

MAC Lesson Plan

Module: Dairy

Objectives: After Completion of this module, students will be able to:

1. Understand how milk is produced
2. Have a current knowledge of the importance of the Dairy Industry in Idaho.
3. Milk Maggie the cow
4. Make butter or Ice Cream

Instruction Time: 50-60 minutes

Resources:

Materials Provided:

- Maggie the cow.
- Big Book of Dairy
- 2-Aluminum Easels
- Instructions on the process to make butter
- Instructions on the process to make Ice Cream
- Plastic cups and lids to make the Butter in
- Plastic baggies to make Ice Cream

Materials needed:

- Water
- For Ice Cream: Cream $\frac{1}{2}$ and $\frac{1}{2}$, Vanilla, Ice, Rock Salt
- For Butter: Heavy Cream
- Round Ritz Crackers for butter. Optional
- Hand Sanitizer

Teaching Strategies (Content Delivery):

Objective 1: Identify the basic steps in which Milk is produced. The teacher is encouraged to ask questions of the class to identify these facts. Place Maggie in front of the group to encourage participation. Set up both easels side by side and place the Big Book of Dairy on the easel on the right when looking at it from the front. (*Time: 15-20 minutes for objectives 1 and 2*).

- Cover Page-Big Book of Dairy. Turn the cover page to the opposite easel. (May have a student come up and help turn the page.)
- **Page 1-Kinds of Cows**
 - **How many different kinds of cows are there?**
 - There are basically two types of cows-Beef and Dairy. Beef we use for meat and dairy for milk. There are hundreds of breeds of cattle
 - **Which cows make good dairy cows?**
 - There are many breeds of dairy cows. (Holstein, Jersey, Guernsey, Brown Swiss, and Milking Shorthorn are the most common breeds of dairy cows) Maggie or Molly is a Holstein. Holsteins are black and white or sometimes red and white. Holsteins are noted for their ability to produce large amounts of milk.

- **Page 2-Feeding Time**
 - **How many pounds of food does a cow eat in a day?**
 - Maggie eats about 20-30 pounds of grain each day.
 - Maggie eats about 30-35 pounds of hay each day.
 - **Gallons of Water?**
 - Maggie drinks about 35 gallons of water each day. This will vary depending on the season and type of feed they are eating. If the feed is really dry they will need to drink more.
 - **What do cows like to eat?**
 - Hay, Grass, Grain, Corn, Silage, etc.
- **Page 3-Animal Care**
 - **What do cows need to be comfortable?**
 - Straw or sand to lie on. Loafing shed to keep the rain and snow off or to keep the sun off. A dairy farmer will clean their stalls and pens to keep them clean.
 - **Who helps take care of the animals?**
 - The dairy farmer will take care of the animals themselves and/or hire someone to care for the animals. Sometimes a dairy cow will get sick and need to be doctored. If the dairy farmer can't figure out what medicine to give the cow, they can call a veterinarian to come and doctor the cow.
- **Page 4-Milking**
 - **How do you get milk out of a cow?**
 - For a cow to produce milk she must first have a calf. Once she has a calf then she can be milked. The calf is bottle fed. The cow can then be milked by hand or put a milking machine on the udder. Before you attach the milking machine you would clean each teat. Then you would attach the milkers. It takes about 7-10 minutes for the milkers to milk a cow. While the cow is being milked they get to eat grain. When the cow is done being milked they are let back out of the barn.
 - **How much milk can a cow produce in a day?**
 - Cows must be milked at least 2 times a day. Some dairies milk their cows 3 to 4 times per day. Each cow produces between 7 and 9 gallons of milk a day. That is between 60 and 100 pounds of milk. That can be made into 2.6 pounds of butter or 6-7 pounds of cheese.
- **Page 5-Transporting**
 - **Where does milk go before going to the store?**
 - Once the milk is taken out of the cow, it is then put into a refrigerated tank where it is stored until a milk truck picks it up. The milk truck transports the milk to a plant to be processed into many different dairy products.
 - **How many products can you name that come from milk?**
 - Cheese, Swiss Cheese, Yogurt, Sour Cream, Ice Cream, Cream Cheese, Cottage Cheese, Chocolate Milk, etc.
- **Page 6-Milk Products**
 - This page has pictures of dairy products.

➤ **Page 7-Back Page**

○ **When does the dairy close down for the day?**

- Dairy farmers don't get to take vacations for Christmas, birthdays, or other holidays unless they hire someone to work for them. Cow must be milked everyday all year round. Most dairies milk around the clock and only have a half hour to an hour to clean the milking parlor.

Objective 2: (Optional-If time allows) Teach students the importance of Dairy industry in Idaho

- Idaho has 574,000 milk cows
- Milk production cash receipts has surpassed Potatoes as Idaho's most valued crop
- Idaho is ranked 3rd in the US in milk production
- Idaho is ranked 3rd in the US in Cheese production

Objective 3: Milk Maggie. (*Time: 10-15 minutes*)

Bring each student one at a time up to the cow and allow them to milk Maggie. Maggie needs to have water, about 1gallon, poured into bucket and plugged in in order to recirculate milk. If more than a gallon is put in the bucket, the water will leak onto the floor. Have the students use hand sanitizer after they are done milking the cow.

Objective 4: Make Ice cream or Butter (*Time: 15-20 minutes*)

- **Making Butter**
You can make butter from cream within 5 minutes. Students will learn where butter comes from, a little bit of science, and gain first-hand experience in making some.

- **Pre-instructions:**
 1. It takes less time if the cream is about room temperature. This helps to start the process of changing the cream into butter. You can still make butter with cream taken directly from the refrigerator, but it will take longer for it to turn into butter. Also, it will have less of the taste butter normally has.
 2. Set out the small plastic Dixie cups. Fill the cup about 1/3 full with heavy whipping cream. (If you fill it to full there is not enough room for the heavy whipping cream to be shook and won't make butter). Snap the lid securely into place. Wrap the closed cup with a paper towel.

- **Butter making rules**
 1. Do not squeeze the container
 2. Do not open the container. When you have a lump of butter that you can see ... wait. The teacher will open the container and drain the butter when everyone is done.
 3. Everyone will shake their containers at the same time. Do not start until everyone is ready.

- **Begin**
 1. Pass out the containers and have the student shake them.

2. Have the students recite a chant, sing a song or discuss the science while they are shaking.
3. If your cream is at room temperature, it will take less than 5 minutes to make the butter.
4. The teacher or helpers should drain and replace the lids on all containers.
5. Have the students sit at tables. Pass round ritz crackers.
6. Students can dip the cracker into the container to get the butter on each cracker (salted and unsalted) and have a taste test.

- Most kids know that milk comes from cows. But perhaps they don't know that butter is made from milk. When cows are freshly milked, the cream separates from the liquid. The cream floats to the top and is skimmed off. It is this cream that butter is made from. In our experiment, we use store bought cream.
- Discuss how cows help us. Brainstorm and make a list of dairy products (milk, cheese, yogurt, ice cream, sour cream, and butter. You could also include food items that have a lot of dairy products in them (pudding, mac & cheese, etc.)
- Discuss how butter is made. The cream contains many fat cells. Bacteria in the cream eat away at the lining or membrane of the fat cells, weakening them and forming Lactic Acid. This Lactic Acid causes the fat to crystallize and form sharp edges which helps the butter clump together.
- Shaking and sloshing the cream against the sides, top, and bottom of the container burst more of these fat cell membranes and cause the fat to separate from the liquid and clump together. The more you shake, the more the fat clumps together.
- You may notice that your finished homemade butter may not be as yellow as store bought butter. (Some butter manufacturers add yellow coloring to their butter.) The yellow coloring in organic butter depends on the diet of the cow which the cream came from. Cows eat grass for food. Grass contains Carotene which gives butter its yellow color. So, if your butter has a deep yellow color, then the cow ate lots green of grass.