

Lecture 2

PRE-INCUBATION CARE OF HATCHABLE EGGS

The following steps should be taken before eggs are set into the incubator:

1. Selection: Select eggs without physical defects, eggs between 48 – 55g, eggs 7 – 10 days after lay.
2. Storage: Store hatchable eggs in sanitary holding facility at 10°C – 15°C and 70 – 80% RH.
3. Fumigation: Fumigate with formalin and potassium permanganate.
4. Setting: Set eggs with small end down.

EMBRYONIC DEVELOPMENT IN CHICKEN (EMBRYOGENESIS)

Fertilization occurs about 24 hours before the egg is laid. A sperm cell, actually a number of sperm cells penetrates the blastodisc on the yolk, and a new life begins (as blastoderm). When the egg is laid, the blastodisc contains several hundred cells. When the egg cools, embryonic development stops. Embryonic development starts again when the temperature is increased. If the temperature is then decreased to room temperature a second time, the embryo may die.

The first cleavage usually takes place in the isthmus after 5 hours of ovulation. **Cleavage** is a process of cellular division in the embryo without increase in the cytoplasm. Series of cleavage or division usually takes place in uterus and shell gland until 256 cell stage is reached, then there will be **Gastrulation**. Gastrulation is the movement of cells within the embryo to form the area of specific organs which usually called 3 germinal layers (Ectoderm, Mesoderm and Endoderm). These layers are definite organ forming region.

The first thing to be formed is usually the **brain** and **neural tissues** and it is usually within the first day. This occurs in incubator.

After 48 hours, the development of the heart, circulatory system and rudimentary gut (intestine) will occur. After 72 hours, while the embryo is developing, temporary structures are formed to support life. They are called **extra-embryonic**, because they do not become a part of the embryo. The one that is visible at the earliest stage of development is the **amnion**.

Amnion: It looks like a small pool in which the embryo is floating. Its purpose is to protect the embryo.

The allantois is a structure that collects the waste that the embryo produces before it hatches. Many of the nutrients that the embryo needs are removed from the yolk by the yolk sac. Its blood vessels can carry nutrients from the yolk to the embryo.

The last structure is the **chorion**, which lies between the embryo and the shell. An important function is for it to exchange the carbon dioxide produced by the embryo and bring oxygen to the embryo. The chorion also is important for dissolving mineral from the shell and making it available to the chick for forming bones

The first 4 days are a time of dramatic change. Mistakes sometimes occur in this process. If it is a serious mistake, the defect is lethal and the embryo dies. In the incubation process, these mistakes cause "early deads." If the biological mistake is not as serious, the embryo may develop longer before dying, or it may survive with a congenital defect.

Beginning at day 18, several major changes occur. One is that the embryo pokes its head through the inner membrane into the air cell, and then begins to breathe. It also takes any remaining yolk into its abdomen through the navel. After 21 days of incubation, the chick finally begins its escape from the shell. The chick begins by pushing its beak through the air cell. The allantois, which has served as its lungs, begins to dry up as the chick uses its own lungs. The chick continues to push its head outward. The sharp horny structure on the upper beak (egg tooth) and the muscle on the back of the neck help cut the shell. The chick rests, changes position, and keeps cutting until its head falls free of the opened shell, then kick free of the bottom portion of the shell. The chick is exhausted and rests while the navel openings heal and its down dries. Gradually, it regains strength and walks. The incubation and hatching is complete.