

Course	Agricultural Science I
Unit	Introduction to Poultry Production
Lesson	Reproduction
Estimated Time	50 minutes

Student Outcome

Explain poultry reproductive processes.

Learning Objectives

1. Identify the parts of the male reproductive tract and explain their functions.
2. Identify the parts of the female reproductive tract and explain their functions for developing an egg.
3. Describe the parts of an egg.
4. Explain how an embryo develops from a fertile egg.
5. Explain how the reproductive process in poultry differs from other livestock.


Grade Level Expectations

SC/LO/3/B/09-11/d

SC/LO/3/E/09-11/a

Resources, Supplies & Equipment, and Supplemental Information

Resources

1. PowerPoint Slides
 - ☐ PPt 1 – Parts of a Male Reproductive Tract
 - ☐ PPt 2 – Parts of a Female Reproductive Tract
 - ☐ PPt 3 – Parts of an Egg
 - ☐ PPt 4 – Chick Embryo
2. Activity Sheets
 -  AS 1 – Female Reproductive System and Egg Development
3. *Introduction to Poultry Production (Student Reference)*. University of Missouri-Columbia: Instructional Materials Laboratory, 1999.
4. *Introduction to Animal Reproduction (Student Reference)*. University of Missouri-Columbia: Instructional Materials Laboratory, 1996.
5. *Introduction to Poultry Production Curriculum Enhancement*. University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

Supplies & Equipment

- ☐ Raw egg and hard-boiled egg
- ☐ Plate and dissection materials

Supplemental Information

1. Internet Sites
 - ☐ “Animal Science Publications.” MU Extension. University of Missouri-Columbia. Accessed September 13, 2007, from <http://extension.missouri.edu/explore/agguides/ansci/>.

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- ❑ "Poultry Anatomy." Purdue University. Accessed September 13, 2007, from <http://ag.ansc.purdue.edu/poultry/slides/anatomy/>.
 - ❑ "Poultry Reproduction." Florida Cooperative Extension Service. Institute of Food and Agricultural Sciences. University of Florida Accessed September 13, 2007, from http://edis.ifas.ufl.edu/TOPICT_Poultry_Reproduction.
 - ❑ "Unit 3: Poultry Reproduction." Purdue University. Accessed September 13, 2007, from <http://ag.ansc.purdue.edu/nielsen/www245/lecnotes/avianrepro.html>.
 - ❑ "Poultry: Reproduction and Incubation." MSUcares. Mississippi State University. Accessed September 13, 2007, from <http://msucares.com/poultry/reproductions/index.html>.
2. Print
- ❑ Ensminger, M.E., *Poultry Science*. 3rd ed. Danville, IL: Interstate Publishers, Inc., 1992.
 - ❑ Gillespie, James R., *Modern Livestock and Poultry Production*, 5th ed. Albany: Delmar Publishers. 1997.
 - ❑ Moreng, Robert E. and John S. Avens. *Poultry Science and Production*. Prospect Heights, IL: Waverly Press, Inc. 1991.
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Interest Approach


Dissect a raw and a hard-boiled egg. Discuss the different layers and their functions. Explain their purpose in the reproduction cycle of a bird.


Communicate the Learning Objectives

1. Identify the parts of the male reproductive tract and explain their functions.
2. Identify the parts of the female reproductive tract and explain their functions for developing an egg.
3. Describe the parts of an egg.
4. Explain how an embryo develops from a fertile egg.
5. Explain how the reproductive process in poultry differs from other livestock.

Instructor Directions	Content Outline
<p>Objective 1</p> <p><i>Familiarize students with the parts of the reproductive system of male poultry. PPt 1 is a diagram of the parts of a male reproductive tract.</i></p> <p>☐ PPt 1 – Parts of a Male Reproductive Tract</p>	<p>Identify the parts of the male reproductive tract and explain their functions.</p> <ol style="list-style-type: none">1. Testicles<ol style="list-style-type: none">a. Located along backbone within the abdominal cavityb. Two testicles made up of ducts that produce and secrete semenc. Connected to the vas deferens2. Vas deferens – tube that transfers semen to the cloaca3. Cloaca<ol style="list-style-type: none">a. Common area where reproductive and digestive systems meetb. Holds the papillae within the folds of the wall4. Papillae – transports the sperm to the female reproductive tract during mating5. Vent – opening of the cloaca that releases the reproductive and digestive products
<p>Objective 2</p> <p><i>Familiarize students with the female reproductive tract and how each part contributes to the development of the egg. PPt 2 is a diagram of the parts of a female reproductive tract. Complete AS 1.</i></p> <p>☐ PPt 2 – Parts of a Female Reproductive Tract</p>	<p>Identify the parts of the female reproductive tract and explain their functions for developing an egg.</p> <ol style="list-style-type: none">1. Female reproductive tract made up of the ovary and the oviduct2. Ovary<ol style="list-style-type: none">a. Produces the ova, or "yolk", female reproductive cellb. Only left ovary is functionalc. Located in the body cavity near the backbone3. Oviduct<ol style="list-style-type: none">a. Long tube made up of sections where remaining

Instructor Directions	Content Outline
<p>AS 1 – Female Reproductive System and Egg Development</p>	<p>membranes are added to form egg</p> <ol style="list-style-type: none"> b. Consists of the infundibulum, magnum, isthmus, uterus, and vagina <ol style="list-style-type: none"> 1. Infundibulum – Funnel-shaped upper portion that receives the mature yolk from the ovary; site where yolk becomes fertilized 2. Magnum – Albumen secreted to form various layers of egg white 3. Isthmus – Adds shell membranes that represent the final shape of the egg 4. Uterus – Adds a thin, white shell where water is added to develop the albumin 5. Vagina – Passageway to the cloaca 6. Cloaca – Held briefly while it rotates into position 7. Vent – Egg passes from the body
<p>Objective 3</p> <p><i>Familiarize students with the parts of the egg. PPt 3 is a diagram of the parts of an egg.</i></p> <p>PPt 3 – Parts of an Egg</p>	<p>Describe the parts of an egg.</p> <ol style="list-style-type: none"> 1. Shell consists of three layers. <ol style="list-style-type: none"> a. Inner mammillary layer consists of sponge-like, calcium crystals. b. Outer shell layer is made up of hard calcium crystals. c. Cuticle is a protective layer that prevents microorganisms from entering egg. 2. Membranes are made of protein fibers that exist inside the shell. <ol style="list-style-type: none"> a. Inner membrane holds contents of egg tightly together. b. Outer membrane is connected to the shell. c. Acts as a barrier to outside contaminants. d. Reduces evaporation of egg contents. e. Air cell forms at large end of shell where two membranes separate. 3. Albumen (egg white) consists of four layers. <ol style="list-style-type: none"> a. Chalaziferous layer surrounds the yolk and extends into the chalazae. b. Chalazae are two twisted cords extending from opposite ends of the yolk and help to keep yolk in place.

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	<ul style="list-style-type: none"> c. Liquid inner thin layer, firm dense white layer, and outer thin layer surround the chalaziferous layer. 4. Yolk (ovum) contains the germ spot (female reproductive cell). <ul style="list-style-type: none"> a. Made up of layers that are a record of daily growth. b. Orange-yellow colored layer comes from carotene, which is found in feed. c. Lighter colored layers reflect growth while hen is not eating during the night. d. Darker colored layers indicate daylight hours when hen is eating and has high levels of carotene. e. Yolk is surrounded by membrane that helps to maintain spherical shape.
<p>Objective 4</p> <p><i>Familiarize students with the development of the chick from fertilization to hatching. PPt 4 is a diagram of a chick embryo at approximately 10 days.</i></p> <p> PPt 4 – Chick Embryo</p>	<p>Explain how an embryo develops from a fertile egg.</p> <ul style="list-style-type: none"> 1. Embryonic development in the chick occurs in 21 days. 2. Cell division process starts as the egg passes through the warm oviduct of the hen. 3. Blastoderm divides into two cells three hours after fertilization. 4. Blastoderm divides further into two layers, the ectoderm and the entoderm. <ul style="list-style-type: none"> a. Ectoderm forms skin, feathers, beak, claws, nervous system, lens and retina, lining of the mouth, and lining of the vent. b. Entoderm forms lining of digestive tract, respiratory tract, and other secondary organs. 5. Mesoderm forms an additional layer and develops into bones, muscles, blood, respiratory organs, and excretory organs. 6. Embryo supports itself with membranes that help to utilize food material. <ul style="list-style-type: none"> a. Allantois serves as circulatory system. <ul style="list-style-type: none"> 1. Absorbs oxygen. 2. Oxygenates the blood. 3. Removes carbon dioxide. 4. Removes wastes from kidneys. 5. Aids in digestion of albumen. 6. Absorbs calcium from eggshell.

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	<ul style="list-style-type: none"> b. Amnion is filled with fluid and protects embryo during development. c. Yolk sac surrounds yolk and provides nourishment for the embryo to grow. <ul style="list-style-type: none"> 1. Drawn into body cavity just before hatching. 2. Serves as temporary nutrition for newly hatched chick. d. Chorion fuses with inner shell membrane and forms a protective layer around allantois while it completes metabolic functions.
<p>Objective 5</p> <p><i>Review the reproductive processes of other livestock that students have studied and compare to the poultry reproductive process.</i></p>	<p>Explain how the reproductive process in poultry differs from other livestock.</p> <ul style="list-style-type: none"> 1. Primary difference is that poultry reproductive process occurs more rapidly. <ul style="list-style-type: none"> a. Length of time from fertilization to birth for cattle is 281 days, swine is 114 days. b. Average incubation period for chickens is 21 days and 28 days for turkeys. 2. Majority of embryonic growth and development occurs outside mother's body. <ul style="list-style-type: none"> a. Hen prepares egg but is expelled from body in about 24 hours. b. Reproductive process in other livestock occurs inside the mother. 3. Parts of reproductive system differ <ul style="list-style-type: none"> a. Testes of poultry located within body cavity along backbone. b. Testes of other livestock located in scrotum which hangs from the body. c. Only one of two ovaries are functional in poultry. d. Both ovaries are functional in other mammals.
<p>Application</p> <p> AS 1 – Female Reproductive System and Egg Development</p>	<p>Answers to AS 1</p> <ul style="list-style-type: none"> 1. Ovary – Produces the ovum or yolk. 2. Oviduct – Remaining membranes are added to form the rest of the egg. 3. Infundibulum – Receives the mature yolk from the ovary. 4. Magnum – Albumen is secreted and forms various layers of egg white.

Instructor Directions	Content Outline
	<ol style="list-style-type: none"> 5. Isthmus – Adds inner and outer shell membrane that represents the final shape of the egg. 6. Uterus – Adds a thin, white shell. 7. Vagina – Serves as a passageway. 8. Cloaca – Egg is held briefly as it rotates so the large end is expelled first. 9. Vent – Egg passes from body. <p>Other activity</p> <ol style="list-style-type: none"> 1. Obtain pictures or a video showing a poultry embryo at different stages of development. Observe the different membrane layers and how they change and adjust as the embryo grows.
Closure/Summary	<p>Reproduction of poultry is different than that of other livestock in many ways. The location of the male and female reproductive parts is different than other livestock. In poultry, the development of the embryo takes place outside of the mother's. The length of time from fertilization to birth is much shorter in poultry than in other livestock.</p>
Evaluation: Quiz	<p>Answers</p> <ol style="list-style-type: none"> 1. d 2. c 3. c 4. f 5. g 6. a 7. d 8. b 9. e 10. Shell, membrane, albumen, and yolk 11. Ectoderm, entoderm, and mesoderm 12. c 13. b 14. d 15. Occurs more rapidly, growth and development takes place outside mothers's body, testes are located within the body cavity along the backbone, and only one of the two ovaries is functional.