



Livestock Reproduction Methods

Middle School Food and Agricultural Literacy Curriculum

Precepts

- A. Action
 - A8. Evaluate and reflect on actions taken and make appropriate modifications.

National Standards

- AS.05.03.02.a. Define natural and artificial breeding methods.
- AS.05.03.02.b. Explain the process of natural and artificial breeding methods.
- AS.05.03.05.a. Discuss the uses and advantages and disadvantages of natural breeding and artificial insemination.
- BS.01.01.02.a. Investigate current applications of biotechnology in agriculture.
- CS.01.01.07.c. Evaluate actions taken and make appropriate modifications to personal goals.
- NL-ENG.K-12.3 – Evaluation Strategies
- NL-ENG.K-12.8 – Developing Research Skills
- NS.5-8.3 – Life Science

Student Learning Objectives

- As a result of this **unit** the students will...
- Recognize common production systems used in the United States.
- As a result of this **lesson** the students will...
- Define conventional animal reproduction methods.

Content Outline

- A. **Methods of livestock reproduction**
 - 1. **Natural Breeding** – to reproduce sexually under natural conditions
 - 2. **Artificial Insemination** – introduction of semen from a male into the sex organs of a female by other than natural means
 - 3. **Embryo** – an animal in the earliest stages of its development in the egg
 - 4. **Embryo Transfer** – a procedure in which an **embryo** from one female is removed from that female and implanted into another female

Time

Instruction time for this lesson: 45 minutes.

Resources

Breeding. (n.d.) Merriam-Webster's online dictionary (11th ed.). Retrieved on July 13, 2009, from <http://www.merriam-webster.com/dictionary/breeding>
Cloning. (n.d.) Merriam-Webster's online dictionary (11th ed.). Retrieved on July 13, 2009, from <http://www.merriam-webster.com/dictionary/cloning>
Embryo Transfer. (n.d.) Merriam-Webster's online dictionary (11th ed.). Retrieved on July 13, 2009, from <http://www.merriam-webster.com/dictionary/embryo%20transfer>
Insemination. (n.d.) Merriam-Webster's online dictionary (11th ed.). Retrieved on July 13, 2009, from <http://www.merriam-webster.com/dictionary/insemination>

Tools, Equipment, and Supplies

Overhead projector/transparencies
Writing Surface
Marker
Reference books, such as almanacs or encyclopedias
MS.AS.2.1.TM.A-D – one per class
MS.AS.2.1.AS.A – one per student
MS.AS.2.1.ASSESS.A – one per student

Key Terms

The following terms are presented in this lesson and appear in **bold italics**:

Natural Breeding

Artificial Insemination

Embryo

Embryo Transfer

Cloning

- 5. ***Cloning*** – to reproduce a genetic duplicate from genetic material of an organism

Interest Approach

With the class, create a code of conduct for the day that encourages mature actions by the students. This will set the scene for a mature discussion on reproduction.

Today our topic of discussion requires us to act as mature explorers of new information. To prepare, we will create a code of conduct for the day.

When we are discussing a topic for mature audiences, how should we act?



Lesson Number: MS.AS.2.1

Middle School Food and Agricultural Literacy Curriculum

Livestock Reproduction Methods

Solicit answers from students.

Those are all very true; here is a proposal for a code of conduct for the day.

Have the following written on a writing surface/poster, etc., and reveal it when it is introduced.

Code of Conduct

1. Seek new information
2. Ask appropriate questions
3. Use proper terminology
4. Act maturely

To show your dedication to the code of conduct, use the marker provided to trace your hand on the poster/writing surface and sign your name on the palm.

Allow students time to trace their hand and sign the poster.

Excellent. We are now ready to seek new information about the reproduction methods of livestock.

Summary of Content and Teaching Strategies

Objective 1. Define conventional animal reproduction methods.

Today we will explore animal reproduction methods used in the industry. Using **MS.AS.2.1.AS.A** students will complete the chart that includes the definition and pros and cons for each livestock reproduction method.

We are going to look at some actual scenarios that producers face and see what method of reproduction we would likely recommend. As we research a method of reproduction, complete the chart on **MS.AS.2.1.AS.A**.

Refer to **MS.AS.2.1.AS.A**

Read the following scenario:

Scenario #1:

You have limited labor on your beef cattle operation. You own a high-quality bull and you sell your cattle at the local livestock auction.

What method of reproduction do you think this producer should use?

Look for **Natural Breeding**.

Let's take a closer look at **natural breeding** as a method of reproduction.

Display **MS.AS.2.1.TM.A**.

As referred to in the title, this is the most common and **natural breeding** method.

What questions do you have about **natural breeding**? Make sure this information is in your chart titled "Methods to Animal Reproduction."

Read the following scenario:

Scenario #2:

You are a swine producer, and so is your brother. He just purchased a very expensive boar and you would like to breed him to some of your sows. However, he lives across the country and shipping the boar that far would put him at risk for stress and sickness. What method of reproduction could you use?

Listen for **Artificial Insemination**. Semen could be collected from the boar and shipped to you for use on your gilts.

Artificial Insemination is correct.

Display **MS.AS.2.1.TM.B**.

Semen can be purchased for a wide variety of prices from a few dollars to several hundred dollars per straw. The semen is stored in a small straw. The procedure may be effective on the first attempt in breeding a sow or it may take several attempts. For a few head of animals, AI is commonly a less expensive option, but it depends on the price of the semen.

What questions are there about **artificial insemination**?

What situations lend to using this method over **natural breeding**?



Lesson Number: MS.AS.2.1

Middle School Food and Agricultural Literacy Curriculum

Livestock Reproduction Methods

The situation that lends itself best to this method is the desire to mate one animal in your herd to another animal that is not located near your herd. **Artificial insemination** is also used when breeding a few head of livestock. One can purchase semen from highly valued males at a fraction of the cost of the animal with the given genetics.

Read the following scenario:

Scenario #3:

You raise Holstein dairy cattle and you have a female that produces nearly double the amount of milk each day as your herd average. Your operation would be much more profitable if you had more offspring from her or from other related females.

What method of reproduction should you use?

Listen for **Embryo Transfer**.

Let's first define an **embryo** and then take a look at why **embryo transfer** would be the best method for this situation.

Display **MS.AS.2.1.TM.C**.

Each **embryo transfer** is expensive; the cost ranges from \$125-\$250 per pregnant recipient female. This does not include the cost of the care and purchase of the recipient females. Although it varies, the number of **embryos** collected range from 2-20 per donor female and can be transferred fresh to the recipient females or preserved by freezing.

What questions do you have about **embryo transfer**? Make sure all of the boxes in your chart are complete for this section.

Read the following scenario:

Scenario #4:

A top genetics company that collects semen from bulls to utilize for **artificial insemination** has just experienced the death of their leading **artificial insemination** sire. They know that if they had another bull exactly like him that the record sales they are experiencing would continue. What method of reproduction would be used to accomplish the task of creating an exact replica of the top bull?

Listen for **cloning**.

Cloning is a word you have most likely heard on the news lately; let's take a look at what it means.

Display **MS.AS.2.1.TM.D**. Currently, **cloning** is not a common method used in animal agriculture, although it is possible.

What questions do you have about **cloning**? At this time, make sure your chart is complete.

"**Cloning**" is certainly a buzz word these days, from **cloning** the first sheep, Dolly, in 1998, to the on-going discussions for and against allowing the method to be used.

Our personal ethics help us make the right decision when otherwise it may be difficult. Although we have the ability to clone plants, animals, and even humans, that may not be the "ethical" thing to do.

Can you think of a situation where **cloning** would be unethical?

Potential responses: **Cloning** a race horse who had won in order to win again.

Can you think of a situation that you believe **cloning** would be ethical? Keep in mind, what you may view as an ethical reason may not be the same for someone else, so be respectful of others' views and beliefs.

Potential responses: If there was an animal that possessed the ability to cure cancer.

If time exists, have students find a recent headline discussing views on **cloning**.

Let's take some time to link this new information with things you already know about.

Review/Summary

Use the *Almanac/Encyclopedia e-Moment®* to help students connect the information learned on animal reproduction to other topics they are familiar with.

Have reference books in your classroom such as almanacs or encyclopedias – ideally there would be a reference book for each student.

Thank you for your positive actions today. Let's take our knowledge a step further by connecting



Lesson Number: MS.AS.2.1

Middle School Food and Agricultural Literacy Curriculum

Livestock Reproduction Methods

this information to other things we know about. When I say SEARCH, you will get a reference book and return to your seat. Then you will search the contents of the book and make connections to the knowledge you gained today. For example, there are four methods of animal reproduction, just like there are four methods of exiting a computer; log off, sleep, shut down, or re-start. Be ready to share your connections with the class. You will have six minutes to make the connections. What questions are there? SEARCH

Monitor student progress. Remind students that the connections are broad and they can be creative.

Time is up in 3...2...1. Who will share their connections?

Call on students.

Thank you for sharing.

I appreciated your ability to follow the code of conduct today. This information is important as it helps us understand that no matter how the animals are produced the products are safe for consumers. However, the choice of reproduction can make a large impact on the cost of the product produced.

Application

Extended classroom activity:

Take students to a farm to see **artificial insemination**, or show a video on **artificial insemination** to demonstrate the methods and equipment used. If you use a video, be sure to have parental permission slips before viewing.

FFA activity:

Provide a community educational seminar that educates consumers and/or producers about the options in animal reproduction.

SAE activity:

Have students with animal SAEs research the methods of reproduction available for the livestock they raise and the pros and cons of each method for that specie.

Evaluation

MS.AS.2.1.ASSESS.A.

Answers to Evaluation

1. Natural Breeding
2. Cloning
3. Artificial Insemination
4. Embryo Transfer



Methods of Livestock Reproduction

A. Natural Breeding – to propagate sexually under natural conditions

Commonly used when livestock is hard to breed artificially, the most natural and widely used method of reproduction.

Pros: Low labor demands
Natural
Relatively inexpensive

Cons: Limits genetic material to livestock you have access to
Difficult to make large genetic improvements without large investments



Methods of Livestock Reproduction

B. Artificial Insemination – introduction of semen into the uterus or oviduct by other than natural means

Commonly used in swine and cattle especially dairy production.

Pros: You do not have to own the male, but you can purchase the semen.

Allows you to high-priced genetics for a portion of the costs
Producers can be trained
Additionally, this method can mean less physical wear on both the male and female species of livestock.

Cons: Requires more labor than natural breeding
Requires specific equipment



Methods of Livestock Reproduction

Embryo an animal in the earliest stages of its development in the egg

C. Embryo Transfer – a procedure in which an embryo from a superovulated female is removed and implanted in the uterus of another female

Commonly used when you want to produce a large number of offspring from one superior female

Pros: Allows more than natural number of offspring in a short amount of time

Cons: Usually requires a veterinarian to perform the procedure

Labor intensive

Expensive



Methods of Livestock Reproduction

D. Cloning – to propagate a clone from genetic material

Not widely used, but experimental.

Pros: You can create an identical copy of an animal

Cons: Very expensive

Very labor intensive

Questionable ethically



Methods of Animal Reproduction

Directions: Complete the chart below including the definition and pros and cons for each of the methods of animal reproduction.

Term – Definition	Pros of this method	Cons of this method
Natural Breeding		
Artificial Insemination		
Embryo Transfer		
Cloning		



Name _____

Directions: Read the following scenarios and list which method of livestock reproduction would be the BEST method for that situation.

Methods of livestock reproduction:			
Natural Breeding	Artificial Insemination	Embryo Transfer	Cloning

1. You are a sheep producer and own 25 ewes and a ram. You are short on labor and do not have a lot of additional money to put into your operation. Which method of reproduction would be best to use?

2. You are the owner of a very successful race horse. The horse has won several races including the Kentucky Derby. The horse recently got hurt and you want to ensure that you have another horse exactly like this one. What method of reproduction would be best to use?

3. You are a swine producer who has 100 sows. You have learned of a boar in Brazil that has very high rankings on carcass traits. You would like to bring these genetics into the United States, but the boar is not for sale. What would be the best method of reproduction so that you can use these genetics on your herd?

4. You raise Angus cattle. You have one female that when she is bred to a particular bull consistently produces calves that are higher quality and grow at a faster rate than the rest of your females. Your operation would be much more productive if you had more females like her. What methods of reproduction would be best in this situation?
