Course: AG- ASB 02.421
Introduction to Animal Science Technology/Biotechnology
Unit 13: The Reproduction Process

Lesson 4: Reproductive Technology

Georgia Performance Standards: AG-ASB- 13 i, j, k, l

Academic Standards: SCSh9, SB2, SB5

Objectives:

1. Demonstrate the procedures used in artificial insemination.
2. Evaluate the importance of embryo transfer.
3. Describe the process and advantages of estrus synchronization.
4. Explain the process of cloning.
5. Research new scientific technology that will be of benefit to livestock producers.

Teaching Time: 2 hours

Grades: 9-12

Essential Question: What types of technology are used in animal reproduction?

Unit Understandings, Themes, and Concepts:

Students will learn about the practices and technologies used in animal reproduction.

Primary Learning Goals:

In this unit students will demonstrate the procedures used in artificial insemination and evaluate the importance of embryo transfer. Students will describe the process and advantages of estrus synchronization. Students will explain the process of cloning and research new scientific technology that will be of benefit to livestock producers.

Students with disabilities: For students with disabilities, the instructor should refer to the individual student's IEP to insure that the accommodations specified in the IEP are being provided within the classroom setting. Instructors should familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation within any given instructional activity or requirement.

Assessment Method/Type:

____ Constructed Response
_X__ Combined Methods
____ Informal Checks
____ Peer Assessment
____ Selected Response
____ Self Assessment

References:

Herren, Ray V. *The Science of Agriculture: A Biological Approach.* Delmar Publishers, Inc. Albany, NY. ISBN: 0-8273-5811-3.

Herren, Ray V & Catherine Teare Ketter. *Lab Manual The Science of Agriculture: A Biological Approach.* Delmar Publishers, Inc. Albany, NY. ISBN: 0-8273-5811-3.

Materials and Equipment:

See Lab Manual, Video - Embryo Transfer by Cattle@ CEV; Video - artificial Insemination in Cattle@ by Video Trend, St. George, Utah (ph. 801-673-1601)

Georgia Ag Ed Power points – "Embryo Transfer in Cattle"
"Artificial Insemination"

Power Points:

AG-ASB-02.421-13.4P Artificial_Insemination
AG-ASB-02.421-13.4P Artificial_Insemination,_An_Overview
AG-ASB-02.421-13.4P Artificial_Insemination_cidr_presentation

Georgia Performance Standards: AG-ASB- 13 i, j, k, l

AG-ASB-13: The student demonstrates an understanding of the reproductive anatomy and biological processes involved in the reproduction of agricultural animals.

i. Demonstrates the procedures used in artificial insemination.
j. Explains the use and procedures of embryo transfer and evaluates its economic importance.
k. Describes the process and advantages of estrus synchronization.
l. Researches and predicts new scientific technology that will be of benefit to livestock producers.

Academic Standards: SCSh9, SB2, SB5

SCSh9 Students will enhance reading in all curriculum areas.

SB2 Students will analyze how biological traits are passed on to successive generations.

SB5 Students will evaluate the role of natural selection in the development of the theory of evolution.

TEACHING PROCEDURE

Introduction and Mental Set

Show students the video Artificial Insemination@ to introduce A.I. and new technologies to students. Give an example such as sow perking up ears and standing still as a bear approaches if she is in heat.

Discussion

1. **Lead students through lab exercise 13.2 in the lab manual.**

2. **What are the advantages of Artificial Insemination?**
   Divide the class into small groups and have each group report their findings.
   Advantages
   A. Producers may use a sire of higher quality than he or she could afford otherwise
   B. Data from the progeny of sires is available to the producer to assist them in the decision-making process
   C. Allows the producer to select a sire for a particular group of females
   D. Producers do not need to keep male animals
   E. Transmission of disease is reduced
   F. Sires from anywhere in the world can be used
   G. Sires can be replaced inexpensively
   H. Dam safety

3. **What is estrus synchronization?**
   Using synthetic hormones to make a group of females come into heat at the same time.

4. **How is estrus synchronization used by livestock producers?**
   A. To cause all the females to come into heat at the same time, thus the animals can be artificially inseminated at one time.
   B. This saves time and resources at breeding time.

C. The new crop of animals will be the same age so they can be managed more easily.

5. Show class video Embryo Transfer.@

6. What are the benefits of embryo transfer?

A. Rapid advancement of genetics from the dam.
B. Allows progeny testing of females or how valuable the animal is as a parent.
C. Permits import and export of quality animals without quarantine measures.
D. Allows use of a dual production system.
E. Twin offspring can be produced.
F. Rapidly produce grade animals into herd of purebred animals.

7. How are embryos collected from the female?

A. Through a process called flushing.
B. Catheter is passed through cervix and entered into the uterus.
C. Balloon seals the uterus and fluid is pumped into fallopian tubes and embryos are flushed out and collected.

8. What potential problem do some people see in the continued use of embryo transfer?

Many embryo transfers are not carried to a full term like natural conception.

9. Have class read pages 219-221 New Technologies in Embryo Transfer@-- in text.

10. What is cloning?

Producing an organism, by asexual means, with the exact same genetic makeup as another.

11. How is cloning done?

A. Splitting of the embryo.

B. Place DNA material into an unfertilized egg and then remove the genetic material in the unfertilized egg.

12. What new technologies can you think of that might improve farm animals in the future?

SUMMARY

The future of animal breeding will continue to change vastly in the future as new technologies are discovered.

Evaluation

Lab activity
Written test

Individual Learning Activity

Lesson: Reproductive Technology

Assignment: Choose one of the topics below and research it. Write a report on your findings that answers the question or explains the concept and shows why it is relevant to your life.

1. Demonstrate the procedures used in artificial insemination.
2. Evaluate the importance of embryo transfer.
3. Describe the process and advantages of estrus synchronization.
4. Explain the process of cloning.
5. Research new scientific technology that will be of benefit to livestock producers.

Minimum Requirements:

1. Paper must be typed in 12 point font and at least one page in length. The paper may be double-spaced.

2. At least two credible references must be properly cited.

3. All work must be original. No plagiarism! Any use of another's ideas without giving credit will result in a zero.

4. Papers will be graded on content (amount of good information, accuracy, etc.) and mechanics (grammar, spelling, and punctuation.)

Due Date:

Points/Grade Available:

Individual Learning Activity Rubric

Content - offers current information on the topic chosen, thoroughly covers each aspect of the question, and demonstrates understanding and mastery of the lesson. The paper should include information and issues of state and local importance.	35 pts.
Critical Analysis - logical process of analyzing and reporting information that examines and explains the topic selected. The paper should go beyond simply listing facts and must include why the concept is relevant to the student's life.	25 pts.
Organization- The paper should have an orderly structure that demonstrates a logical flow of ideas.	15 pts.
Mechanics- spelling, grammar, punctuation, font size, double spacing, citation, etc. Essentially, the paper should meet all specifications and be executed following rules of proper written English.	15 pts.

Group Learning Activity

Lesson: Reproductive Technology

Assignment: Choose one of the topics below and research it. With your group, prepare a presentation to teach the class your concept.

1. Demonstrate the procedures used in artificial insemination.
2. Evaluate the importance of embryo transfer.
3. Describe the process and advantages of estrus synchronization.
4. Explain the process of cloning.
5. Research new scientific technology that will be of benefit to livestock producers.

Your presentation should include the following:

1. **A lesson plan outlining exactly what your group will teach and how the information will be taught**
2. **A Power Point of at least twelve slides**
3. **Notes containing the information the class will be responsible for (these can be printed and given to the class, written on the board, or part of the Power Point). A copy of the notes will be turned in to the instructor.**
4. **Some type of interactive activity for the class (game, problem solving activity, interactive model, etc.)**
5. **Your group must also prepare an assessment for the class. This assessment can be written or oral, but should show the instructor that the class understands and has retained the material being taught.**

Due Date:

Points/Grade Available:

All work must be original. No plagiarism! Any use of another's ideas without giving credit will result in a zero.

Group Learning Activity Rubric

Lesson Plan – The group submits a thorough, detailed lesson plan highlighting the content and organization of their lesson.	10 pts.
PowerPoint – The group presents a Power Point of at least twelve slides that contains information and pictures vital to the lesson with additional information or examples for enhancement.	20 pts.
Interactive Activity – Some type of interactive activity is used to help teach the lesson. The activity should contribute to the mastery of content and involve the entire class in some way.	15 pts.
Assessment – A fair, thorough assessment is prepared and administered based on the information presented to the class. Poor grades on the assessment by a few members of the class are excusable, but if the entire class has difficulty, the points awarded in this category may be lowered at the discretion of the instructor.	15 pts.
Content – The group should cover the concept (within reason) in entirety. The group may study actual lesson plans to help decide what should be emphasized.	25 pts.
Overall Effect – The group is prepared, enthusiastic, and interesting, and the lesson flows smoothly.	15 pts.

Presentation Learning Activity

Lesson: Reproductive Technology

Assignment: Choose one of the topics below, research it, and prepare a presentation that answers the question or explains the concept and shows why it is relevant to your life.

1. Demonstrate the procedures used in artificial insemination.
2. Evaluate the importance of embryo transfer.
3. Describe the process and advantages of estrus synchronization.
4. Explain the process of cloning.
5. Research new scientific technology that will be of benefit to livestock producers.

Minimum Requirements:

Oral Report Option

1. **Write a paper on one of the topics and orally present your work to the class.**
2. **Paper may be double-spaced and should be at least one page in length, resulting in a two to five minute presentation.**
3. **At least two references must be properly cited.**
4. **The presentation of the report will be graded secondary to the content of the paper.**

PowerPoint Option

1. **Presentation should be at least ten slides in length**
2. **Presentation should include at least four photos.**
3. **Presentation should be two to five minutes in length.**
4. **Grammar and spelling will be graded by the same standards as any other written assignment.**
5. **At least two references must be properly cited.**

Poster Option:

1. **Prepare a poster that answers/explains one of the topics. You will present your poster to the class.**
2. **Your poster should include both text and graphics that help communicate your research.**
3. **At least two sources of information should be properly cited on the back of the poster.**
4. **Neatness and appearance of the poster will be graded.**
5. **Poster presentation should last two to five minutes.**

Due Date:

Points/Grade Available:

For all presentations: All work must be original. No plagiarism! Any use of another's work or ideas without giving proper credit will result in a zero.

Presentation Learning Activity Rubric

Content- offers current information on the topic chosen, thoroughly covers each aspect of the question, and demonstrates understanding and mastery of the lesson. The presentation should include information and issues of state and local importance.	40 pts.
Critical Analysis/Organization – The presentation shows a logical process of analyzing and reporting information that examines and explains the topic selected. The presentation should go beyond simply listing facts and must include why the concept is relevant to the student's life.	20 pts.
Presentation – The student makes a genuine effort to present, not just read the material. The student should present with confidence using techniques like eye contact and voice inflexion to make his or her point. Although content takes precedence over presentation, the experience of successfully presenting in front of a class is part of the basis of this assignment.	25 pts.
Mechanics- spelling, grammar, punctuation, font size, double spacing, citation, etc. Essentially, the presentation should meet all guidelines set forth and should be executed in proper written English. For the poster, this includes neatness and appearance.	15 pts.

Lesson Evaluation

What are reasons you would give a producer to utilize artificial insemination?
1)

2)

3)

4)

5) What is estrus synchronization?

Why do producers use this tool?
6)

7)

8) How are embryos collected from the female?

9) What is one benefit of embryo transfer?

10) What is cloning?

Lesson Evaluation Key

1) A. Producers may use a sire of higher quality than he or she could afford otherwise
B. Data from the progeny of sires is available to the producer to assist them in the decision-making process
C. Allows the producer to select a sire for a particular group of females
D. Producers do not need to keep male animals
E. Transmission of disease is reduced
F. Sires from anywhere in the world can be used
G. Sires can be replaced inexpensively
H. Dam safety

2) ""
3) ""
4) ""
5) Using synthetic hormones to make a group of females come into heat at the same time.
6) cause all females to come into heat at the same time, saves time and resources, new crop of animals will be easier to manage, etc.
7) ""
8) through a process called flushing
9) Rapid advancement of genetics from the dam.
B. Allows progeny testing of females or how valuable the animal is as a parent.
C. Permits import and export of quality animals without quarantine measures.
D. Allows use of a dual production system.
E. Twin offspring can be produced.
F. Rapidly produce grade animals into herd of purebred animals.
10) producing an organism through asexual means that has the exact genetic makeup of the parent material

Essential Question:

What types of technology are used in animal reproduction?

Vocabulary

Artificial Insemination

Estrus synchronization

Embryo

Embryo transfer