Course	Agricultural Science I
Unit	Introduction to Animal Reproduction
Lesson	Conception and Gestation
Estimated Time	50 minutes

Student Outcome

Describe conception and gestation.

Learning Objectives

1. Describe what conception is and where it occurs.
2. Describe the methods that are used to impregnate.
3. Explain the procedures used to determine pregnancy.
4. Describe what gestation is and its three stages.
5. Describe the embryonic membranes and their functions.
6. List the factors that influence the length of gestation.
7. Describe what incubation is.
8. Determine how gestation and incubation lengths differ among species.

Grade Level Expectations

SC/LO/1/B/09-11/b

Resources, Supplies & Equipment, and Supplemental Information

Resources

1. PowerPoint Slides
   - PPt 1 – Embryonic Membranes of a Pig
   - PPt 2 – Gestation and Incubation Lengths for Different Species
2. Activity Sheet
   - AS 1 – Gestation and the Reproductive Tract
3. *Introduction to Animal Reproduction (Student Reference)*. University of Missouri-Columbia: Instructional Materials Laboratory, 1996.
4. *Introduction to Animal Reproduction Curriculum Enhancement.* University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

Supplies & Equipment

- ❑ Obtain sow reproductive tracts for examination.

Supplemental Information

1. Internet Sites
   - ❑ Alexander, M. A., et al. *Sheep Pregnancy Checking By Ultrasonic Sound*. MU Extension. University of Missouri-Columbia. Accessed June 18, 2007, from http://extension.missouri.edu/explore/agguides/ansci/g02610.htm.
   - ❑ Animal Science Publications. MU Extension. University of Missouri-Columbia. Accessed April 12, 2007, from http://extension.missouri.edu/explore/agguides/ansci/.
   - ❑ Cattle gestation table and calving date calculator. Cattle Today, Inc. Accessed June

18, 2007, from http://www.cattletoday.com/gestation.shtml.
- Lyons, J. J. *Small Flock Series: Incubation of Poultry*. MU Extension. University of Missouri-Columbia. Accessed June 18, 2007, from http://extension.missouri.edu/explore/agguides/poultry/g08353.htm.
- Massey, J. W., J. C. Whittier, and C. J. Bierschwal. Increase *Your Calf Crop by Good Management, Pregnancy Testing and Breeding Soundness Examination of Bulls*. MU Extension. University of Missouri-Columbia. Accessed June 18, 2007, from http://extension.missouri.edu/explore/agguides/ansci/g02006.htm.
- Pregnancy Diagnosis in Cows and Heifers. Partners in Reproduction. Accessed June 18, 2007, from http://www.partners-in-reproduction.com/reproduction-cattle/pregnancy-diagnosis.asp.
- Pregnancy in Cows and Heifers. Partners in Reproduction. Accessed June 15, 2007, from http://www.partners-in-reproduction.com/reproduction-cattle/pregnancy-conception-gestation.asp.

Interest Approach

1. Place one balloon inside another. Fill the inner balloon with water and tie it shut. Then fill the outer balloon with water. The balloons can be used to simulate the function of the placenta during gestation. Have students attempt to break the inner balloon to demonstrate how the fetus is protected during its development.
2. Ask students how they think an embryo develops in preparation for birth. Describe how gestation prepares the fetus to survive outside the mother's body. If possible, show pictures of an embryo and fetus during gestation.

Communicate the Learning Objectives

1. Describe what conception is and where it occurs.
2. Describe the methods that are used to impregnate.
3. Explain the procedures used to determine pregnancy.
4. Describe what gestation is and its three stages.
5. Describe the embryonic membranes and their functions.
6. List the factors that influence the length of gestation.
7. Describe what incubation is.
8. Determine how gestation and incubation lengths differ among species.

Instructor Directions	Content Outline
Objective 1 *Ask students what happens during conception.*	**Describe what conception is and where it occurs.** 1. Conception occurs when a single sperm unites with the egg, creating an embryo. 2. Conception occurs in the oviduct, usually in the upper third. 3. In swine, dogs, and rabbits, multiple ova are released and fertilized. 4. In fowl, the egg and sperm unite in the infundibulum. Fertilization takes place at the germinal disk on the yolk, which contains the nucleus.
Objective 2 *In nature, for females to become pregnant, mating has to occur. However, other ways to impregnate a female do exist. Discuss with students the different ways in which a female may be impregnated. To illustrate the hormone cycle, refer back to PPt 10 in Lesson 2.*	**Describe the methods that are used to impregnate.** Natural breeding - male copulates with the female Artificial insemination 1. Semen is collected from the male and stored. 2. During estrus, the previously collected semen is inserted into the female reproductive tract. Embryo transfer 1. The female releases many eggs during ovulation because of FSH injections.

Instructor Directions	Content Outline
	2. The eggs are fertilized either by natural or artificial mating. 3. After conception, the embryos are collected from the female and transferred to other females for the pregnancy. 4. ET cannot be used in fowl.
Objective 3 *Discuss the economic and biological importance of being able to determine pregnancy. Describe the different procedures used to determine pregnancy. Hand out AS 1 and complete the activity.* AS 1 – Gestation and the Reproductive Tract	**Explain the procedures used to determine pregnancy.** Visual inspection 1. No visual signs of estrus are present. 2. The abdomen is enlarged late in pregnancy. Rectal palpation 1. Rectal palpation involves inserting an arm into the rectum and feeling for the distended uterus or for cotyledons. 2. A modified version is used in sheep in which a rod is inserted in the rectum to move the fetus so it can be felt. Abdominal palpation - The abdomen is externally examined by hand. During pregnancy, the uterus becomes enlarged and can be felt. Ultrasonic sound 1. Used for many species, pregnancy checking by ultrasonic sound involves using a transducer attached to a machine and a sealant. 2. With a sealant being used to exclude air from between the transducer and the body, the transducer transmits ultrasonic sound waves through the body. 3. The sound waves are reflected by tissue. When the waves encounter a fetus, the unit will light up or sound to indicate pregnancy. In a laboratory situation, pregnancy may be determined through blood tests or even x-rays.
Objective 4 *Ask students what gestation is. Discuss when gestation begins. Identify the three stages of*	**Describe what gestation is and its three stages.** Gestation is the period of development for offspring beginning at conception and ending at birth. During gestation, the fetus receives nutrients and oxygen from the

Instructor Directions	Content Outline
gestation. Discuss the importance of gestation.	mother through the placenta and gives off carbon dioxide and waste products that are absorbed by the mother. The fetus goes through three stages of gestation. 1. Cell division stage - The embryo undergoes 16 or more cell divisions as it is transported to the uterus. 2. Embryonic stage - Body parts are differentiated, and important organs are formed. When the embryonic stage is complete, a fetus has developed. 3. Fetal period - The fetus grows until birth.
Objective 5 *Discuss why the embryo needs protection and nutrients. Using PPt 1, discuss the roles of each of the embryonic membranes in providing protection and nutrients.* ☐ PPt 1 – Embryonic Membranes of a Pig	**Describe the embryonic membranes and their functions.** 1. Chorion - The chorion is connected to the uterus. The points of attachment provide nourishment and waste disposal for the embryo. 2. Amnion - The amnion is a sac that surrounds the embryo itself and contains amniotic fluid to protect the embryo from shock. The umbilical cord connects the amnion to the embryo's navel. The cord also provides nourishment to the embryo. 3. Allantois - The allantois, which is an extension of the urinary system of the embryo, lies between the amnion and the chorion. It contains allantoic fluid, which originates in the embryo's kidney.
Objective 6 *The length of gestation differs for each mother within a species. Ask students what would cause these differences in gestation lengths. Discuss the influence of these factors on gestation length.*	**List the factors that influence the length of gestation.** 1. Breed of the mother 2. Mother's age 3. Individual variation - Two mothers may be the same age and breed but may still have different gestation lengths. 4. Weather 5. Choice of sire
Objective 7 *Discuss how the development of the embryo in fowl differs from the gestational process described above.*	**Describe what incubation is.** 1. The time from when the hen sits on an egg or it is placed in an incubator to its hatching is called incubation. Incubation is a period of fetal development analogous to gestation. 2. The embryo is nourished by the yolk. 3. The membranes that surround the embryo are the same as those found in mammals, although the

Instructor Directions	Content Outline
	chorion and the allantois merge to form the chorioallantoic membrane, which functions as a respiratory organ.
Objective 8 *Discuss the differences among species in gestation lengths. Use PPt 2 to illustrate the different lengths.* ☐ PPt 2 – Gestation and Incubation Lengths for Different Species	**Determine how gestation and incubation lengths differ among species.** 1. Cow - 281 day average gestation length with a range of 274 to 290 days 2. Sow - 114 day average gestation length with a range of 112 to 116 days 3. Ewe - 147 day average gestation length with a range of 144 and 151 days 4. Mare - 336 day average gestation length with a range of 330 to 350 days 5. Bitch - 63 day average gestation length with a range of 56 to 70 days 6. Doe - 31 day average gestation length with a range of 30 to 32 days 7. Fowl - vary in incubation length for each species, with chickens averaging 21 days and turkeys averaging 28 days
Application: AS 1 – Gestation and the Reproductive Tract	Answers to "Key Questions" on AS 1 1. The cotyledons are the points of attachment between the placenta and the uterus. 2. Answers will vary depending on the reproductive tracts used. 3. Answers will vary depending on the reproductive tracts used. Other activities 1. Have an artificial inseminator speak to the class about the procedure. The AI method should be demonstrated, either on a model or a real animal. Students may practice the procedure on a model. 2. Have a veterinarian demonstrate how to use ultrasonic sound to pregnancy check a sow. If a nearby veterinarian has a real-time ultrasound machine, take students on a field trip to observe its use. 3. Have the students contact a local feed dealer, Extension office, AI technician, or veterinarian to obtain a breeding calendar.
Closure/Summary	Conception, which takes place in the upper third of the

Instructor Directions	Content Outline
	oviduct and in the infundibulum in fowl, marks the beginning of a new life and the start of gestation in mammals and incubation in fowl. Conception may occur due to natural or artificial breeding, and several procedures can be used to determine whether pregnancy has resulted. Gestation has three stages, with gestation lengths varying due to factors such as the breed and age of the mother. During gestation and incubation, embryonic membranes are essential to the survival of the new life.
Evaluation: Quiz	Answers: 1. b 2. c 3. c 4. b 5. c 6. a 7. b 8. Conception occurs when a single sperm unites with the egg. The union of the egg and sperm creates a new life called an embryo. 9. Natural breeding involves the cow and bull mating with the bull depositing semen in the vagina. There are two artificial methods used to impregnate a cow, artificial insemination (AI) and embryo transfer (ET). In AI, the semen is collected from the bull. When estrus is detected in the female, the collected semen is artificially inserted into the cow's reproductive tract. In ET, the female releases many eggs during ovulation because of FSH injections. The eggs are fertilized naturally or artificially. Once the eggs are fertilized, the embryos are collected from the cow and transferred to other cows for the pregnancy. 10. Gestation length may be influenced by the mother's age and breed and by individual differences between animals. The weather and the sire may also affect the length of gestation.