

Lecture 3

Events in Embryonic Development

Before Egg Laying:

- Fertilization

- Division and growth of living cells

- Segregation of cells into groups of special function (tissues)

Between Laying and Incubation

- No growth; stage of inactive embryonic life

During Incubation:

First day:

- 16 hours - first sign of resemblance to a chick embryo

- 18 hours - appearance of alimentary tract

- 20 hours - appearance of vertebral column

- 21 hours - beginning of nervous system

- 22 hours - beginning of head

- 24 hours - beginning of eye

Second day:

- 25 hours - beginning of heart

- 35 hours - beginning of ear

- 42 hours - heart beats

Third day:

- 60 hours - beginning of nose

- 62 hours - beginning of legs

- 64 hours - beginning of wings

Fourth day - beginning of tongue

Fifth day - formation of reproductive organs and differentiation of sex

Sixth day - beginning of beak

Eighth day - beginning of feathers

Tenth day - beginning of hardening of beak

Thirteenth day - appearance of scales and claws

Fourteenth day - embryo gets into position suitable for breaking shell

Sixteenth day - scales, claws and beak becoming firm and horny

Seventeenth day - beak turns toward air cell

Nineteenth day - yolk sac begins to enter body cavity

Twentieth day - yolk sac completely drawn into body cavity; embryo occupies practically all the space within the egg except the air cell

Twenty-first day - hatching of chick

Table 1: Incubation Periods of some Poultry Species

Species	Incubation Period (days)
Domestic fowl	21
Turkey	28
Duck (Muscovy)	33-35
Duck (others)	28
Goose	29-31
Guinea fowl	26-28
Pigeon	16-20
Japanese quail	16-19
Pheasants	22-24
Ostrich	40-42

EMBRYONIC MORTALITY

Embryonic mortality has to do with the death of embryo at various stages of development. The early embryonic mortality is called **dead-in-germ** while late embryonic mortality is called **dead-in-shell**.

Causes of dead-in-germ

- Deformed spermatozoa- low sperm count, infertile sperm
- Nutritional problems- deficiency of Vitamin B complex in the ration of breeder.
- Improper/inadequate turning of eggs in the incubator.

- The condition of the incubator with particular reference to temperature (low or high), humidity (low or high, accumulation of CO₂, lactic acid, NH₃ as a result of gasses produced by the egg when there is no adequate ventilation)

Causes of dead-in-shell

- Inadequate turning
- Malpositioning of the embryo. Normal position of embryo is that head should be positioned to broad end so that it will use its beak to tear off the air space membrane thereby breath in the first air in the air space. Any position apart from this is mal-positioning.
- The thickness of egg shell – it causes mortality because at times chick may not be strong enough to break the shell.
- Deficiency of Vitamin B complex (Nutritional problem)
- Twinning- this can cause mortality because the twin in the egg will be competing for the nutrient and be unable to break the shell because of their weakness.
- The condition of the incubator and hatcher (temperature, humidity, ventilation)
- Contamination of the hatching egg (egg condition)
- Time taking during the fertility test- wasting of time from incubator to candling room to hatcher leads to loss of temperature and humidity from the eggs.
- Improper handling during the candling.

SEXING OF DAY-OLD CHICKS

Sexing of day-old chicks is done to determine the gender of the chick i.e. the differentiation of the sex of the birds into male and female. In avian, the spermatozoa are homogametic. The chromosomes are the same i.e. they carry the W-chromosome. In case of the female, the chromosomes are heterogametic because they carry Z-chromosome. In other words, it is the female that determines the sex of the chicken in avian. In most cases, more than 50% in chicken hatched are males.

Methods of sexing Day-old chicks

Cloacal, or vent sexing, was the first method perfected and is the oldest method used today to distinguish between day-old hens and roosters. Although this method is not easy to accomplish, with proper training and experience, the individual performing this method can generally get positive results. This method involves examining the baby chicken's vent, located under its tail, looking for a genital

organ. If the genital organ is present in the vent, it will resemble a small pimple and the chicken is a rooster.

Machine sexing is the second oldest method of determining the sex of day-old baby chickens. The machine method came into existence in the 1950s. These machines worked by a telescopic tube with a light inserted into an evacuated vent of the baby chicken in question. The tester carefully looks into the lens of the instrument and makes a determination of the sex of the chicken by seeing whether the chicken has testes or ovaries.

Feather sexing became possible in 1969 after several years of genetic research by the Tegels Poultry Breeding Company. This method used to determine the sex of newly hatched chicks is only possible if a female from a slow-feathering breed is crossed with a male from a fast-feathering breed. The sex of the chicks produced from this cross can be determined during the first 48 hours after hatching by looking at the primary and secondary feathers located on the chick's wings. The primary feathers will be noticeably longer than the secondary feathers on a female chick. On a male, the primary and secondary feathers are the same length.

Colour sexing is the newest method of determining the sex of a day-old chicken. In 1975, commercial breeders were developed and the day-old chickens of these breeders can be identified as hens and roosters by the colour of their plumage. The plumage on day-old hens is generally white while the plumage on day-old roosters is brown.