

### **Species affected**

Chickens and turkeys

### **Clinical signs and lesions**

Staphylococcus aureus is ubiquitous and infections occur as secondary infections. Most frequently affected tissues are bone, tendon sheaths and joints.

Clinical picture includes lameness in one or both legs, ruffled feathers, swollen joints, fever and increased mortality.

Lesions; swollen joints, arthritis, synovitis, osteomyelitis, and septicaemia-of liver and spleen.

### **Diagnosis**

Clinical signs and gross lesions in combination with isolation from affected tissues will confirm Staphylococcus infection.

### **Treatment**

Antibiotic treatment based on sensitivity test. Success is not guaranteed.

### **Control**

Prevent damage to natural host defense mechanisms. Good litter quality, prevent wounds, hatchery management and sanitation. So far vaccination has not been successful.

## **Module III**

Selection, care and handling of hatching eggs. Egg testing. Methods of hatching. Brooding and rearing. Sexing of chicks.

### **Describe the process of selection of eggs for brooding and their precautions.**

Poultry has become one of the fastest growing segments of agricultural sector in India today. Now a days poultry products are in high demand. Hatching Technology deals with various aspects of Incubation of fertilized eggs to the arrival of baby chicken.

### **SELECTION OF HATCHINGS EGG**

Most producers set as many eggs as their breeders produce. If incubator space is the limiting factor, it is more profitable to select the better quality eggs for incubation.

#### **A. Characters of the layers chosen for egg selection should be**

1. Well developed, mature and healthy
2. Compatible with their mates and produce a high percentage of fertile eggs
3. Undisturbed during the mating season
4. Fed with complete breeder diet
5. Not related.
6. Good layer and a cockerel are needed for getting fertilized eggs of high quality.

#### **B. Eggs selection**

1. Avoid excessively large eggs as they hatch poorly and small eggs as they produce small chicks.
2. Avoid eggs with cracked or thin shells as there is difficulty in retaining moisture needed for proper development. Cracked eggs give scope for the penetration of disease causing organisms.
3. Select the eggs from hens aged between eight and eighteen months as they lay eggs with uniform size with superior shell quality. Keep 20 or 25 eggs on a table and eliminate the eggs which are
  - (a) Are round and ball like
  - (b) Have nearly the same size at both ends.
  - (c) Have uneven shell structure
4. Pick up and select the moderately elongated eggs with broader a side and pointed end on the other.

#### **C. Sanitization:**

Bacteria on eggs will penetrate the egg shell within 2 to 5 hours after laying the eggs. Eggs can be sanitized by dipping then in a container having chlorine solution. 500ppm ammonia solution can also be used

as disinfectant for dipping. The dipped eggs are removed and dried.

#### D. Egg Care and Storage:

If eggs need to be stored before they go into the incubator, they must be kept below or near to room temperature with careful handling.

Viable eggs should be taken special care before they are placed in the incubator since the embryo starts developing even before the egg is kept for incubation

1. Collect eggs at least three times daily. If the daily high temperatures exceed 85°F increase egg collection to five times daily.

2. Collect two or three times in the morning and one or two times in the afternoon.

3. Slightly soiled eggs can be used for hatching purposes without causing hatching problems, but dirty eggs should not be used even after washing them.

4. Store eggs in a cool-humid storage area. Ideal storage conditions include 55° F. temperature and 75% relative humidity.

5. Always store the eggs with the small end pointed downward.

5 Alter the egg position periodically if it is not incubating within 4 to 6 days

7. Turn the eggs to a new position daily once until



they are

placed in incubator.

8. Hatchability is well up to seven days, but declines rapidly. Hence not to store eggs beyond 7 days.

9. Any eggs stored at 10 - 16°C should be kept at 21-25°C before placing them into incubator



Living egg floats at an angle

10. place the egg carton at an angle of 45° to increase the chance of hatching

11. Only clean eggs are to be selected. Do not wash or wipe dirty eggs with a damp cloth as it removes the egg's protective coating thus facilitating the entry of pathogens.

12. Check the eggs for cracks, inner bacterial rings and inner developing

#### EGG TESTING

There is a need to test the eggs for hatchability, Spoiled, broken, cracked. Unclean eggs are not suitable and hence are to be properly identified and disposed. To identify the fertile and viable eggs, egg testing is necessary before the eggs are kept for incubation. Egg testing can be done in the following ways.

**Float Test:** It is the simple and effective method of testing the eggs for Viability as it is easy to perform. Eggs can be tested after 24 hours of laying. Take sufficient water in to a deep bowl and allow the water to settle. Drop the egg into the water gently and allow it to leave for 10 to 15 mins. Totally sunken eggs are probably dead eggs or unfertilized and are unfit for hatching. Discard them.

If 45-50% of the egg floats out of the water it is also not good for hatching. discard them. The eggs that float with 90-95% submerged in water are good for hatching. Such egg floats at more of an angle, almost horizontally in the water. use them

**Candling Test:** Candling is the process of holding a strong light above or below the egg to observe the embryo. The egg is placed against the light. Torch can also be used.

Under the candling lamp, the embryo appears as a dark shadow with the head as a dark spot. Healthy embryos will respond to the light by moving. Clear eggs with no embryo are to be discarded.

#### Methods of Hatching

There are two methods of Hatching namely Natural hatching and Artificial Hatching.

**Natural hatching:** Natural incubation by the female



bird is the simplest way of hatching eggs. Not all Breeds are Natural Brooders.  
Brahma - brilliant mothers and a big plus is their size, place for up to 20 eggs!  
A broody hen can be identified with the following features

- a. ruffles her feathers
- b. makes noises that remind of water in a bottle - c. gets angry when you come near her ( she picks)

A nest is to be prepared for proper hatching of eggs. The requirements for this nest are:

- a. comfortable, fill it with straw
- b. separate from all other chickens, to avoid disturbing and distraction
- d. dark, shady and silent
- e. safe from predators

Place the viable eggs in the nest and allow the brooder to brood on the eggs. It takes 21 days until the chicks will hatch!!!

### **Principles Of Incubation**

Five major functions are involved in the incubation and hatching of poultry eggs. They are: Temperature, Humidity, Ventilation (Oxygen and Carbon dioxide level and air velocity), Position of eggs, Turning of eggs.

#### **1. Temperature**

Temperature is the most critical environmental concern during incubation because the developing embryo can only withstand small fluctuations during the period.

The optimum temperature for chicken egg in the setter (for first 18 days) ranges from 99.50 to 99.75 o F . For the las three days it should be 98.50 F.



#### **2. Humidity**

Incubation humidity determines the rate of moisture loss from eggs during incubation. Recommended incubation relative humidity for the first 18 days ranging between 55 and 60% (in setter) and for the last 3 days ranging between 65 and 75%. Higher humidity rates dehydrate the eggs.

#### **3. Ventilation**

Ventilation is important in incubators and hatcher because fresh oxygenated air is needed for the respiration of developing embryos

The oxygen needs are small during the first few days compared to the latter stages of development. Oxygen content of the air at sea level is about 21%. Generally the oxygen content of the air in the incubator should be at about 21%. For every 1% drop in oxygen there is 5% reduction in hatchability.

Carbon dioxide is a natural by-product of metabolic processes during embryonic development and is released through the shell. The tolerance level of CO2 for the first 4 days in the setter is 0.3%. CO2 levels above 0.5% in the setter reduce hatchability and completely lethal at 5.0%.



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#### **4. Position of eggs**

Artificially incubating eggs should be held with their large ends up. When the eggs are incubated with the small end up, about 60% of the embryos will develop with the head near the small end. Thus, when the chick is ready to hatch, its beak cannot break into the air cell (which is located at the broad end) to respire. Under normal circumstances eggs are set with large end up for the first 18 days (in setter) and in horizontal position for the last 3 days.

#### **5. Turning of eggs**

Birds, including chickens and quail, turn their eggs during nest incubation. Nature provides nesting birds with the instinct of turning eggs during incubation. Similarly eggs to be turned at least 8 times a day. Turning of eggs during incubation prevents embryo mortality. In large commercial incubators the eggs are turned automatically each hour i.e. 24 times a day.

#### **6. Arrival of the baby chicks**

Around 18th day spray a little quantity of warm water over the eggs to facilitate easy breakage of egg shell by the baby chick. on 21st day the eggs hatch and the newly hatched chick will be wet and will quickly dry. It runs and looks for food and water immediately.

## HATCHERY OPERATION

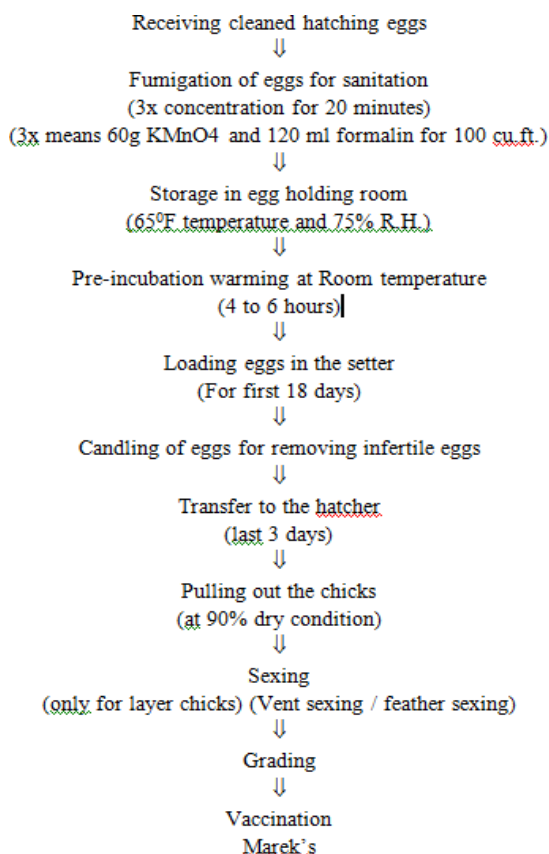
Operation of hatchery involves production of large numbers of chicks which are healthy and economical. It involves the following steps.

**1. Securing good eggs:** Good quality eggs are to be selected for breeding through Float test or Candle test.

**2. Traying hatching eggs:** The eggs are to be arranged in incubator trays. with their large ends up.

**3. Fumigation:** After traying, eggs are to be kept in the fumigation chamber for fumigation. Fumigation with formaldehyde vapours for 20 mins will kill the germs on the shell

**4. Loading of eggs:** Placing of eggs in the setter is called 'Loading of eggs'. In the setter the eggs are incubated upto 18th day keeping all the parameters like temperature, humidity, ventilation etc in good condition.



**5. Candling:** Candling is a process in which eggs are kept in front of a light source to find out the defects in embryonic development. Candling is to be done occasionally to the incubating eggs so as to remove dead or undeveloping eggs if found. The entire tray of hatching eggs may be placed on the mass candler and examined with one observation.

**6. Transfer of eggs:** In modern incubators, eggs are transferred from setter to hatcher at 19th day of incubation. This will give good hatching results as the

last three days require special conditions of incubation.

**7. Hardening the chicks:** The Hatched chicks are to be pulled out from the incubator and are left for 4-5 hours so that they will acclimatize to the environmental conditions. This is called hardening the chicks. When the chicks are first placed in the chick boxes they are soft in the abdomen, are not completely fluffed out, and do not stand well. They must be "hardened" by leaving them in the boxes for 4 or 5 hours. Such hardening makes it easier to grade the chicks for quality, and the chicks are more easily vent-sexed.

**8 Grading the chicks:** No chick below the minimum standard must be allowed to go to a customer. Some standards for quality are, 1) No deformities 2) No unhealed navels 3) Above a minimum weight 4) Not dehydrated and 5) Stand up well.

**9. Sexing the chicks:** Layer type day-old chicks are need to be sex separated either by vent sexing or auto-sexing (feather sexing). In case of meat-type day-old chicks sexing is not practiced.

## **BROODING AND REARING OF THE HEALTHY CHICKS**

Once the chicks have hatched, the needs of the baby chickens are the same as naturally hatched chicks. Generally the brooding hen will look after the needs of the baby chicks. In incubator method brooding and rearing is to be provided as follows.

### **1. Housing**

The brooding room should be heated prior to arrival of the chicks. It should be disinfected properly. A newly hatched chick requires supplemental heat to maintain its body temperature; therefore, an external heat source must be provided to chicks in the first few weeks.

Heat lamps with infra-red bulbs are usually positioned in the centre of a brooder ring. Reheat lamps are used to confine chicks in a small area close to feed and water and ultimately allowing them to select an environment at their own thermal comfort level.

### **2. Brooder Rings**

Brooder rings are made from corrugated cardboard which has been cut to an appropriate length in order to form a ring 2.4 to 3.6 m in diameter. The brooder ring is set up in the pen where the chicks are placed, and is removed once they are five to 10 days old.

These brooding temperature should be adjusted according to observations of the chicks. The behaviour and sounds of the chicks will indicate their comfort level. Comfortable birds will be evenly spaced around the pen and will make soft "cheeping" noises. Cold chicks will huddle in the warmest part of the pen and cheep loudly.



Source of heating: Incandescent light 100w. 1 for 100 chicks, Infrared lamps (250 watts) 1 for 250 chicks  
Pancake heater 1 for 1000 chicks

### 3. Space requirements

Floor space

Baby chicks are small when they hatch but grow quite rapidly.

Minimum space requirements are as follows:

Age	0-3 weeks	3-8 weeks	More than 8 weeks
Space required in Feet square per bird	0.5	0.75 - 1.0	1.5 - 2.0

### 4. Lighting

Light is a powerful stimulus for most production birds.

Broiler chicks should be raised in 24-hour light for maximum growth rate.

Constant bright light of 20 to 50 lux (the measurement term lux being the International System of Units or SI for illuminance and luminous emittance), should be provided from hatch to seven days of age. The constant lighting allows chicks to adjust to their new environment and find their feed and water sources. After seven days, the light intensity may be lowered to five lux.

### 5. Water

During the first week of brooding, deaths due to dehydration can be reduced by providing additional water sources in the brooder ring. Several shallow trays, such as ice cube trays, can be placed throughout the ring. It is also helpful to dip the chicks' beaks into the water when initially placing them into the brooder ring.

Fresh water should be available at all times, and the water containers should be cleaned routinely. As with the feeders, the height of the water source should be

regularly adjusted to be even with the back of the chicks.

### 6. Feed

During the first week of brooding, in addition to the feeding troughs, small amounts of feed should be provided in shallow trays (such as box lids or egg flats) which the chicks can easily access. This helps the chicks find the feed more successfully in the first few days. It is also beneficial to place the feed and water close together during this time to ensure the chicks eat and drink. Proper feeder space should be provided.

### 7. Sanitation and disease

For maximum survival rate and to minimize disease problems, one should purchase chicks from reputed hatchery. Chicks must be pre vaccinated. Sanitation is the best way to prevent diseases. Keep the facility clean, Feed only non moldy feed. Cleaning of waterers. Reduce the movement of people.

### 8. Precautions to be taken

1. After arrival of chicks, moist the beak and leave the chicks under heating source.

2. Maintain a brooder temperature of 90 to 95<sup>0</sup>F for the first week and then reduce 5<sup>0</sup>F every week until it reaches the room temperature.

3. First and second day provide electrolytes and vitamins in drinking water to overcome stress.

4. Watch the behaviour of chicks in order to find out whether temperature provided is correct or less or more.

5. 24 hours lighting programme may be adopted during 0-8 days of age.

6. One hour darkness may be provided to train the chicks in case of any power failure.

7. Remove the old newspaper after 3 days and destroy it by burning. If necessary, spread another set of newspaper.

8. Remove brooder guard after 7 to 10 days depending upon the season.

### SEXING OF CHICKS

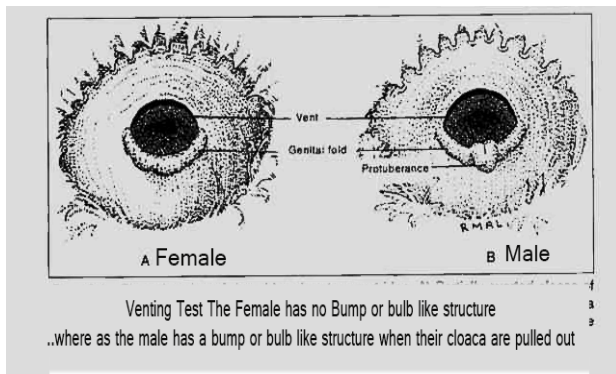
Chick sexing is the method of distinguishing the sex of baby by a trained person called a chick sexer or chicken sexer.

Chicken sexing is practiced mostly by large commercial hatcheries to separate female chicks or "pullets" (destined to lay eggs for commercial sale) from the males or "cockerels" (These are usually killed at the hatchery)

## Methods of Sexing

### **Venting:**

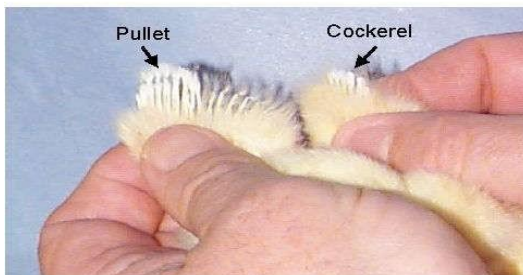
Vent sexing, also known simply as venting, involves squeezing the faeces out of the chick, which opens up the chick's cloaca slightly. If a small bulb like structure is seen inside the cloaca the chick is a male and it is discarded.



This kind of sexing is very difficult, only an experienced sexer can do it perfectly.

**Feather Sexing** Feather sexing is another easy way to determine the gender of chicks. Surprisingly, female chicks typically have wing feathers before they hatch. Young roosters do not begin to develop their wing

### **Comparison of Pullet and Cockerel One Day Old Chicks**



feathers until a few days after they hatch.

Chick's tiny wings are stretched to look for signs of wing feather development. Female wing feathers are longer and male baby chick feathers are shorter.

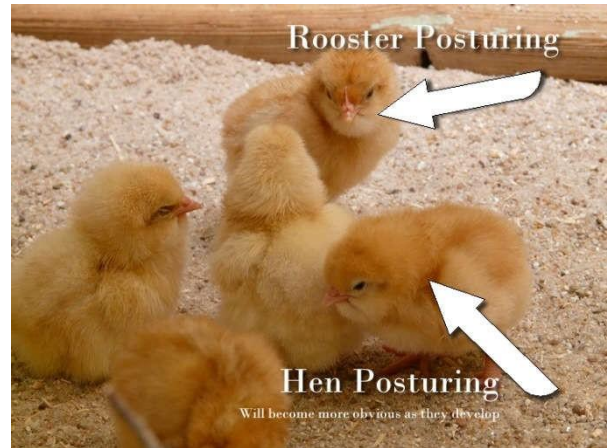
### **Comb Colours and Sizes**



In certain breeds of chicken like Barred rocks the comb size will be more larger in male baby chicks than female chicks. The colour of the combs will be brighter in males than female chicks.

### **Behaviour**

Young male baby chicks act dominant. It tends to be nearer the by female chicks to protect them. The



female chick posture usually be submissive.

### **Colour sexing**

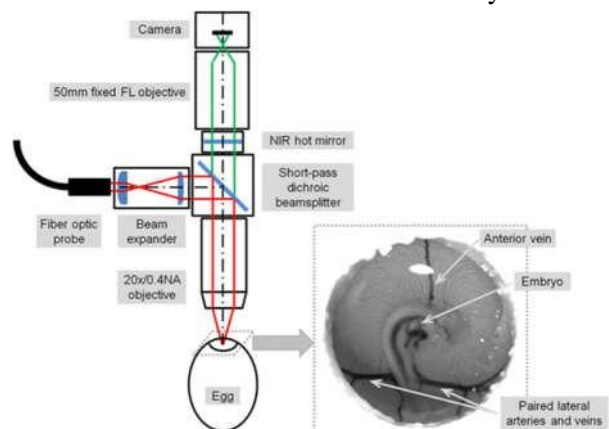
The sex linked silver or gold gene is makes the female chicks darker in colour and males have whiter colour. This is very easily identifiable feature in hatchery industry.

### **In Ovo Sexing based on feather colour**

Automatic sexing machines are developed in 2016 and to be available to market soon.

In this system, 14 days old hatching eggs are put under bright light. The feather colour of the developing embryo are observed using spectroscopy. Embryos sex is determined by the machine based on the colour of the feather.

It is found to be 97% accurate and is very fast method.



This method saves time and money because the eggs with male embryos can be discarded on the 14<sup>th</sup> day itself.

### **In Ovo sexing based on automated allantoic fluid testing.**

The day 15 hatching eggs are punctured by a needle and little quantity of allantoic fluid is collected. This

fluid contains the genetic information of the baby chick. The sex chromosome pattern tells whether that embryo is male or female. This entire process is automated on a conveyor belt. This gives 99% accurate results. Once the sex of the embryo is found the male embryos are discarded immediately.