

Course	Agricultural Science I
Unit	Introduction to Animal Reproduction
Lesson	Puberty and the Estrous Cycle
Estimated Time	50 minutes

Student Outcome

Explain the role of puberty and the estrous cycle in reproduction.

Learning Objectives

1. Describe what puberty is.
2. List the age at which each species reaches puberty.
3. Describe what estrus is.
4. Describe how estrous cycles differ for various species.
5. Describe how estrus length differs among species.
6. Describe the visual signs of estrus in each species.
7. List the factors that determine when an animal should be bred for the first time.

Grade Level Expectations

Resources, Supplies & Equipment, and Supplemental Information

Resources

1. PowerPoint Slide
 - ❑ PPT 1 – Puberty Age, Estrous Cycle Length, and Estrus Length
2. Activity Sheet
 - 📄 AS 1 – Gathering Breeding Age Information
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.

Supplemental Information

1. Internet Sites
 - ❑ Animal Science Publications. MU Extension. University of Missouri-Columbia. Accessed April 12, 2007, from <http://extension.missouri.edu/explore/agguides/ansci/>.
 - ❑ Eilts, B. E. *Bovine Reproductive Herd Health*. Louisiana State University. Accessed June 15, 2007, from http://www.vetmed.lsu.edu/eiltslotus/Theriogenology-5361/bovine_intro_and_herd_health.htm.
 - ❑ Floyd, Jr., G. and D. Gimenez, Jr. *Estrus Synchronization Programs for Beef Herds*. Alabama Cooperative Extension System. Accessed June 15, 2007, from <http://www.aces.edu/pubs/docs/A/ANR-1027/>.
 - ❑ Kojima, F. N., J. F. Bader, B. E. Salfen, M. F. Smith, and D. J. Patterson. *Development of a New Estrous Synchronization Protocol for Beef Cattle with Short-Term Feeding of Melengestrol Acetate: 7-11 Synch*. Missouri Agricultural Experimental Station.

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- University of Missouri. Accessed June 15, 2007, from <http://aes.missouri.edu/thompson/research/kojima.stm>.
- ❑ Löfstedt, R. *Reproductive Physiology of Mares*. University of Prince Edward Island, Canada. Accessed June 15, 2007, from <http://people.upei.ca/lofstedt/opence/horsephysiol.html>.
 - ❑ Lown, M. *Detection of Estrus in Mares*. Penn State University. Accessed June 15, 2007, from <http://www.das.psu.edu/user/equine/ansc407/horseBarnsProject/lowntease.htm>.
 - ❑ Puberty in Heifers. Partners in Reproduction. Accessed June 15, 2007 from <http://www.partners-in-reproduction.com/reproduction-cattle/puberty-heifers.asp>.
 - ❑ Rasby, R. and R. Vinton. *Estrus Cycle Learning Module*. University of Nebraska-Lincoln. Accessed June 15, 2007, from <http://beef.unl.edu/learning/estrous.shtml>.
 - ❑ Schoenian, S. "Reproduction in the Ewe." *Sheep 201: A Beginner's Guide to Raising Sheep*. Accessed June 15, 2007, from <http://www.sheep101.info/201/ewerepro.html>.
 - ❑ Singleton, W. and M. Diekman. *Reproductive Physiology and Anatomy of the Sow*. Purdue University Department of Animal Sciences. Accessed June 15, 2007, from <http://www.ansc.purdue.edu/swine/porkpage/repro/physiol/reppaper.htm>.
 - ❑ Sterle, J. and T. Safranski. *Artificial Insemination in Swine: Breeding the Female*. University of Missouri-Columbia. Accessed June 15, 2007, from <http://extension.missouri.edu/explore/agguides/ansci/g02312.htm>.
 - ❑ Wattiaux, M. A. and W. T. Howard. "The Reproductive Function of Dairy Cattle." *Dairy Essentials*. University of Wisconsin. Accessed June 14, 2007, from http://babcock.cals.wisc.edu/downloads/de_html/ch08.en.html.
 - ❑ Whittier, J. C. *Reproductive Anatomy and Physiology of the Cow*. University of Missouri-Columbia. Accessed June 15, 2007, from <http://extension.missouri.edu/explore/agguides/ansci/g02015.htm>.
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Interest Approach

Ask students why it is important to know when to first breed an animal. Indicate that in order to benefit economically and productively through healthy offspring, the breeder must make a careful decision about when to breed for the first time based on puberty and the estrous cycle. Ask the students to define puberty and explain the role of the estrous cycle in reproduction.



Communicate the Learning Objectives

1. Describe what puberty is.
2. List the age at which each species reaches puberty.
3. Describe what estrus is.
4. Describe how estrous cycles differ for various species.
5. Describe how estrus length differs among species.
6. Describe the visual signs of estrus in each species.
7. List the factors that determine when an animal should be bred for the first time.

Instructor Directions	Content Outline
Objective 1 <i>Ask students to explain puberty. Discuss puberty and its importance in reproduction. Describe what happens in the female reproductive system during puberty.</i>	Describe what puberty is. Puberty is the stage during which the animal becomes sexually mature. In males, the animal is then able to produce viable sperm and has a desire to mate. In females, puberty involves the production of ova, the development of the reproductive tract, and a desire for mating. Puberty in the female mammal is identified by the first estrus.
Objective 2 <i>Each species goes through puberty. Point out that animals reach puberty at different ages. Compare species using PPt 1. Remind students that nutrition, physical size, and breed all affect the age at which a particular animal reaches puberty.</i> <input type="checkbox"/> PPt 1 – Puberty Age, Estrous Cycle Length, and Estrus Length	List the age at which each species reaches puberty. <ol style="list-style-type: none">1. Heifer - between 6 and 12 months2. Gilt - between 4 and 8 months3. Ewe - between 5 and 9 months4. Mare - between 10 and 12 months5. Bitch - between 6 and 12 months6. Doe - between 5 and 8 months7. Fowl - chickens between 17 and 26 weeks; turkeys between 27 and 30 weeks
Objective 3 <i>Ask students what estrus is and how it is connected to puberty.</i>	Describe what estrus is. Estrus is the period in which the female is receptive to mating. Estrus occurs at intervals; each interval is called

Instructor Directions	Content Outline
<p><i>Discuss the role the estrous cycle has in reproduction and describe the relationship between the estrous cycle and estrus.</i></p>	<p>an estrous cycle.</p> <p>During the estrous cycle, the reproductive tract is prepared for the release of the egg and to receive the fertilized egg.</p> <p>The estrous cycle has three phases.</p> <ol style="list-style-type: none"> 1. Proestrus - The follicle matures. 2. Estrus - The female is receptive to mating, and the egg is released. 3. Diestrus - The reproductive tract is less active.
<p>Objective 4</p> <p><i>Describe how the estrous cycle differs for various species, occurring at different times and seasons depending on the species. Use PPt 1 to compare the different estrous cycles.</i></p> <p><input type="checkbox"/> PPt 1 – Puberty Age, Estrous Cycle Length, and Estrus Length</p>	<p>Describe how estrous cycles differ for various species.</p> <p>Monoestrus species have estrus only once in a breeding season or year (e.g., dogs).</p> <p>Some species are polyestrus, with more than one estrus per breeding season or year. Sheep and horses are different from other polyestrus species in that they are seasonal breeders. In most breeds of sheep, the ewe has estrous cycles only during the fall. The period in which the ewe is not cycling is called anestrus. The mare usually experiences anestrus in the winter and cycles from around March until October or November. The variations in the estrous cycles of sheep and horses are triggered by changes in the length of days during the year.</p> <p>Estrous cycles also differ in length for different species.</p> <ol style="list-style-type: none"> 1. Cow - from 17 to 24 days, with an average of 21 days 2. Sow - between 18 and 24 days, with an average of 21 days 3. Mare - an average of 21 days, with a range of 18 to 25 days 4. Ewe - an average of 16 days, with a range of 14 to 20 days 5. Doe - an average of 15 days, with a range of 15 to 16 days 6. Bitch - does not have an estrous cycle, but is in anestrus until it experiences proestrus, estrus, and diestrus once each breeding season
<p>Objective 5</p> <p><i>Point out that estrus is a window of opportunity for mating, and</i></p>	<p>Describe how estrus length differs among species.</p> <ol style="list-style-type: none"> 1. Cow - an average length of 18 hours, with a 10 to 30 hour range

Instructor Directions	Content Outline
<p><i>consequently breeding, to occur. Stress that estrus length is an important consideration for breeding, since estrus is the only time when the female is receptive to mating. Refer to PPT 1 for comparisons.</i></p> <p><input type="checkbox"/> PPT 1 – Puberty Age, Estrous Cycle Length, and Estrus Length</p>	<ol style="list-style-type: none"> 2. Sow - an average of 3 days, with a range of 1 to 5 days 3. Ewe - an average of 30 hours and a range of 22 to 38 hours 4. Mare - an average of 5 days, with a range of 1 to 10 days 5. Bitch - an average of 9 days, with a 5 to 19 day range 6. Doe - does not have a well-defined estrus period, since ovulation is stimulated by mating
<p>Objective 6</p> <p><i>Discuss how an individual can determine whether an animal is in heat. Ask the students to list some common visual signs of estrus. Discuss the signs found in each species.</i></p>	<p>Describe the visual signs of estrus in each species.</p> <p>Cow</p> <ol style="list-style-type: none"> 1. Mounting other females or allowing itself to be mounted 2. Agitation or nervousness 3. Frequent urination 4. Swollen vulva 5. Vaginal discharges <p>Sow - same signs as the cow</p> <ol style="list-style-type: none"> 1. Occasional loud grunting 2. Immobile stance with ears held erect <p>Ewe</p> <ol style="list-style-type: none"> 1. Slightly swollen vulva 2. Vaginal mucus discharge 3. Seeking the ram and standing to be mounted <p>Mare</p> <ol style="list-style-type: none"> 1. Raised tail 2. Relaxed vulva 3. Mucus discharges 4. Disturbing other mares 5. Nervousness 6. Nicker 7. Frequent urination 8. Winking of vulva <p>Bitch</p> <ol style="list-style-type: none"> 1. Behavioral changes, such as an increase or decrease in appetite

Instructor Directions	Content Outline
	<ol style="list-style-type: none"> 2. Swollen vulva 3. Cessation of a bloody discharge begun during proestrus 4. Acceptance of the male for mating <p>Doe</p> <ol style="list-style-type: none"> 1. Reddish-purple, slightly swollen vulva 2. Acceptance of the male for mating
<p>Objective 7</p> <p><i>Ask students when a heifer should be bred the first time. Indicate that many factors play a role in determining the correct breeding time and that what might be the appropriate time for breeding for one heifer may not be the right time for another. Describe the factors to look for in deciding when to breed an animal. Have students complete AS 1.</i></p> <p> AS 1 - Gathering Breeding Age Information</p>	<p>List the factors that determine when an animal should be bred for the first time.</p> <p>Should not be bred at puberty; may not be physically equipped for successful reproduction</p> <p>Factors influencing the first breeding</p> <ol style="list-style-type: none"> 1. Physical size - weight and size of frame 2. Age - past puberty and fully sexually mature 3. Breed - variation of maturation time by breed
<p>Application:</p> <p> AS 1 - Gathering Breeding Age Information</p>	<p>Answers to AS 1</p> <p>Answers will depend on the responses from the sources.</p> <p>Other activities</p> <p>Using the information in the lesson, have students make an estrous cycle time line for each species. The time line should indicate the time at which puberty is expected to occur, as well as the average interval at which the estrous cycle repeats.</p>
<p>Closure/Summary</p>	<p>Puberty occurs in animals as they become sexually mature, which happens at different ages in different animals. The first estrus, which can be identified by certain visual signs, is an indication of puberty in the female. The length of estrus and the estrous cycle vary among species. After puberty occurs, physical size, age, and breed are factors to consider when determining when an animal should be bred for the first time.</p>

Instructor Directions	Content Outline
Evaluation: Quiz	<p>Answers:</p> <ol style="list-style-type: none"> 1. d 2. b 3. b 4. b 5. b 6. c 7. c 8. a 9. The five visual signs of estrus in the cow are mounting, agitation or nervousness, frequent urination, swollen vulva, and vaginal discharges from vulva. 10. Age, physical size, and breed will determine when to first breed an animal.