

CHICK EMBRYOLOGY – LESSON 1

Time Needed

- Pre-test, if given, should take 10 minutes.
- Time for discussion will depend on age, knowledge base and experience of the students can vary from 15-30 minutes.

Skill/Grade Level

- Can be adapted for K-12 students

Core Area

- Agriculture
- Animal production

Life Skills

- Participation in group discussion
- Sharing experiences and ideas

Educational Standards

- AA2: Participate in conversation, discussion and group presentations
- OD2: Contrast the processes of natural and artificial breeding methods



Objectives/Outcomes

- To introduce the students to the chick embryology project before the incubator is brought into the classroom

Introduction to Content

This lesson should be held in advance of receiving the incubator and fertile eggs for the 'Incubation and Embryology in the Classroom' project. It will let the students know what to expect and, hopefully, develop enthusiasm for the project.

Curriculum

The materials required are included in this lesson plan. They include a copy of the lifecycle of a chicken and the record sheets of activities required. There is also a PowerPoint presentation on the lifecycle of a chicken.

Background Information

Refer to the leaders manual for background information on chickens, embryology, and incubation.

Materials Needed

- Copies of the pre- and post-test
- A copy of the PowerPoint on the lifecycle of the chicken
- Projector with computer
- Copies of the record sheets needed for the daily and periodic activities

Getting Ready

Use the pre-test to get a baseline of the information that the students have.

Activity 1 – Overview of the life cycle of a chicken

Review the terminology related to chickens.

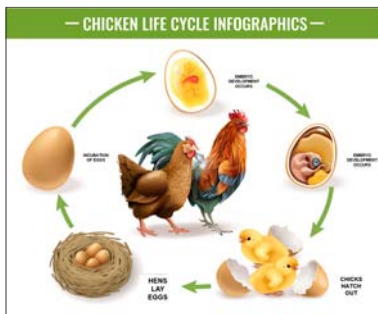
Show the PowerPoint on the overview of the lifecycle of a chicken.

Learn more at www.kentucky4h.org or contact your county extension office.



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ACTIVITY 1 (continued)



Using the graphic on the lifecycle of the chicken. Discuss the vocabulary.

Chick: Baby chicken

Hen: Adult female chicken

Rooster or Cock: Adult male chicken

Pullet: Immature female chicken

Cockerel: Immature male chicken

Chickens hang out in groups referred to as **flocks**. A group of hatchlings is referred to as a **brood** or **clutch**.

For more advanced classes, you can add additional terminology:

- A baby duck is called a **duckling**
- A baby goose is called a **gosling**
- A baby turkey is called a **poult**
- A baby pigeon is called a **squab**
- A baby guinea fowl is called a **keet**
- A group of geese is called a **gaggle**
- A group of ducks is called a **brace**



Chickens become sexually mature between 18 and 25 weeks of age depending on the breed and time of the year. For females this involves the laying of **eggs** while for male chickens sperm is produced. Chickens mate by having the rooster mount the hen and the cloaca of each chicken touch allowing for the transfer of **sperm**. There is no actual penetration of the hen by the rooster. Chickens do not have a penis like mammals do. The only poultry species that have a penis are waterfowl (such as ducks and geese) and ostriches. The hen will lay a 'clutch' of eggs before she sits on the entire group of eggs to brood them. The number of eggs will depend on the size of the hen. This is possible because of the avian feature of physiological zero in which, without incubation, the embryo goes into hibernation until the correct conditions are provided.



After the hen lays all her eggs, she will start to sit on them. The chick inside the egg will grow for 21 days before a baby chick emerges. The hen maintains the necessary temperature for proper development of the chicks inside the eggs by sitting on them and keeping them warm. The heat she provides is generated by the brood patch on her abdomen. She also turns the eggs around with her beak. She gets up occasionally to eat and drink. Her underside picks up moisture which is transferred to the eggs when she returns to the nest.



After 21 days, the chick breaks through the egg (**pipping**) makes its way out of the egg (**hatching**). The chick emerges wet but quickly dries out. Chicks emerge with 'down' feathers which dry fast. Chicks can walk soon after they hatch. They are called '**precocial**'. The alternative is '**altricial**', in which the birds are hatched without down and are not able to walk after hatch but must be cared for by their parents. Pigeons are examples of altricial birds.

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ACTIVITY 1 (continued)



Hens do not need roosters to lay eggs. The commercial eggs you find in the grocery stores are from hens in cages with no roosters present. So, eggs from the grocery store are infertile and, even if incubated, will never develop into a chick.

ACTIVITY 2

Then use the following questions or points as a guide in a discussion of the project:

- Have you ever seen and/or held a chicken?
 - If so, what do you remember about it?
- Have you ever hatched a chick before?
 - If so, what do you remember about it?
 - Was there anything that surprised you about the chick hatching? If so, what was it?
- Has anyone ever seen wild birds sitting on eggs in a nest?
- Has anyone ever seen a hen sitting on eggs to hatch them out? This is referred to as brooding and the hen is referred to as a broody hen. If so, what does a hen provide to make sure the eggs hatch?
 - Heat from brood batch on her abdomen
 - Turning of the eggs periodically
 - Moisture to increase humidity
 - Getting up occasionally so the eggs get fresh air
- When the incubator and eggs arrive, there are some things we will need to do to make sure that the eggs hatch. These include proper care of the eggs before they go into the incubator, temperature and humidity control during incubation, routine turning of the eggs, recordkeeping, and care of the chicks after they hatch. Why do you think each one is important?
 - What will happen if the eggs are not cared for before or during incubation?
 - How might we make sure that the eggs get proper care during incubation?
- Develop a calendar chart to make sure the eggs get the care they need to hatch into healthy chicks. Make plans as a class to share responsibility for temperature monitoring, egg turning, keeping the water reservoir filled (for adequate humidity) and recordkeeping. There are several records that can be kept in addition to the temperature and whether a specific chore was done or not. Eggs can also be weight periodically to monitor changes and the number of eggs removed during candling whether they are infertile or dead embryos.

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ACTIVITY 2 (Continued)

- Selection of a location for the important since this is important for successful operation.
 - Room temperature of 70-75°F is ideal
 - Requires consistent supply of electricity (does a socket get turned off in the evening or on weekends to save electricity?)
 - Fresh air, without a draft is necessary (air should move around freely so do not place in a corner)
 - No direct sunlight (i.e., away from windows)
 - Away from fans, heaters, and air conditioners

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CHECK LIST – For wafer-controlled incubator

Two days before the eggs are delivered:

- ☐ 1. Chose location for incubator
- ☐ 2. Plug in incubator at least two days before eggs arrive
- ☐ 3. Fill the pan with water
- ☐ 4. Lay the thermometer in the wire rack where the eggs will be, making sure it does NOT interfere with the automatic turner.
- ☐ 5. Close the incubator
- ☐ 6. Make sure the light turns on initially
- ☐ 7. If the light does not turn on, turn the bolt on outside of incubator in the hot direction until the light does turn on
- ☐ 8. Monitor the temperature checking every half hour to make sure the incubator is getting warm
- ☐ 9. When the temperature reaches 98°F, screw the nut tight at that setting
- ☐ 10. Continue to monitor temperature to make sure it remains a constant temperature

When eggs are delivered:

- ☐ 1. Number each egg with a pencil in the large end of an egg

OPTIONAL – If using manual turning during school days

- ☐ 2. Mark and X on all the eggs with a pencil
- ☐ 3. Mark an O on the other side
- ☐ 4. Mark an arrow coming from the X-mark on one side
- ☐ 5. Weigh and record the weights of each egg
- ☐ 6. Refill water tray if needed
- ☐ 7. Close the incubator
- ☐ 8. Monitor temperature – it will have dropped from opening the incubator and will need to climb back up to between 98-100°F

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CHECK LIST – Daily activities

Daily activities

- ☐ 1. Record the temperature of the incubator on the record sheet for daily activities.

OPTIONAL – If using manual turning during school days

- ☐ 2. In the morning, open the incubator and turn the eggs (from X to O if the X is up rotating the egg in the direction of arrow, and O to X in the opposite direction of the arrow if the O is up) and indicate that they eggs have been turned on the record sheet.
- ☐ 3. Fill water trays if necessary.
- ☐ 4. Close the incubator and confirm the temperature a half hour later

OPTIONAL – If using manual turning during school days

- ☐ 5. At noon repeat steps 1-4
- ☐ 6. Before the end of the day repeat steps 1-4

Periodic activities – Egg weight

- ☐ 1. Every three days, once that day, you should record the weight of each egg at the same time as turning the eggs
- ☐ 2. Quickly weigh each egg and record the weights
- ☐ 3. Turn the eggs as scheduled
- ☐ 4. Close the incubator and monitor temperature periodically until it reaches the correct temperature

Periodic activities – Candling the eggs

- ☐ 1. Every three days you should candle each egg (this can be at a different time as eggs are weighed)
- ☐ 2. Quickly candle each egg and indicate on the record sheets if the eggs are infertile or if the embryo is dead
- ☐ 3. Close the incubator and monitor temperature periodically until it reaches the correct temperature

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PRE-TEST

Student name _____ Grade _____

School name _____

Answer each, question by circling T" if the statement is true and "F" if the statement is false.

- T F 1. All eggs laid by hens are fertile.
- T F 2. A hen will not lay an egg if a rooster is not present.
- T F 3. To hatch eggs, the incubator should be set at 99-100° F.
- T F 4. Chicken eggs hatch after being in the incubator 17 days.
- T F 5. A classroom incubator should be placed by a window.
- T F 6. All newly hatched baby chicks are white or black in color.
- T F 7. If a baby chick is wet when it hatches, it is sick and will probably die.
- T F 8. Eggs are candled to see the chick embryo.
- T F 9. After chicks hatch, they need to be kept warm at a temperature of 95° F.
- T F 10. Eggs are a very nutritious food for humans to eat.
- T F 11. The water pan in the incubator provides moisture to increase the humidity to the air.
- T F 12. A hen pushes an egg from her body. We call this process hatching an egg.
- T F 13. Chickens use an egg tooth to eat food.
- T F 14. A chick gets out of the egg by pecking through the eggshell.
- T F 15. The chick developing inside the egg is called an embryo.
- T F 16. The adult female chicken is called a rooster.
- T F 17. Adult chickens are the same color they were when they hatched.
- T F 18. A newly hatched chick's eyes are closed for three days.
- T F 19. When you candle an incubated egg, the red lines you see are the chicken's feathers.
- T F 20. Nature's way of hatching eggs is by a mother hen sitting on the eggs.

CHICKEN EMBRYOLOGY

POST-TEST

Student name _____ Grade _____

School name _____

Answer each, question by circling T" if the statement is true and "F" if the statement is false.

- T F 1. All eggs laid by hens are fertile.
- T F 2. A hen will not lay an egg if a rooster is not present.
- T F 3. To hatch eggs, the incubator should be set at 99-100° F.
- T F 4. Chicken eggs hatch after being in the incubator 17 days.
- T F 5. A classroom incubator should be placed by a window.
- T F 6. All newly hatched baby chicks are white or black in color.
- T F 7. If a baby chick is wet when it hatches, it is sick and will probably die.
- T F 8. Eggs are candled to see the chick embryo.
- T F 9. After chicks hatch, they need to be kept warm at a temperature of 95° F.
- T F 10. Eggs are a very nutritious food for humans to eat.
- T F 11. The water pan in the incubator provides moisture to increase the humidity to the air.
- T F 12. A hen pushes an egg from her body. We call this process hatching an egg.
- T F 13. Chickens use an egg tooth to eat food.
- T F 14. A chick gets out of the egg by pecking through the eggshell.
- T F 15. The chick developing inside the egg is called an embryo.
- T F 16. The adult female chicken is called a rooster.
- T F 17. Adult chickens are the same color they were when they hatched.
- T F 18. A newly hatched chick's eyes are closed for three days.
- T F 19. When you candle an incubated egg, the red lines you see are the chicken's feathers.
- T F 20. Nature's way of hatching eggs is by a mother hen sitting on the eggs.

PRE/POST-TEST ANSWERS

- ✖ F 1. All eggs laid by hens are fertile. NO, EGGS WILL NOT BE FERTILE IF A ROOSTER IS NOT PRESENT
- ✖ F 2. A hen will not lay an egg if a rooster is not present. HENS WILL LAY AN EGG WHETHER OR NOT A ROOSTER IS PRESENT
- T ✖ 3. To hatch eggs, the incubator should be set at 99-100° F.
- ✖ F 4. Chicken eggs hatch after being in the incubator 17 days. IT TAKES 21 DAYS
- ✖ F 5. A classroom incubator should be placed by a window. NO, THE SUN SHINING THROUGH MAY EFFECT THE OPERATION OF THE INCUBATOR
- ✖ F 6. All newly hatched baby chicks are white or black in color. NO, DEPENDS ON THE BREED. SOME ARE YELLOW RATHER THAN WHITE
- ✖ F 7. If a baby chick is wet when it hatches, it is sick and will probably die. NO, ALL CHICKS ARE WET WHEN THEY HATCH OUT
- T ✖ 8. Eggs are candled to see the condition of the chick embryo. YES – IF NO EMBRYO IT MAY BE INFERTILE OR THE EMBRYO MAY HAVE DIED
- T ✖ 9. After chicks hatch, they need to be kept warm at a temperature of 95° F.
- T ✖ 10. Eggs are a very nutritious food for humans to eat.
- T ✖ 11. The water pan in the incubator provides moisture to increase the humidity to the air.
- ✖ F 12. A hen pushes an egg from her body. We call this process hatching an egg. NO, IT IS CALLED OVIPOSITION OR SIMPLY LAYING OF AN EGG
- ✖ F 13. Chickens use an egg tooth to eat food. NO, CHICKENS DO NOT HAVE TEETH FOR EATING. THE EGG TOOTH IS FOR BREAKING THROUGH THE SHELL AT HATCH
- T ✖ 14. A chick gets out of the egg by pecking through the eggshell.
- T ✖ 15. The chick developing inside the egg is called an embryo.
- ✖ F 16. The adult female chicken is called a rooster. NO, A FEMALE CHICKEN IS CALLED A HEN (A BABY CHICK IS CALLED A PULLET)
- ✖ F 17. Adult chickens are the same color they were when they hatched. NO, THE DOWN COLOR ON CHICKS IS NOT ALWAYS THE SAME AS THE FEATHERS OF THE ADULT
- ✖ F 18. A newly hatched chick's eyes are closed for three days. NO, EYES ARE OPEN AT HATCH
- ✖ F 19. When you candle an incubated egg, the red lines you see are the chicken's feathers. NO, THEY ARE BLOOD VESSELS
- T ✖ 20. Nature's way of hatching eggs is by a mother hen sitting on the eggs.

CHICKEN EMBRYOLOGY

— CHICKEN LIFE CYCLE INFOGRAPHICS —

