

Course	Agricultural Science I
Unit	Equine Science
Lesson	Genetics and Reproduction
Estimated Time	50 minutes

Student Outcome

The student will understand the basic genetic characteristics and reproductive organs of mares and stallions.

Learning Objectives

1. Describe the basic genetic characteristics.
2. Identify the reproductive organs of the mare.
3. Identify the reproductive organs of the stallion.
4. Describe the methods of reproduction.
5. Explain the process of parturition.
6. Identify dystocia and how can it be handled.
7. Discuss the importance of checking the afterbirth.
8. Identify colostrum and why is it important.


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. Assignment Sheet
 -  AS 1 - Reproductive Part Identification
2. *Equine Science* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1995.
3. University of Missouri-Columbia Extension Division agricultural publications
 - a. G2790: Horse Breeding Arithmetic: $2 + 2 = 1$
 - b. G2791: Genetics of Coat Color of Horses
4. *Equine Science Curriculum Enhancement*. University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

Supplies & Equipment

- ☐ Graph paper

Supplemental Information

1. Internet Sites
 - ☐ Extension More Mind Reach. Horse Reproduction. Accessed June 13, 2007, from <http://www.extension.org/category/horse+reproduction>.
 - ☐ *The Stallion: Breeding Soundness Examination and Reproductive Anatomy*. Cooperative Extension Service. University of Kentucky. Accessed June 13, 2007, from <http://www.uky.edu/Ag/AnimalSciences/extension/pubpdfs/asc117.pdf>.
 - ☐ Dystocia or Difficult Birth. Scott Creek Horse Farm. Accessed June 13, 2007, from

<http://www.scottcreek.com/Dystocia.htm>.

2. Print


- ❑ Ensminger, M. E., and C. J. Hammer. *Equine Science*. 8th ed. Upper Saddle River, NJ: Pearson Education, Inc., 2004.
 - ❑ Frandson, R. D., W. L. Wilke, and A. D. Fails. *Anatomy and Physiology of Farm Animals*. 6th ed. Baltimore: Lippincott Williams and Wilkins, 2003.
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Interest Approach


Divide students into groups of three or four. Have students tally their hair color, eye color, and whether their ear lobe is attached to their head or loose. Next, tally the class totals from the small groups and chart the results on graph paper. Discuss what causes these differences.

Communicate the Learning Objectives

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3. Identify the reproductive organs of the stallion.
4. Describe the methods of reproduction.
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Instructor Directions	Content Outline
Objective 1 <i>Genes and how they mix determine an animal's characteristics. Groups of genes linked together make up chromosomes. In horses, there are 32 chromosome pairs, or 64 chromosomes in all.</i>	Describe the basic genetic characteristics. <ol style="list-style-type: none">1. Physical traits, such as color, muscling, stamina, speed, etc.2. Desirable traits3. Undesirable combinations, such as lethal genes (albinism)4. Chromosome pairs (32) and compatibility
Objective 2 <i>A correctly functioning reproductive tract is important for a broodmare. A good knowledge of the reproductive tract can help identify any potential problems. Have students complete the female reproductive parts matching on AS 1.</i>  AS 1 - Reproductive Part Identification	Identify the reproductive organs of the mare. <ol style="list-style-type: none">1. Ovaries produce ova (eggs).2. Fallopian tubes connect ovaries to the uterus.3. Uterine horns are between fallopian tubes and the uterus.4. The uterus is where the embryo attaches and grows.5. The cervix muscle keeps out foreign material.6. The vagina receives semen from the stallion and is the birth canal.
Objective 3 <i>For the stallion to be productive in the breeding barn, a well-</i>	Identify the reproductive organs of the stallion. <ol style="list-style-type: none">1. Penis2. Urethra

Instructor Directions	Content Outline
<p><i>functioning reproductive system is vital. Have students complete the male reproductive parts matching on AS 1.</i></p> <p> AS 1 - Reproductive Part Identification</p>	<ol style="list-style-type: none"> 3. Cowper's gland, which produces fluids 4. Prostate gland, which produces fluids 5. Seminal vesicles, which produce fluids 6. Vas deferens 7. Epididymis 8. Testicles, which produce sperm 9. Scrotum
<p>Objective 4</p> <p><i>Ask students to identify methods of breeding. Discuss reasons that hand breeding is the most practiced method with horses. Answers should include more accurate conception records, which greatly help in predicting the foaling date, and less chance of injury.</i></p>	<p>Describe the methods of reproduction.</p> <ol style="list-style-type: none"> 1. Natural (pasture) breeding: hard to predict foaling dates and higher chance of injury to mare and stallion 2. Hand breeding: most practiced method 3. Artificial insemination (AI): not widely used with horses; never used in the thoroughbred industry; steps include collection, evaluation, and insemination
<p>Objective 5</p> <p><i>Parturition is the process of giving birth and is similar in most mammals. Most mares do not like an audience when foaling and will foal early in the morning. It is a good idea to be as inconspicuous as possible.</i></p>	<p>Explain the process of parturition.</p> <p>Waxing</p> <p>Udder and vagina muscle changes</p> <p>Three stages of birth</p> <ol style="list-style-type: none"> 1. Agitation and perhaps breaking of the water 2. Labor and visible fetal membranes 3. Presentation <p>Afterbirth expulsion, usually within 2-3 hours</p>
<p>Objective 6</p> <p><i>Dystocia means having problems giving birth. Any time a mare strains or has contractions for an unusually long period of time; a veterinarian should be called to assist.</i></p>	<p>Identify dystocia and how can it be handled.</p> <p>Causes</p> <ol style="list-style-type: none"> 1. Abnormal presentation 2. Unusually large foal 3. Twins <p>Veterinarian help</p>
<p>Objective 7</p> <p><i>Retained placenta can cause serious infections and make</i></p>	<p>Discuss the importance of checking the afterbirth.</p> <p>Retained placenta</p> <ol style="list-style-type: none"> 1. Consult a veterinarian.

Instructor Directions	Content Outline
<i>rebreeding difficult or even impossible. When parturition has been completed and the afterbirth delivered, the afterbirth should be removed from the stall and inspected for possible retained placenta.</i>	<p>2. Do not try to pull the placenta yourself.</p> <p>Avoid foaling founder (laminitis)</p>
<p>Objective 8</p> <p><i>Ask students how colostrum differs from regular mare's milk.</i></p>	<p>Identify colostrum and why is it important.</p> <ol style="list-style-type: none"> 1. First milk lasts only 48 hours and is yellowish and thick. 2. Colostrum is higher in protein and antibodies than regular milk.
<p>Application</p> <p> AS 1 - Reproductive Part Identification</p>	<p>Answers to AS 1</p> <ol style="list-style-type: none"> 1. h 2. a 3. k 4. j 5. d 6. f 8. e 9. c 10. i 11. g 12. d 13. a 14. c 15. g 16. e 17. h 18. k 19. l 20. i 21. b 22. j <p>Other activities</p> <ol style="list-style-type: none"> 1. If possible, observe an actual foaling or show a video of foaling.
<p>Closure/Summary</p>	<p>Great care should be taken to assure the safety of the mare and the stallion during breeding. It is also</p>

Instructor Directions	Content Outline
	important that a clean, dry, draft-free area be provided to the mare during foaling. No other process on earth is more breathtaking and mystifying than the process of birth.
Evaluation: Quiz	<p>Answers:</p> <ol style="list-style-type: none"> 1. d 2. c 3. a 4. b 5. d 6. c 7. d 8. b 9. c 10. b 11. b 12. a 13. c 14. d 15. a 16. d