

Unit B: Anatomy and Physiology of Poultry

Lesson 3: Natural Poultry Reproduction

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Discuss the process of natural poultry reproduction.
2. Discuss the role of hormones in poultry reproduction.
3. Discuss factors that can cause reproductive failure.

Recommended Teaching Time: 2 hours

Recommended Resources: The following resources may be useful in teaching this lesson:

- A PowerPoint has also been developed for use with this lesson plan
- <http://www.poultryhub.org/index.php/Reproduction>
- <http://people.eku.edu/ritchisong/avianreproduction.html>

List of Equipment, Tools, Supplies, and Facilities

Writing surface
PowerPoint Projector
PowerPoint Slides
Poultry sperm samples
Microscope
Internet access
Live female poultry (optional)

Terms: The following terms are presented in this lesson (shown in bold italics and on PowerPoint Slide # 2):

androgen
hormone
luteinizing hormone
oestrogen
progesterone
sperm viability

Interest Approach: Use an interest approach that will prepare the students for the lesson.

Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Ask students, “How do poultry reproduce?” After hearing and discussing the answers, write the word “natural reproduction” on the chalkboard and ask them what this word means.

Summary of Content and Teaching Strategies

Objective 1: Discuss the process of natural poultry reproduction.

(PowerPoint Slide #3)

- I. Reproduction in poultry is different from other mammals.
 - A. In mammals, the young are carried inside the female's body.
 - 1. Poultry produce eggs as a result of fertilization.
 - 2. The egg then develops outside the body.
 - 3. Hens will still produce eggs if they are not fertilized, however the egg will not produce a chick.

(PowerPoint Slide #4)

- B. Male birds sometimes conduct a mating dance around a female to attract her attention.
 - 1. Some species of birds, like turkeys have very colorful feathers in order to attract a mate.
 - 2. If the female does not take interest in the male bird, he will chase her down.

(PowerPoint Slide #5) This slide shows the difference between a male and female turkey. The male is much bigger and has colorful feathers so that it can attract a female for mating.

(PowerPoint Slide #6)

- C. The reproductive cycle begins with the male placing the sperm into the oviduct of the female.
 - 1. The sperm is deposited from the male onto the vent of the female.
- D. Next, the male papillae deposits sperm in cloacal wall of female.
 - 1. The sperm move up the oviduct to the funnel where the egg is fertilized.

(PowerPoint Slide #7) This slide shows an example of a male turkey depositing its sperm into the oviduct of the female.

(PowerPoint Slide #8) This slide shows an example of chickens mating.

(PowerPoint Slide #9)

- E. These sperm cells remain in oviduct 2-3 weeks after mating.
 - 1. This allows for the females to produce fertilized eggs even if they are apart from the male.
 - 2. The sperm have full fertilizing ability for about 6 days.
 - 3. After then the ability of sperm to fertilize an egg is decreased.
 - a. This is called **sperm viability**.
 - b. After the 10th day of deposition, the sperm have 50% viability.
 - c. That moves to 15% 19 days after deposition.

Acquire poultry sperm samples. View these under a microscope and have the students draw a picture of what they see. If possible, try to obtain samples from different species and compare shapes and sizes of the sperm. Discuss with the class how sperm shape and size can impact fertilization of the embryo.

Objective 2: Discuss the role of hormones in poultry reproduction.

(PowerPoint Slide #10)

- II. Reproduction in all animals, including birds is regulated by hormones.
 - A. The sexual behavior of animals is regulated by the secretion of hormones.
 - 1. If the hormones are not properly secreted the animal may not be able to reproduce.
 - 2. In poultry, hormone production and therefore egg production, is stimulated by day length.

(PowerPoint Slide #11)

- B. A **hormone** is a chemical substance that has a specific effect on an organ or in some cases all body tissues.
 - 1. Hormones produced include androgen, oestrogen and progesterone.
 - 2. **Androgen** causes comb growth and condition, and has a function in the formation of albumen.

(PowerPoint Slide #12)

- 3. **Oestrogen** causes the growth of the female plumage, mating and nesting behavior, oviduct development together with the nutrient supply to the ovary/oviduct for egg formation.
- 4. **Progesterone**, with androgen is involved in the production of albumen and the carriage of the message to the pituitary gland to release **luteinizing hormone**.
 - a. **Luteinizing hormone** triggers ovulation.

(PowerPoint Slide #13)

- C. The female reproductive system remains dormant in the young chicken and growing pullet until she reaches the age when these organs start to prepare for the normal production of eggs.
 - 1. One of the first signs of her developing maturity is the change in the comb development.
 - 2. This organ starts to grow and to take on a vivid red hue as the hormones produced by the now awakening ovary start to have an effect.

Observe some female birds. If live birds are not available use the picture on PowerPoint Slide #14. Have students make observations about the birds to determine if they are sexually mature. Have the students research if different species sexually mature in different amounts of time.

Objective 3: Discuss factors that can cause reproductive failure.

(PowerPoint Slide #15)

- III. Reproduction can fail for many reasons.
 - A. The general physical condition of an animal can play a major role in reproductive ability.
 - 1. The size and shape of the bird has an effect on the ability to reproduce.
 - 2. If the bird is too fat or too thin it may not become pregnant.
 - 3. Their body will not have enough energy to produce an egg.
 - 4. Providing proper nutrition and exercise can help prevent weight issues.

(PowerPoint Slide #16)

- B. If the bird is in poor physical condition it can have trouble giving birth.
 - 1. This could include diseases and infections or other physical ailments.

(PowerPoint Slide #17)

- C. Infections can be a major problem in reproductive failure.
 - 1. Infections in birds can affect reproductive organs.
 - a. These infections may prevent pregnancy.
 - 2. Other diseases may cause a spontaneous abortion, or a miscarriage.
 - 3. If a bird with a disease or infection does become pregnant the resulting chick may be very weak or may not live.
 - 4. Infections of the uterus are the most serious.

- a. These infections are almost always fatal to embryos or fetus

Provide the students with internet access, textbooks and any other materials available to have them research common diseases and infections that impact reproduction in birds. As a class, create a chart comparing the various diseases and infections.

Review/Summary: Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used to determine which objectives need to be reviewed or re-taught with a different approach. Questions on **PowerPoint Slide #18** can also be used.

Application: Split the class into four groups. After groups are determined, assign a species of bird to each group- turkey, duck, goose, and chicken. Have the groups research how natural reproduction takes place for that species. They should present their findings to the class in any format they are comfortable with (PowerPoint, poster, pamphlet, etc.).

Evaluation: Evaluation should focus on student achievement of this lesson's objectives. A sample written test is attached.

Answers to Sample Test:

Part One: Matching

1. A
2. B
3. C
4. E
5. F
6. D

Part Two: Short Answer

7. In poultry, the development of the young occurs outside of the female's body.
8. Hens can produce fertilized eggs without the presence of a male because the sperm is stored in the body for 2-3 weeks.
9. Day length stimulates the production of hormones and eggs in poultry.
10. Reproduction can fail if the bird is in poor physical condition, if it is too large or small and if it has an infection.

Test

Unit B Lesson 3: Natural Poultry Reproduction**Part One: Matching***Instructions. Write the letter of the correct answer next to the statement.*

- | | | |
|--------------|-----------------|------------------------|
| A. androgen | B. hormone | C. luteinizing hormone |
| D. oestrogen | E. progesterone | F. sperm viability |

- ____ 1. Causes comb growth and condition, and has a function in the formation of albumen.
- ____ 2. A chemical substance that has a specific effect on an organ or in some cases all body tissues
- ____ 3. Triggers ovulation
- ____ 4. Is involved in the production of albumen and the carriage of the message to the pituitary gland to release **luteinizing hormone**
- ____ 5. The ability of sperm to fertilize an egg
- ____ 6. Causes the growth of the female plumage, mating and nesting behavior, oviduct development together with the nutrient supply to the ovary/oviduct for egg formation

Part Two: Short Answer*Instructions: Provide a short statement to answer each of the following questions.*

- 7. How is poultry reproduction different from that of other mammals?
- 8. How can hens produce fertilized eggs even if males are not around?
- 9. What stimulates egg and hormone production in poultry?
- 10. What are the three reasons reproduction can fail?