideae</em></td>
</tr>
<tr>
<td>Fowl cholera</td>
<td><em>Pasteurella multocida</em></td>
</tr>
<tr>
<td>Fowl pox</td>
<td><em>Pox virus</em></td>
</tr>
<tr>
<td>Haemorrhagic enteritis</td>
<td><em>virus</em></td>
</tr>
<tr>
<td>Infectious synovitis</td>
<td><em>Mycoplasma gallisepticum</em></td>
</tr>
<tr>
<td>Infectious sinusitis</td>
<td><em>Bacteria</em></td>
</tr>
<tr>
<td>Mycotoxicosis</td>
<td><em>Fungal origin</em></td>
</tr>
<tr>
<td>New Castle disease</td>
<td><em>Paramyxvo Virus</em></td>
</tr>
<tr>
<td>Paratyphoid</td>
<td><em>Salmonella pullorum</em></td>
</tr>
<tr>
<td>Turkey coryza</td>
<td><em>Bordetella avium</em></td>
</tr>
<tr>
<td>Coccidiosis</td>
<td><em>Coccidia spp</em></td>
</tr>
<tr>
<td>Turkey venereal disease</td>
<td><em>Mycoplasma meleagris</em></td>
</tr>
</tbody>
</table>
Fowl pox - Small yellow pustules on comb and wattles

Fowl cholera - Liver

Liver

Lungs and airsac

Chronic respiratory disease

Fowl typhoid - Liver
10. NUTRITIVE VALUE OF EGG & MEAT AND ITS PROCESSING

Turkey egg:

Turkey egg is considered to be one of the best sources of animal protein.

Nutritive value of turkey egg - fresh (raw)

<table>
<thead>
<tr>
<th>Amount - 1 egg (79g)</th>
<th>Calories: 135</th>
<th>Carbohydrate: 0.91g</th>
<th>Protein: 10.81g</th>
<th>Fat: 9.39g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A - 438IU</td>
<td>Calcium - 78mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin B1 (Thiamin) - 0.09mg</td>
<td>Iron - 3.24mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin B2 (Riboflavin) - 0.37mg</td>
<td>Magnesium - 10mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin B3 (Niacin) - 0.02mg</td>
<td>Phosphorus - 134mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin B5 (Pantothenic Acid) - 1.49mg</td>
<td>Potassium - 112mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin B6 (Pyridoxine) - 0.1mg</td>
<td>Sodium - 119mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin B12 (Cobalamin) - 1.34mcg</td>
<td>Zinc - 1.25mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Folate - 56mcg</td>
<td>Copper - 0.05mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin C - 0mg</td>
<td>Manganese - 0.03mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin D - 0IU</td>
<td>Fluoride - 0mcg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin E - 0mg</td>
<td>Selenium - 27.1mcg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin K - 0mcg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Turkey meat:

The turkey meat is low fat, high protein compared with red meat and is therefore a good raw material for products to be made for an increasingly sedentary and informed consumer. The protein, fat, energy value of turkey meat is 21.8 g, 2.5 g, 118 calories per 100 gm of meat; respectively. An average portion of turkey meat (100g) provides 20 g of protein, approximately half a woman’s daily requirement and almost half a man’s requirement. Mineral like potassium, calcium, magnesium, iron, selenium, zinc and sodium are present. It is also rich in essential amino acids and vitamins like niacin, vitamin B6 and B12. It is rich in unsaturated fatty acids and essential fatty acids and low in cholesterol. The dressing percentage turkey is 72% with yield of Breast – 32%, Thigh and legs – 32%, wings – 15% and back – 21%.

COMPOSITION OF POULTRY MEAT (100 g)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Turkey</th>
<th>Duck</th>
<th>Quail</th>
<th>Chicken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein (g)</td>
<td>21.81</td>
<td>18.3</td>
<td>22</td>
<td>21.64</td>
</tr>
<tr>
<td>Total fat (g)</td>
<td>2.5</td>
<td>6</td>
<td>2.5</td>
<td>2.98</td>
</tr>
<tr>
<td>Carbohydrate (g)</td>
<td>0.08</td>
<td>0.0</td>
<td>1.20</td>
<td>0.13</td>
</tr>
<tr>
<td>Energy (Kcal)</td>
<td>118</td>
<td>131</td>
<td>116</td>
<td>120</td>
</tr>
</tbody>
</table>
FAT AND PROTEIN CONTENT IN TURKEY MEAT (100 g)

<table>
<thead>
<tr>
<th>Meat Type</th>
<th>Calories</th>
<th>Total Fat</th>
<th>Protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast with skin</td>
<td>194</td>
<td>8 g</td>
<td>29 g</td>
</tr>
<tr>
<td>Breast with out skin</td>
<td>161</td>
<td>4 g</td>
<td>30 g</td>
</tr>
<tr>
<td>Wing with skin</td>
<td>238</td>
<td>13 g</td>
<td>27 g</td>
</tr>
<tr>
<td>Leg with skin</td>
<td>213</td>
<td>11 g</td>
<td>28 g</td>
</tr>
<tr>
<td>Dark meat with skin</td>
<td>232</td>
<td>13 g</td>
<td>27 g</td>
</tr>
<tr>
<td>Dark meat with out skin</td>
<td>192</td>
<td>8 g</td>
<td>28 g</td>
</tr>
<tr>
<td>Skin only</td>
<td>482</td>
<td>44 g</td>
<td>19 g</td>
</tr>
</tbody>
</table>

Steps in processing turkeys:

Processing is the changing of the natural/normal raw product into convenient ready-to-work/ cook products.

★ Suspend by legs in a steel shackle.
★ Stunning.
★ Bleeding.
★ Scalding.
★ Feather removal (Picking).
★ Evisceration.
★ Chilling.
★ Packaging.
★ Further processing.

Further processing:

Further processing is the adding of value to the raw product either by pre-cooking, crumbing or the adding of marinates. The reasons for the development of easy to prepare or ready to eat products are the advantages for both the producer and the consumer:

Producer:
★ Producing high quality products
★ Use lower grade raw material
★ Portion weight control
★ Simple processing method
★ More product variety
Consumer:
★ Cheaper products
★ Easy to prepare
★ No waste at preparation
★ Short cooking time

Cut up parts

- **Breast**
  - Tender
    - any wing of breast肌肉

- **Tenderloin**
  - inner posterior muscles that run alongside the breastbone

- **Wing**
  - 3rd section—wing tip
  - 2nd section—flat wing tip
  - 1st section—wing drumstick

- **Leg**
  - Thigh and drumstick
  - Thigh also used to make turkey ham

The basic processes for adding value are:
- **Forming**
- **Coating**
- ★ **Pre dusting**

Processed turkey meat
Battering
Breading or crumbing

Frying
Pre-frying or flash frying
Fully cooking

Cooking
Hot air cooking
Steam cooking

Grill systems

Mechanical meat – bone separators
This process is also referred to as MRM or mechanically recovered meat, or
MDM or mechanically deboned meat

Some of the further processed products available in North America:
Turkey ham and smoked ham,
Deli sliced turkey, turkey ham and smoked turkey,
Turkey bacon with alternating white and dark meats
Mechanically de-boned turkey meat,
Ground turkey meat products such as turkey hamburger, sausage,
Ground turkey meat products in an emulsion e.g., frankfurters.

Value added turkey meat
11. MARKETING AND ECONOMICS

MARKETING:

The marketing of turkeys has been confined largely to the festive season during the months of November, December and January. There has been a definite trend during the past few years to extend the marketing of turkeys over a longer period. Turkeys are ready for market when they are 16 to 24 weeks of age, since it is not economical to feed turkeys beyond this period. There is an increase in the quantity of feed required to produce a kilogram of turkey after about 20 weeks of age. The absolute gains in weight during the later stages of growth are large, but in terms of cost these gains are also the most expensive. The average body weight is 4-6 Kgs and the birds are generally lifted by the traders from the farm. There appears to be no retail market for the birds on day to day basis except during festive season like Christmas, Deepavali etc.

The Indian turkey market remains primarily a live bird market. Although there is a growing trend in consumption of chilled and frozen turkey products in restaurants, most consumers prefer fresh turkey meat. Birds for home consumption are typically purchased live and slaughtered in poultry retail shops. Demand for frozen turkey products will continue to remain constrained by inadequate cold chain facilities. Luxury hotels account for most of the consumption of processed turkey products such as sausages, salami, etc.

ECONOMICS OF TURKEY FARMING (100 TURKEYS):

Assumptions:

- Cost of day old poult: Rs. 60/-
- Cost of feed/kg: Rs. 18/-
- Average feed consumption/bird (upto 16 wks): 10.5 kg
- Space requirement per bird: 4 sq. ft
- Medication and vaccinations: Rs. 10/ turkey
- Cost of construction of shed: Rs.75 / sq feet
- Equipments: Rs.15/ turkey
- Market age: 16 weeks
- Average market weight in kg: 3 kg
- Mortality (16 weeks): 5%

**Sale price:**

- Live: Rs. 120/ kg
- Dressed: Rs.200/ kg
I. Fixed cost:
   Construction of turkey shed
   (100 poults- 400 sq. ft.)
   Equipment costs
   (100 poults)

   Total
   Rs. 30,000/-
   Rs. 1500/-
   __________________________
   Rs. 31,500

II. Recurring cost:
   Cost of turkey poults (100 nos)
   Feed cost (97.5 turkeys; mid point mortality)
   Medicine and vaccination cost

   Total
   Rs. 6000/-
   Rs. 18,428/-
   Rs. 1,000/-
   __________________________
   Rs. 25,428/-

III Gross Return:
   Sale of 95 turkeys (5% total mortality)

   Rs. 34,200/-

IV. Gross Profit:
   Gross Return – Recurring Cost
   Profit per bird sold
   Profit per kg sold

   Rs. 8,772/-
   Rs. 88/-
   Rs. 30/-
12. BANK LOAN AND INSURANCE

For obtaining bank loan the farm(ers) have to apply to the nearest branch of a Commercial or Cooperative or Regional Rural Banks in their area in the prescribed application form which is available in the branches of financing banks. The technical officers attached to or the manager of the bank can give guidance to the farmers in preparing the project report to obtain bank loan.

For poultry farming projects with very large outlays, detailed report has to be prepared. Banks provide financial assistance for the following purposes:

★ For construction of brooder/grower and layer sheds, feed store, quarters etc.
★ For purchase of poultry equipment such as feeders, waterers, brooders etc.
★ For creating infrastructure items for supply of electricity, feed, water etc.
★ For purchase of day old chicks or ready to lay pullets.
★ For meeting working capital requirement in respect of feed, medicines and veterinary aid etc. for the first 5 to 6 months (i.e. till the stage of income generation).

However, if land is purchased for establishing a poultry farm, land cost can be treated as party’s margin upto a maximum of 10% of total cost of project.

PROJECT REPORT FORMULATION FOR BANK LOAN

A project can be prepared by the beneficiary after consulting local technical persons of State Veterinary department, Poultry Corporation or private commercial hatcheries. If possible, they can also visit the progressive turkey farms in the area and discuss the profitability of farming. A good practical training and experience on a turkey farm is highly desirable, before starting a farm. A regular and constant demand for meat and nearness of the farm to the market has to be ensured.

The project should include information on land, water and electricity facility, marketing aspects, training facilities and experience of entrepreneurs and the type of assistance available from State government, Poultry Corporation, local hatcheries. It can also include data on proposed capacity of the farm, total cost of the project, margin money to be provided by the beneficiary, requirement of bank loan, estimated annual expenditure, income and profit and the period for repayment of loan and interest.

REQUIREMENTS OF A GOOD PROJECT

After the scheme is submitted to the bank it is examined for technical feasibility and economic viability.

A. Technical Feasibility:

This briefly include:-

★ Suitability of climate and potentiality of the area
★ Availability of inputs such as chicks, feed, medicines etc.

44
★ Technical norms
★ Infrastructure available for veterinary aid, marketing, training and experience of the beneficiary.

B. Financial Viability:
This briefly include:-
★ Unit cost and loan requirement.
★ Input costs for chicks, feed, veterinary aid, labour and other overheads.
★ Output costs i.e. sale of eggs, culled birds, for meat, manure, empty gunny bags etc.
★ Income-expenditure statement and annual gross surplus.
★ Cash flow analysis.
★ Repayment schedule i.e. repayment of principal loan amount and interest.

SCRUTINY OF PROJECT BY THE BANK
After the scheme is submitted to the bank it is examined for technical feasibility and economic viability. Other documents such as loan application forms, security aspects, margin money requirement etc. are also examined. A field visit to scheme area is undertaken for conducting techno economic feasibility study for appraisal of the scheme.

SANCTION OF BANK LOAN AND ITS ALLOCATION
After ensuring technical feasibility and financial viability the scheme is sanctioned by the bank. The loan is allocated in kind in 2 or 3 stages against the creation of specific assets such as construction of sheds, purchase of equipment and machinery, recurring cost during growing period on purchase of first batch of chicks, feed, medicines and vaccines, electricity and water, labour expenses etc. Constant follows up and supervision of the scheme is done by the bank.

LENDING TERMS-GENERAL

Unit cost
Each Regional Office (RO) of NABARD has constituted a State Level Unit Cost Committee under the Chairmanship of RO in charge and with the members from developmental agencies, commercial banks and cooperative banks to review the unit cost of various investments once in six months.

Margin money
NABARD has defined farmers into three different categories and where subsidy is not available the minimum down payment as shown below is collected from the beneficiaries.

<table>
<thead>
<tr>
<th>SNo</th>
<th>Category of Farmer</th>
<th>Farmer Level of pre-development return to resources</th>
<th>Beneficiary’s Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Small farmers</td>
<td>Upto Rs. 11,000</td>
<td>5%</td>
</tr>
<tr>
<td>b)</td>
<td>Medium farmers</td>
<td>Rs.11,001 to Rs.19,250</td>
<td>10%</td>
</tr>
<tr>
<td>c)</td>
<td>Large farmers</td>
<td>Above Rs.19,251</td>
<td>15%</td>
</tr>
</tbody>
</table>
Interest Rate
As per the RBI guidelines issued from time to time.

<table>
<thead>
<tr>
<th>INTEREST RATE</th>
<th>Repayable upto 3 years</th>
<th>Repayable in 3 years and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto Rs. 50,000/-</td>
<td>8.5 %</td>
<td>9 %</td>
</tr>
<tr>
<td>Over Rs. 50,000/- upto Rs. 2 lacs</td>
<td>9.5 %</td>
<td>9.75 %</td>
</tr>
<tr>
<td>Over Rs. 2 lacs upto Rs. 5 lacs</td>
<td>10.25 %</td>
<td>10.25 %</td>
</tr>
<tr>
<td>Over Rs. 5 lacs upto Rs. 25 lacs</td>
<td>11.25 %</td>
<td>11.75 %</td>
</tr>
<tr>
<td>Over Rs. 25 lacs based on credit risk assessment</td>
<td>10.75 % to 12.25 %</td>
<td>11.25 % to 12.75 %</td>
</tr>
</tbody>
</table>

Security
Security will be as per NABARD/RBI guidelines issued from time to time.

<table>
<thead>
<tr>
<th>SECURITY TO BE FURNISHED</th>
<th>Amount of Loan</th>
<th>Security to be furnished</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Where movable assets are not created (eg. Dugwells, development of land etc.)</td>
<td>a) Upto Rs. 10,000/-</td>
<td>a) Personal Guarantee</td>
</tr>
<tr>
<td></td>
<td>b) Above Rs. 10,000/-</td>
<td>b) i. Personal Guarantee</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii. Mortgage of land</td>
</tr>
<tr>
<td>B. Where movable assets are created (pump set, pipeline etc.)</td>
<td>a) Upto Rs. 50,000/-</td>
<td>a) Hypothecation of the asset created</td>
</tr>
<tr>
<td></td>
<td>b) Above Rs. 50,000/- to Rs. 1 lac</td>
<td>b) i. Hypothecation of the assets created</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii. Mortgage of land or third party guarantee</td>
</tr>
<tr>
<td></td>
<td>c) Above Rs. 1 lac</td>
<td>c) i. Hypothecation of the assets created</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii. Mortgage of land</td>
</tr>
</tbody>
</table>

Repayment of loan
Repayment period depends upon the gross surplus in the scheme. The loan will be repaid in suitable monthly/quarterly installments usually within a period of seven to eight years with first year as grace period.
Documents to be produced by the applicant:

★ Certified copies of records in respect of lands owned / leased.
★ NOC / No Due Certificate from other financial institutions wherever applicable.
★ Two passport size photographs.
★ Documents of title and other relevant documents, wherever landed properties are taken as security.
★ Plan and estimate in respect of construction / drilling / deepening of wells, proforma invoice / quotations in case of machines, vehicle, etc.
★ Valuation certificate of the land from a competent authority / panel valuer wherever applicable.
★ Other documents related to specific schemes.

II. POULTRY INSURANCE SCHEME

★ There are comprehensive insurance schemes available with the General Insurance firms applicable to poultry farms consisting layer birds, broiler birds and parent stock (Hatchery) which are exotic and cross-bred.
★ All birds in a farm has to be covered. After issuing policy, if additional birds are introduced in the farm, immediate notice to be given to insurer otherwise claim will be repudiated.
★ The schemes are applicable to poultry farms consisting of minimum number of birds as specified
★ The schemes are available for insuring birds in the following age groups

<table>
<thead>
<tr>
<th></th>
<th>Broilers</th>
<th>Layers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o 1 day to 8 weeks</td>
<td>o 1 day to 6 weeks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hatchery Birds (Parent Stock)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o 1 day to 20 weeks</td>
<td>o 21 weeks to 72 weeks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o 1 day to 72 weeks</td>
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<tr>
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</tbody>
</table>

★ The premium rates are applicable on per cent basis which are applicable to the peak value of birds in the applicable categories.
★ The sum insured is the peak value and for broilers is Rs 45 and for layers is Rs 75. There is a week wise valuation table in-built in the policy which is applied for calculating indemnity. In case of parent stock the same is negotiable.
★ The policy is characterized by excess and final indemnity is restricted to 80% (60% in case of Gumboro).
Insurance Coverage

The Policy provides indemnity against death of birds due to accident (including fire, lightning, flood, cyclone/ storm/ tempest/ earthquake, strike, riot, act of terrorism) or diseases contracted or occurring during the period of insurance subject to the exclusions.

Major Exclusions

★ Malicious/ willful injury, neglect.
★ Transit by any mode of transport.
★ Improper management (including over crowding) i.e. when the farm is not run on scientific poultry management guidelines and standards laid down by Poultry Corporations/ Animal Husbandry Department in regard to housekeeping, watering, feeding, vaccination, deworming, debeaking, lighting/ heating, culling etc.
★ Loss/ death due to natural mortality, non-specified or unknown diseases or reasons.
★ Undergrowth, cannibalism, action or predators like preying birds and carnivorous animal.
★ Theft and clandestine sale of birds.
★ Intentional slaughter of the birds except in cases where destruction is necessary to terminate incurable suffering on humane consideration and to protect remaining healthy flock to reduce additional losses on the basis of certificate issued by qualified Vet. Surgeon or in cases where destruction is resorted to by order of lawfully constituted authority, under intimation to Insurance Company.
★ Consequential loss however caused.
★ Permanent and partial disablement of any nature.
★ Loss of production i.e. the failure due to any reasons whatsoever to lay required number of eggs or small sized eggs in layers or to attain proper weight at a particular age in Broilers.
★ Marek’s disease, Ranikhet disease, Fowl Pox and Infectious Bronchitis. These diseases are covered by the policy if the birds are successfully inoculated against these diseases and the necessary veterinary certificate to that effect is supplied to the company. Coccidiosis and other diseases are covered only if preventive and curative measures are taken from time to time.
★ Malnutrition/ shortage of water, death due to starvation because of non supply of feed to birds or similar reasons of whatsoever nature.
★ Undergrowth.
★ Cannibalism
★ Loss due to huddling and / or piling of birds.
★ Avian leucosis Complex (A.L.C.)
★ War, invasion, act of foreign enemy, hostilities (whether war be declared or not), civil war, rebellion, revolution, insurrection, mutiny, tumult, military or usurped power or any consequences thereof or attempt threat.
★ Any accident, loss, destruction, damage or legal liability directly or indirectly caused by or contributed or arising from nuclear weapons.

**How to Effect Insurance**
★ Proposal Form
★ Veterinary Health Certificate from a qualified Veterinarian
★ All birds in the farm should be covered.
★ Farm should follow standard package of practices, vaccination schedule, deworming, and debeaking.
★ Farm should maintain essential records as per insurer's specifications.

**Claim Procedure**
★ In the event of death of birds immediate intimation should be given to the Company and the Insurer should be supplied with the following documents and required information:
  + Duly filled in claim form.
  + Vet. P.M. Report for sample birds.
  + Daily records of mortality, feeding etc.
  + Purchase invoices for the birds.
  + Any other point to substantiate the loss like photographs, medical bills, etc. as and when required.
★ In case of alarming death/outbreak of epidemic nature immediate notice within 12 hours should be given to the Company and all birds should be segregated and produced to the representative of the Company or to any person authorised by the Company for inspection.
★ Daily mortality details should be sent to the Company on weekly basis failing which report will be treated as nil for that particular week.
★ Delay in reporting of the claim should be avoided and if there is delay for more than three days the claim can be treated as non-standard.
★ In case of doubtful claims/ farms for which claim ratio is adverse, Technical Report from an expert may be insisted for settlement of claim.

During the outbreak of epidemic/ natural calamities in the farm, insured has to arrange emergency sale of live birds in the presence of the representative of the insurance company in order to avert or minimise the loss. In case the insured realises the value less than the valuation table agreed upon for the corresponding week then the difference will be paid to the insured in addition to the cost of dead birds as per terms and conditions of the policy.
13. RECORD KEEPING

Data are kept for the purpose of performance analysis and financial appraisal during the process of brooding, growing and slaughtering of commercial turkeys. Daily inspection of production data allows the informed stockman to better manage his flock(s) and make effective responses to any changes or deviations from the expected norms.

1. **Placement data**
   - Number of day old poult(s).
   - Strain & sex.
   - Flock(s) names/codes.
   - Date & time of arrival.
   - Poult quality (size/uniformity etc.) and number of dead on arrivals (DOAs).
   - House floor area.

2. **Mortality**
   - Daily mortality (all breeder flocks together) – it is common to record natural deaths and culled mortality separately.
   - Weekly and cumulative flock mortality (number and percentage).

3. **Live weight**
   - Weekly average live weight from check weighings.
   - Daily average live weight if automatic weighers are in use.

4. **Egg production**
   - Hen day production.
   - Hen housed production.

5. **Feed**
   - Date of delivery.
   - Quantity delivered.
   - Type (compound crumbs/pellet, whole grain).
   - Ration name/codes.
   - Feed quality (e.g. whether pellets are hard or break down to dust).
   - Feed intake.

6. **Water**
   - Daily consumption volume.
   - Chlorination level and check dates & results.
7. Environment
★ House temperature (daily maximum & minimum).
★ External daily temperature.
★ Air quality, e.g. dust, moisture levels and occasional measurement of ammonia
★ Daily litter quality (often a simple point score can be used e.g. 1 to 4, where 1 is very good, dry and friable and 4 is very poor, wet and dirty).
★ Litter used - quantity/date of additional litter added (No. bags/bales and weight of each unit).
★ Weekly checks of standby generators.

8. Medication & Vaccination
★ Date(s) administered.
★ Whether routine or not (part of Veterinary Health Plan or following Veterinary Prescription).
★ Type (name and batch numbers).
★ Amounts used & method of administration.

9. Miscellaneous
★ Rodent control record.
★ Cleaning out dates.
★ Detergents, disinfectants and fumigant used.
★ Hygiene checks (total bacterial counts).
★ Weekly checks of standby generators.

**Turkey Farm Records**

1. Breeder Flock: Daily register

<table>
<thead>
<tr>
<th>Variety of turkey</th>
<th>Number birds housed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pen No</td>
<td>Date of hatch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Month</th>
<th>January</th>
<th>February</th>
<th>March</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>Mortality (No.)</td>
<td>Eggs (No.)</td>
<td>Feed issued kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<td>3</td>
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<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Turkey Daily register

<table>
<thead>
<tr>
<th>Date</th>
<th>Age in days</th>
<th>Mortality (No.)</th>
<th>Feed intake / day (Kg)</th>
<th>Feed intake /week (Kg)</th>
<th>Average body weight in (grams)</th>
<th>Feed conversion ratio</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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</tr>
</tbody>
</table>

3. Vaccination schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Vaccine</th>
<th>Date of manufacture of vaccine</th>
<th>Expiry date of vaccine</th>
<th>Quantity of vaccine given</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
4. Sales register

No. of turkey poults : -------------------  Variety of turkey sold : -------------------
Total live body weight : -------------------  Average body weight : -------------------

<table>
<thead>
<tr>
<th>Date</th>
<th>No. of turkeys sold</th>
<th>Total Live body weight (Kg)</th>
<th>Average body weight (Kg)</th>
<th>Price/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
14. HATCHERY MANAGEMENT

INCUBATION:

The incubation period of turkey is 28 days.

Natural incubation with broody hens:

Turkeys are good brooders naturally and a broody hen can hatch 10-15 eggs.

Artificial Incubation:

In artificial incubation, eggs are hatched with the help of incubators. The measure of success of any hatchery is the number of first-quality chicks produced. This number is expressed as a percentage of all eggs set for incubation and is normally termed as hatchability. Only clean eggs with good eggshell and shape should be placed for hatching to get 60-80% hatchability and healthy poults.

Physical requisites of incubation:

- Temperature
- Relative humidity
- Ventilation
- Position and Turning of eggs

Types of incubators:

There are two types of incubators:

- Still air incubators, which have no air circulating within the incubator.
- Forced draft incubators, in which air circulates for a more even temperature throughout the incubator.

Care of hatching eggs:

Proper egg care is important to achieve maximum hatchability and produce healthy, vigorous chicks. Ideal practices in collecting, handling, cooling, storing and transporting of hatching eggs must be practiced.

Nests

Nests are to be kept clean. Clean and fresh nesting material has to be provided. During the first few weeks, birds tend to scratch the material out of the nests. Extra attention has to be given to replace the nest material early in the laying period. Droppings, broken eggs and soiled material are to be removed from nest promptly and replaced with clean fresh nest material.

Collection

Eggs are to be collected frequently, four times a day and more often during extremes of hot or cold weather.
Selection of hatching eggs:

Select clean, nest-laid eggs for hatching purposes. All floor, slat and dirty eggs are to be gathered and kept separate from hatching eggs and utilized as market eggs only. If eggs are soiled, it is preferable to clean them with sandpaper & egg brush. Select hatching eggs that are uniform in size (recommended minimum 70 g for meat-type), shape and colour, with good sound shells. Do not set malformed, porous-shelled, doubled-yolked eggs or eggs with cracks.

Hatching egg sanitation:

The goal of any breeder operation is to provide clean eggs to the hatchery. Sanitation is important in every step of collection, handling and storage.

Fumigation

Fumigation with formaldehyde gas has been an effective method of sanitation of hatching egg. The formaldehyde provides excellent bacterial kill on contact and it is very easy to fumigate a large number of eggs at a time.

<table>
<thead>
<tr>
<th>Fumigation materials per 100 cubic feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>Single strength</td>
</tr>
<tr>
<td>Double strength</td>
</tr>
<tr>
<td>Triple strength</td>
</tr>
</tbody>
</table>

Fumigation procedures

Eggs are placed in an air tight cabinet or room immediately after collecting the eggs. Close all the vents. Place the recommended amount of fumigation materials in the bottom of the cabinet or in the room. Close the door and fumigate the cabinet or room for 30 minutes. Open the vents turn on the exhaust fan; then open the door to remove fumes. Remove the eggs to the holding room.

Egg Storage

Eggs are to be stored at 14 – 15°C (57 - 59°F). The humidity in the egg store is to be kept between 70 – 80 %RH. Eggs are routinely stored before incubation for between 2 to 7 days with minimal impact on hatching success. Incubating eggs on the day that they are laid or, to a lesser extent, after one day of storage can depress hatchability. Extending egg storage beyond 7 days will result in lower hatchability, the longer the storage greater the effect. The age of a breeder flock affects the ability of eggs to withstand long egg storage.

CANDLING:

The candling of hatching eggs is done to determine fertility. It is also useful in determining other sources of breeder flock or hatchery failures, such as percentages of eggs set upside down, cracked and embryos that have died early. Many hatcheries incorporate the candling procedure into their quality control program to monitor the week-to-week status of their breeders throughout the life of the flocks. Candling can be done as early as five days of incubation, but errors in candling often occur at this time. Due of the rapid growth rate of the embryos during the second week of incubation, very few candling errors are made after 14th day of incubation. Clear eggs consist of infertiles and eggs with early dead embryos emit more light than eggs with viable
embryos. Clear eggs are removed from the tray to be broken out. Candling with a spot candler is a little slower, but it is more accurate.

**COMMERCIAL INCUBATION:**
**Multi-Stage Incubation Procedure**

Multi-stage incubation is where the machines are operated continuously, with eggs being set and transferred in the machine. Multi-stage incubation uses the heat generated by the eggs at the end of incubation to warm the eggs at the start of incubation. The alternative system is single-stage incubation where all the eggs within the incubator are at the same stage of development. The temperature and relative humidity in setter and hatcher are as follows:

<table>
<thead>
<tr>
<th></th>
<th>Temperature (°C)</th>
<th>Relative humidity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Setter</strong></td>
<td>37.5</td>
<td>61-63</td>
</tr>
<tr>
<td><strong>Hatcher</strong></td>
<td>37.0</td>
<td>85-90</td>
</tr>
</tbody>
</table>

**Setter Management**
**Setting Eggs**

To avoid temperature shock to the embryo and consequent condensation on the shell, eggs should be removed from the egg storage room and brought to room temperature (24-27°C).

**Setting Patterns**

Multi-stage incubators rely on the efficient transfer of heat from the eggs at the end of incubation to those at the start of incubation. Eggs are normally set within a multi-stage machine either weekly or twice weekly.

**Egg Transfer**

Eggs are removed from the setter after 24 or 25 days and transferred to the hatcher trays. This is done for two reasons. The eggs are laid on their sides to allow free movement of the chick out of the shell at hatching. It also assists hygiene; large quantities of fluff are generated during hatching and spread this potential contamination around the hatchery. Transferring too early or too late will result in embryos being subjected to sub-optimal conditions causing lower hatchability.

**Operations of Hatcher**

Most hatcheries hatch twice a week from each hatcher. The hatcher will be washed and disinfected between hatches, which means durability of construction and ease of cleaning are vital factors. Air supply to the hatchers should be 15 cfm/1000 eggs (0.42 m³/minute/1000 eggs). From point of transfer to pipping, airflow and humidity in the hatcher has to be maintained the same as in the setter. Moisture is important during the hatching process to ensure the shell membranes remain soft and pliable so that the chick can escape unhindered. When pipping starts, the moisture level will rise causing the wet bulb temperature to also rise. At this point, the vent will require adjustment to maintain this level. A few hours before take off the vent is opened to increase air supply for the chicks. Hatcher temperatures are usually slightly lower than those of the setter to reduce the risk of overheating.
The Hatching Phase

The hatching phase is when the poults start to pip all the way around the eggshell and hatch from the egg. In a hatcher that contains eggs that are from one breeder flock and have not been stored for a long period, this phase will typically take 36 hours between the first and last poults hatching. As poults start to hatch they are wet and release a lot of water vapour into the hatcher, resulting in a rise in humidity. Once the natural rise in humidity starts most hatcheries increase the hatcher humidity setting for the rest of the hatching phase to match the natural rise in humidity. However, there is little scientific evidence that this is necessary and it is likely the main benefit is preventing a high humidity alarm. Ventilation should never be restricted in hatchers where the principle method of cooling the machine is by using air.

The Drying Phase

Once the last poults has hatched the humidity in the hatcher is decreased and the ventilation increased so that the poults dry. Typically 6 hours should be sufficient for drying the poults, do not over extend the drying period as it will result in dehydrated poults. Once the hatch has finished and the poults are dry then it is best to remove the poults from the hatcher and hold them in poults boxes.

Chick Pull Out and Processing

Chicks are ready to be taken off when most of them are dry and fluffed up, with a few (about 5%) still having some moisture on the backs of their necks. A common mistake is to allow chicks to spend too long in the hatchers so that dehydrate excessively. Dehydration of chicks may result from incorrect adjustment of setting time for egg age or excessive weight loss during incubation. Similarly, if they are "green" (i.e. not yet ready) check setting times and also check for opportunities for the eggs to have become cooled down in incubation, reducing the rate of development. Upon pulling chicks, they have to be separated from their debris, graded into first quality and culls, and counted into boxes. Some hatcheries carry out additional operations such as:

- Sexing, primarily using feather-sexing with broilers but also vent sexing with breeding stock
- Vaccination, sprayed or injected, using hand or automatic vaccinators
- Beak trimming

Chick Dispatch Boxes

Chick dispatch boxes are usually made to hold 12, 25, 50 or 100 day-old chicks, plus a small percentage of replacements. There are many patterns on the market, each with their own arrangement of air holes to permit safe transport of the chicks under any given set of climatic conditions likely to be encountered in this country.

Sending Out Day-Old Chicks

Chicks may reach their destination by lorry, by rail or their new buyers may collect them at the hatchery. Chicks are to be culled at the time the boxes are being filled and only those that attain a satisfactory standard should be sent out. The points that should be shown by sound chicks are:

- Health and vigour: indicated by round, bright eyes, sturdy legs, ability to stand firmly, and a well grown fluffy down.
- Good size: this will of course vary somewhat with type, breed and egg size.
Trueness to type: any obvious anomalies such as incorrect colouring or comb type should be rejected.

Freedom from deformity: any chick with crooked legs or toes, odd shaped beaks, eyes missing or stuck up, pasty vents or unhealed navels should be discarded.

Major Causes of Eggs Failing to Hatch
- Egg storage
- Breeder nutrition
- True infertility (flock age)
- Diseases
- Bacterial and mold contamination
- Genetics
- Egg faults and shell damage
- Incubation faults

Analysis of Poor Hatchability
Any investigation of the causes of poor hatchability must include examination of dead in shell. The main points to look for are:

1. Egg size and shell quality
2. Air space
3. Position of embryo within shell
4. Anatomical abnormalities
5. Nutritional abnormalities
6. Unused albumen
7. Age of embryo

Diagnosis of hatch problems

<table>
<thead>
<tr>
<th>Observation</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatching early</td>
<td>• High temperature - 1 to 25 days</td>
</tr>
<tr>
<td></td>
<td>• Small eggs</td>
</tr>
<tr>
<td>Hatching late</td>
<td>• Low temperatures or humidity - 1 to 25 days</td>
</tr>
<tr>
<td></td>
<td>• Egg storage</td>
</tr>
<tr>
<td></td>
<td>• Large eggs</td>
</tr>
<tr>
<td></td>
<td>• Low hatcher temperature</td>
</tr>
<tr>
<td>Sticky chicks</td>
<td>• Temperature too high - 26 to 28 days</td>
</tr>
<tr>
<td></td>
<td>• Egg storage</td>
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<tr>
<td></td>
<td>• Broken eggs in the tray</td>
</tr>
<tr>
<td></td>
<td>• Inadequate turning</td>
</tr>
<tr>
<td>Malpositions</td>
<td>• Eggs set upside down</td>
</tr>
<tr>
<td></td>
<td>• Odd shaped eggs</td>
</tr>
<tr>
<td></td>
<td>• Inadequate turning</td>
</tr>
</tbody>
</table>
| **Unhealed navels** | • High temperatures - 1 to 25 days  
• High humidity - 26 to 28 days  
• Egg storage |
| **Crippled chicks** | • Temperature variation throughout incubation  
• Flock age  
• Egg handling first week of incubation |
| **Abnormal chicks** | • Crossed beak: Hereditary or virus infection  
• Missing eyes: High temperatures or handling  
• Wry neck: Nutrition  
• Crooked toes: Temperature and nutrition  
• Spraddle legs: Smooth hatcher trays |
| **If chick starts to pip egg but is unable to get out** | • Low vitality  
• Improper position  
• Eggs not turned  
• Temperature too high day 26-28 |
| **If embryo dies in shell** | • Low vitality  
• Malnutrition or poor environmental conditions of parent stock  
• Insufficient turning  
• Unsanitary conditions |
| **Large number of clear eggs** | • Infertile eggs  
• Very early embryonic mortality |
Inauguration of field day by TANUVAS Vice Chancellor

Hands on training in brooding

Interaction with JBIC