

## UNIT III - ANIMALS IN SOCIETY

### Lesson 4: Current and Emerging Technologies

**Competency/Objective:** Identify current and emerging technologies in animal agriculture.

#### Study Questions

1. **What is natural mating in animal reproduction?**
2. **What are alternative reproductive practices?**
3. **What are the effects of emerging technology in animal agriculture?**

#### References

1. *Exploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit III.
2. Transparency Master  
TM 4.1 Alternative Reproductive Practices
3. Activity Sheet  
AS 4.1 Alternative Reproduction Technologies

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### Lesson 4: Current and Emerging Technologies

#### TEACHING PROCEDURES

##### A. **Review**

The previous lesson discussed the factors involved in selecting animals, resources needed, and sources of animals. This lesson introduces advancements that have changed and continue to change the nature of animal agriculture.

##### B. **Motivation**

Have students brainstorm and discuss recent advancements in agriculture that have improved the care and production of animals or animal products.

##### C. **Assignment**

##### D. **Supervised Study**

##### E. **Discussion**

#### **Q1. What is natural mating in animal reproduction?**

##### **A1. Natural mating allows animals to breed by copulation without human assistance.**

Explain the basics of natural mating so that the students will be able to see a contrast to the following study question on alternative reproductive practices.

#### **Q2. What are alternative reproductive practices?**

##### **A2.**

- a) Artificial insemination
- b) Cloning
- c) Embryo transfer
- d) Genetic engineering - genetically modified organisms (GMOs)
- e) Hand-mating

Display TM 4.1 and discuss alternative reproductive practices that have improved animal agriculture. Then have students complete AS 4.1 and discuss their research findings of an alternative reproductive technology. The students can be assigned this project on an individual basis or it can be assigned to student groups. The information should be presented orally to the whole class.

#### **Q3. What are the effects of emerging technology in animal agriculture?**

##### **A3.**

- a) Animal needs can be monitored by computers.
- b) Management decisions are made by computer readings.
- c) Automated systems have reduced amount of manual labor involved in caring for animals.
- d) Large production units manage several thousand head of animals.
- e) Advanced breeding can select superior genetic traits.
- f) Alternative animal markets are developed.

- g) **Animals are identified so that they can be tracked from produce to processing.**
- h) **Totally controlled environments are created in animal facilities.**
  - 1) **Environment is totally controlled.**
  - 2) **Timing devices reduce manual labor hours and reduce wasted food.**
  - 3) **Self-cleaning systems remove animal wastes.**

Technology provided by automated systems has decreased the amount of manual labor to run successful livestock operations. Today, just one person can manage thousands of animals correctly and efficiently.

#### F. **Other Activities**

1. Assign students to topics in emerging agricultural technology such as cloning, biotechnology, etc. Have them present reports on their findings.
2. Have a local veterinarian speak or demonstrate artificial insemination or embryo transfer.
3. Have students debate arguments for or against genetic engineering.

#### G. **Conclusion**

Natural reproduction allows animals to breed without human assistance. Technological advances in animal production and breeding have allowed agriculture to evolve into a precision business geared on creating superior products for the consumer. Advancements will continue to decrease manual labor as well as produce genetically superior animals resistant to disease with maximum production capabilities. There are several alternatives to reproduction practices, such as artificial insemination, cloning, and embryo transfer, to name a few.

#### H. **Answers to Activity Sheet**

The instructor should determine if the answers are appropriate.

#### I. **Answers to Evaluation**

1. c
2. d
3. c
4. Any two of the following: food, clothing, by-products
5. Any four of the following: beef cattle, dairy cattle, sheep, swine, poultry, horses
6. Any three of the following: recreation/companionship, food, clothing, by-products, medical research, special services to disabled or law enforcement
7. Any two of the following:
  - a. Protect people and other animals from harm
  - b. Prevent spread of disease
  - c. Protect animals from cruel treatment
  - d. Control populations
  - e. Provide proof of ownership
8. Any three of the following: food and water, shelter, cleaning supplies, bath and grooming supplies, exercise and recreation, medical supplies
9. Any two of the following: purpose, cost, maintenance, space, time
10. Any two of the following: animal shelter, purebred breeder, pet store, newspaper
11. One of the following: money, space, owner's goal
12. One of the following: purebred breeders, sale barn, commercial feeders

13. Any two of the following:
- a. Monitor animals by computer
  - b. Management decisions made by computer
  - c. Reduced labor
  - d. Larger operations
  - e. Alternative markets
  - d. Advanced breeding that results in superior genetic traits
14. Any two of the following:
- a. Artificial insemination
  - b. Cloning
  - c. Embryo transfer
  - d. Genetic engineering
  - e. Hand-mating

# **Alternative Reproductive Practices**

## **Artificial Insemination**

Placing of sperm in the female reproductive tract by other than natural means

## **Cloning**

A process through which genetically identical organisms are produced

## **Embryo Transfer**

Process of flushing the embryos from the reproductive tracts of superior, donor females and implanting them in other females

## **Genetic Engineering**

Alteration of the genes of animals by human intervention



Lesson 4: Current and Emerging Technologies

Name\_\_\_\_\_

### **Alternative Reproduction Technologies**

**Objective:** Students will investigate an alternative reproduction technology.

**Directions:** Choose an alternative reproduction technology – artificial insemination, cloning, embryo transfer, or genetic engineering. Research the technology and answer the following questions.

Technology\_\_\_\_\_

1. What are the advantages of this technology?
  
  
  
  
  
  
  
  
  
  
2. What are the disadvantages of this technology?
  
  
  
  
  
  
  
  
  
  
3. How has this technology advanced agriculture?
  
  
  
  
  
  
  
  
  
  
4. How has this technology helped consumers?





UNIT EVALUATION

**Circle the letter that corresponds to the best answer.**

1. One important responsibility of animal ownership would include \_\_\_\_\_.
  - a. Becoming an animal rights activist
  - b. Owning as many animals as possible
  - c. Providing proper food, health care, and shelter
  - d. Finding a home for a stray
2. What is the general definition of animal welfare?
  - a. Eating only animal products
  - b. Setting all animals free to roam
  - c. Living with as many animals as possible
  - d. Provide proper care necessary to ensure the well-being of animals
3. Select the term that best describes natural mating in animal reproduction.
  - a. Artificial insemination
  - b. Embryo transfer
  - c. Copulation
  - d. Cloning

**Complete the following short answer questions.**

4. List two ways that animals in agriculture are important to humans.
  - a.
  - b.
5. List four types of animals in agriculture.
  - a.
  - b.
  - c.
  - d.
6. List three services or products provided by animals.
  - a.
  - b.
  - c.

7. List two purposes of animal control regulations.
  - a.
  - b.
8. List three resources needed to raise a pet in a small fenced lot in town.
  - a.
  - b.
  - c.
9. List two factors to consider before purchasing the pet in question 8.
  - a.
  - b.
10. List two resources that could be used to purchase a pet.
  - a.
  - b.
11. List one factor that should be considered when selecting livestock to raise on a small farm.
12. List one resource where livestock can be purchased.
13. List two positive effects of emerging technology in animal agriculture.
  - a.
  - b.
14. List two alternative reproductive practices.
  - a.
  - b.