DAIRY

The Amazing Dairy Cow

ONE DAY'S PRODUCTION

2.6 pounds of butter
OR
7 gallons of milk
OR
6 pounds of cheese

A typical cow weighs 1,400 pounds and produces 60 pounds of milk per day. A cow converts roughage & grains not used by man into high energy foods.

VALUE of a cow's daily production = **$10.10**

COST
Feed = $3.30
Supplies = $2.70
Bldgs./overhead = $3.50
Daily costs = **$9.50**

RETURN on Labor = **$0.60**

ONE DAY'S CONSUMPTION

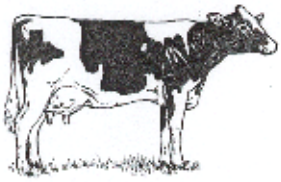
35 gallons of water
+
20 pounds of grain and concentrated feed
+
35 pounds of hay or silage

American Farm Bureau Federation® Graphic
Source: Gould's Dairyman

Milk: Production, Disposition, Price, and Income

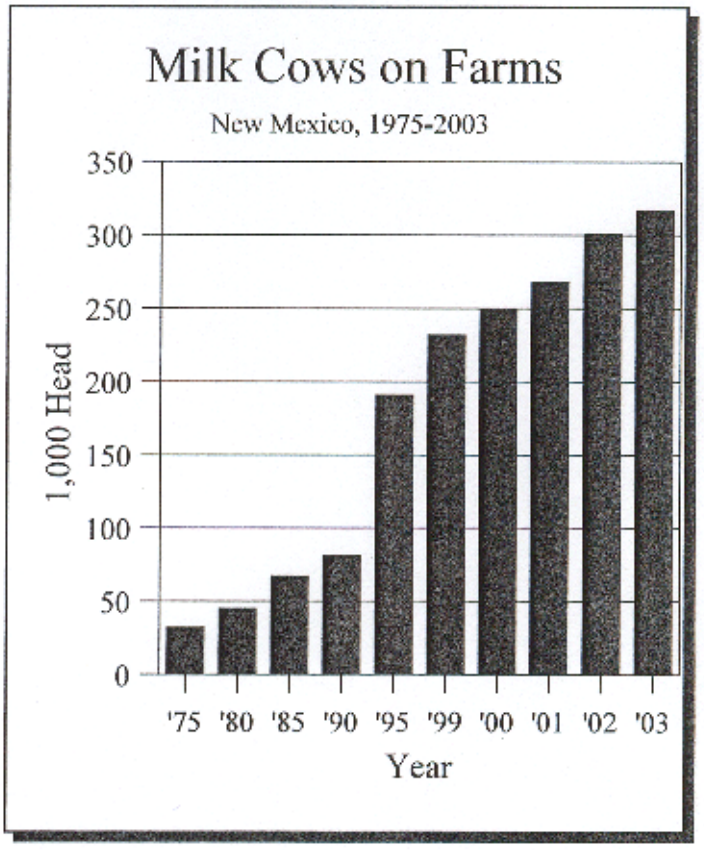
Year	Milk Cows on Farms[1/]	Milk Production Per Cow	Total Milk Production	Used on Farms	Whole Milk	Price Per 100 Pounds	Cash Receipts from Marketings	Producer Gross Income
	1,000 Head	Pounds	-------Million Pounds--------			Dollars	----1,000 Dollars----	
1975	32	11,438	366	11	355	9.75	37,128	37,860
1980	45	13,378	602	14	588	14.10	84,280	85,570
1985	67	16,090	1,078	12	1,066	13.10	142,904	143,708
1990	81	18,815	1,524	13	1,511	13.40	202,474	203,412
1995	191	18,969	3,623	17	3,606	11.70	430,803	431,759
1999	232	20,362	4,724	28	4,696	14.00	657,440	658,840
2000	250	20,944	5,236	44	5,192	12.40	643,808	645,544
2001	268	20,750	5,561	57	5,504	14.80	814,592	816,812
2002	301	20,983	6,316	65	6,251	11.90	743,869	745,773
2003	317	21,028	6,666	82	6,584	12.00	790,080	792,480

[1/]Average number during year.



2003 Milk Prices Received

Month	$ /Cwt.
January	11.70
February	11.00
March	10.70
April	10.70
May	10.50
June	10.40
July	11.20
August	12.20
September	14.00
October	14.40
November	14.00
December	13.40



MILK -- FROM COW TO TABLE

Marci Ruiz
K-1st Grade Teacher
Kimbark Elementary School
San Bernardino, CA

Introduction to *From the Cow to Your Table*

Most toddlers know the milk in their sipper-sealed Tupper-cups comes from cows. But, downing milk and grahams as kindergarteners, do they understand just how the milk got from cow to table?

Marci Ruiz, following Gail Gibbons' book, *The Milk Makers*, simulated that process through an exhibit divided into nine successive sections:

1. What are the different types of dairy cows?
2. When can a cow have milk?
3. What does a cow eat?
4. How does a cow digest its food?
5. How do you milk a cow?
6. Milk Storing
7. To the Dairy
8. Packaging
9. Dairy Products Display

Small and large group projects plus homework tasks guided the exhibit. Marci set up the sections side by side. Each had a taped message, made by the students, explaining the topic.

Classes toured the display by appointment. A brief session for questions followed, during which Marci's students provided the answers.

Building the Exhibit

Section 1. What are the different types of dairy cows?

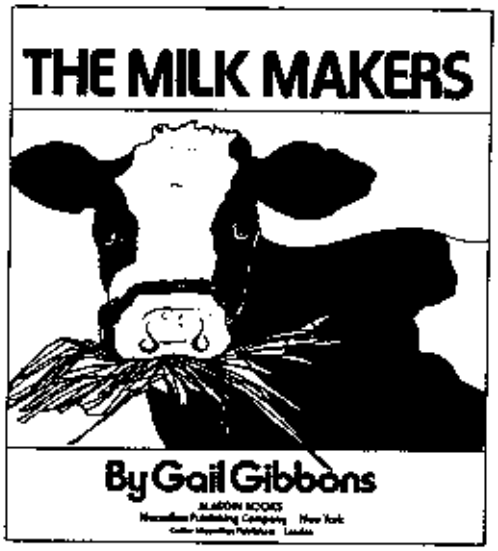
1. Children draw five breeds of dairy cows: Ayrshire, Brown Swiss, Guernsey, Jersey, Holstein-Friesian
2. Mount drawings on tag board. Place a ribbon on the Holstein-Friesian because it produces the most milk.
3. Record the message: *There are 5 kinds of dairy cows. They are the Ayrshire, the Brown Swiss, the Guernsey, the Jersey, and the Holstein-Friesian. The Holstein-Friesian can make the most milk.*

Section 2. When can a cow make milk?

1. Prop up a painted cardboard cow and calf. Attach a surgical glove where the udders would be.
2. Position the cows so it looks like the calf is nursing.
3. Record the message: *A cow can make milk when she is two years old after she has had a baby calf.*

Section *3. What does a cow eat?*

1. On a scale, place 50 pounds of hay, 15 gallons of water which the children measured, and a piece of cardboard with different types of grain, pickled grass and hay glued on and labeled.
2. Record the message: *A cow eats about 50 pounds of food and drinks about 15 gallons of water a day.*



Section *4. How does a cow digest its food?*

1. Outline a cow on butcher paper.
2. Use see-through plastic tubing for the cow's trachea and 4 balloons for each part of the cow's stomach.
3. Record the message: *The cow's stomach has four parts. It eats the food and the food goes to the first two stomachs. It then coughs up the food and eats it again.*

Section *5. How do you milk a cow?*

1. Connect a surgical glove to a liter soda bottle. Cut off the bottle bottom. Make a pinhole in each "udder."
2. Connect this contraption to a cardboard cow.
3. Fill the bottle with water and a bit of white paint. Milk the cow into a pail.
4. Record the message: *A cow is milked twice a day; once in the morning and once at night. A cow can be milked by hand, but most farmers use a milking machine.*

Section *6. How is the milk stored?*

1. Cover a large garbage can with aluminum foil. Draw a gauge on it.
2. Record the message: *The milk is stored in a cooling tank. If the milk stayed warm, it might spoil.*

Section *7. To the Dairy*

1. Attach a garbage can covered in foil to a square box. Add cardboard wheels to make it look like a truck.
2. Record the message: *The milk is taken to the diary to be pasteurized and homogenized.*

Section *8. Packaging*

1. Use milk cartons to illustrate an assembly line where cartons are: flat, sealed at the bottom, filled, sealed on top, dated and put into crates.
2. Record the message: *Milk cartons are filled, sealed and dated. Next, a truck will deliver them to the store, ready for us to buy.*

Section *9. Dairy Products Display*

1. Display the following containers: milk, cream, cheese, chocolate milk, sour cream, buttermilk, cottage cheese, powdered milk, cream cheese, yogurt, egg nog, evaporated milk, butter, ice cream, half 'n half, skim milk, fortified milk.
2. Record the message: *These are some things that come from a cow. What products do you recognize?*

Evaluation

The following questions helped evaluate students' understanding:

1. How many stomachs has a cow?
2. When can a cow give milk?
3. Name some dairy products.

Name _____

New Mexico Agriculture

From The Dairy Farm To Your Table

MILK

Maybe you thought that reindeer were only good for pulling Santa's sleigh. But did you know that in places around the North Pole, people get their milk from reindeer? Sheep provide much of the milk in Italy and Spain. In India the water buffalo gives people their needed milk and in Arabia people get their milk from camels. Here in the U. S., most of our milk comes from cows. Here's how it gets from the cow to your table.

First, the cow is hooked up to a milking machine. Often eight cows are milked at one time with four cows on each side of the "milking parlor." Next, the milk begins to spurt into clean glass jars. The jars fill up with foamy milk. It takes about 11 minutes for the average group of cows to be milked. When the cow is finished, the warm milk goes through a glass pipe to a cold tank that chills the milk and holds it at a temperature of about 40* F. The cold temperature keeps bacteria from growing and keeps the milk fresh and tasty.

From the chilling tank, the milk is pumped once a day into a huge tank truck that hauls it to a processing plant. When the milk at the processing plant, it is heated to more than 160* F for about 15 seconds and then it is immediately cooled. This process is called pasteurization. The high heat kills any bacteria that may be in the milk.

In some plants the milk is made into cheese, butter, powdered milk, ice cream and many other products. If, however, the milk is going into cartons for you to drink, it is put through a machine that breaks the fat into tiny droplets. This is called homogenization because the milk and cream are now mixed together. Most people think homogenized milk tastes better than milk that is not homogenized. When milk stands in the refrigerator, the milk and cream stay mixed instead of the cream rising to the top. Most dairies then add vitamin D to the milk to make it more nutritious. This helps the food value. Sometimes, other vitamins are added too.

The milk then goes to packaging machines. The machines fill and seal the cartons or bottles, which are stored in refrigerated rooms. Soon, trucks arrive to pick up the milk, deliver it to stores, and--well, you know the rest.

Questions

1. People in India get their milk from
   A. camels B. reindeer C. water buffalo

2. Milk is heated to more than 160* F for 15 seconds to kill bacteria and then cooled immediately. This process is called
   A. Homogenization B. Pasteurization C. Bacterization

3. It takes about _____ minutes to milk the average group of cows.
   A. 11 B. 40 C. 6

Adapted form Breadbasket of the World, Agriculture in Iowa curriculum guide

New Mexico Agriculture

Milking Dairy Cows

"Wake up!"

"But, mom, it's four o'clock in the morning!"

If you lived on a dairy farm, your mother might get you up very early in the morning to help with milking. Some farmers start milking as early as 2:30 in the morning. Why so early? Cows have to be milked every 12 hours. If they are milked early in the morning, they can be milked early in the afternoon and allow the farmer to have the night free to do something else. Every dairy farmer has his/her own way of milking cows. Let's take a look at how one farmer does it.

First, the cows are brought up from the pasture. The farmer has to check carefully to make sure all the cows are up to the barn and that none are sick. As the farmer opens the barn doors, the cows slowly walk in. Each cow will walk into her own stall where she will find her morning breakfast of corn silage. The farmer starts on one end of the "milking parlor." The cows' udders are carefully washed off. A dairy farmer has to be especially careful everything is clean. In order for the farmer to sell grade A milk (the kind you buy at the supermarket), the milking parlor must meet standards set up by the Department of Agriculture and be kept very clean.

After the udders are washed, a milking machine is placed on the cow. The milking machine allows the farmer to milk more cows than in the past when all cows had to milked by hand. The milk passes through a pipeline into a cooling tank where it is chilled to 38° F. The milk is held in the tank until the milk truck comes to pick up the milk later in the morning.

When the cows are finished milking, they are let outside. An average dairy cow will give about 11,200 pounds (1302 gallons) of milk a year. She milks for about 305 days (10 months) following the birth of her calf. Then the cow "dries up" (stops milking) for 2 months before she gives birth again.

The chores are not over when the cows are finished milking. All the equipment has to be washed and the milking parlor has to be washed down. The calves need to be fed along with the bulls and heifers. The heifers will someday replace the cows currently being milked. Careful records must be kept to find out what animals are the best producers. Milking 80 cows takes two hours and after you have finished cleaning up, you might be able to just make seven o'clock breakfast. Milking is finished--that is, until 4:00 in the afternoon.

Questions:

1. Dairy cows need to be milked every _____ hours.
   A. 6 hours B. 24 hours C. 12 hours

2. This means dairy cows are milked _____ times per day.
   A. 4 B. 1 C. 2

3. The bag-like organ that holds milk in a dairy cow is called:
   A. muzzle B. udder C. milk bag

Adapted form Breadbasket of the World, Agriculture in Iowa curriculum guide

Name _____

CHEESE

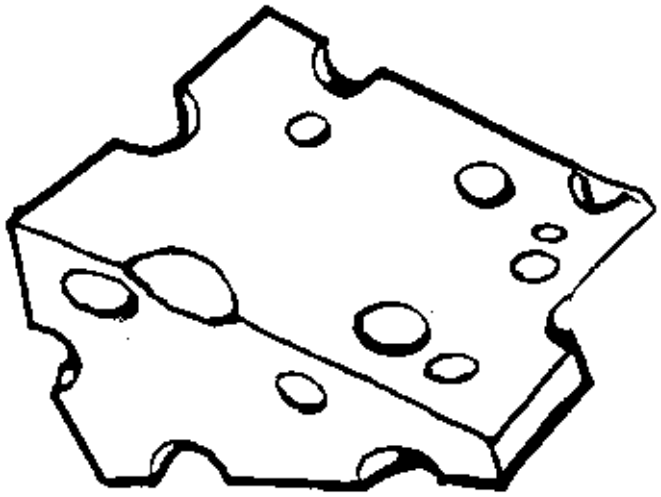
The Minnesota Ag Magazine gives the following information concerning cheese:

"Cheese is one of our oldest foods going back to ancient times. One fanciful legend says a trader named Ahab loaded his camel, Clyde, for a trip across the desert to Asia. About noon, Ahab stopped to drink goat milk he'd stored in a bag made from dried sheep stomach - one of the first canteens. He lifted the bag down and was disappointed the milk had changed to curdy, white lumps floating in a thin watery liquid. He was so thirsty he tasted the strange, lumpy mixture anyways. Surprise! It tasted great! Ahab's treat was curds and whey, the first form of cheese.

Milk, heat, and renin are three things needed to make cheese. Renin is a natural stomach enzyme (protein catalyst) that helps digest milk, curdling it to form lumpy curds and liquid whey. (Remember Little Miss Muffett? She knew all about it). Ahab's sheep stomach probably still had some renin in it. The hot sun warmed the milk, which reacted with the renin as Clyde bumped and juggled along. The result was cheese.

Heat, renin, and agitation (mixing) are still needed for cheese making. Today's cheese is produced in sanitary, government inspected and approved plants. We have at least 1,000 different shapes, sizes, colors, and tastes of cheese to choose from. Of the basic types (about eighteen), many are named after the country or area they came from. How many kinds of cheeses can you name? (Blue, Brick, Cheddar, Cream, Muenster, Process, Swiss)

Most cheese in the U. S. is made from cow's milk. Sheep's milk is used widely in France and goat's milk in Norway. Make it your goal to taste more kinds of cheese...glorious cheese."



Have a cheese tasting party. What cheeses do we associate with certain foods? Ex. Mozzarella, lasagna; Parmesan, spaghetti; Cheddar, taco.. Don't forget cream cheeses. Many of these are also farm products.

DAIRY COW

Name _____

NEW MEXICO AGRICULTURE

The average cow produces 1,095 glasses of ___ ___ ___ ___ in one month.
13 9 12 11

It takes approximately 12 lbs. of milk to make 1 gal. of

___ ___ ___ ___ ___ ___ ___ ___ ___.
9 3 5 3 18 5 1 13

It takes approximately 12 lbs. of milk to make 1 lb. of

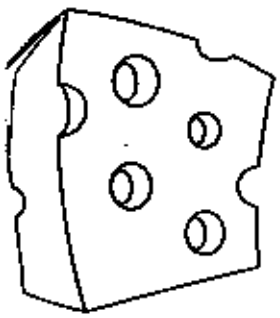
___ ___ ___ ___ ___ ___.
3 8 5 5 19 5

It takes approximately 10 lbs. of milk to make 1 lb. of

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___.
14 15 14 6 1 20 4 18 25 13 9 12 11

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

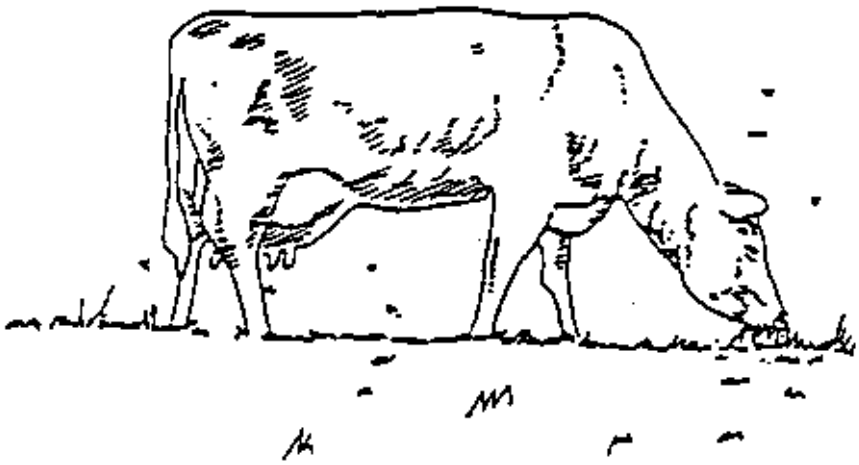
S	T	U	V	W	X	Y	Z
19	20	21	22	23	24	25	26



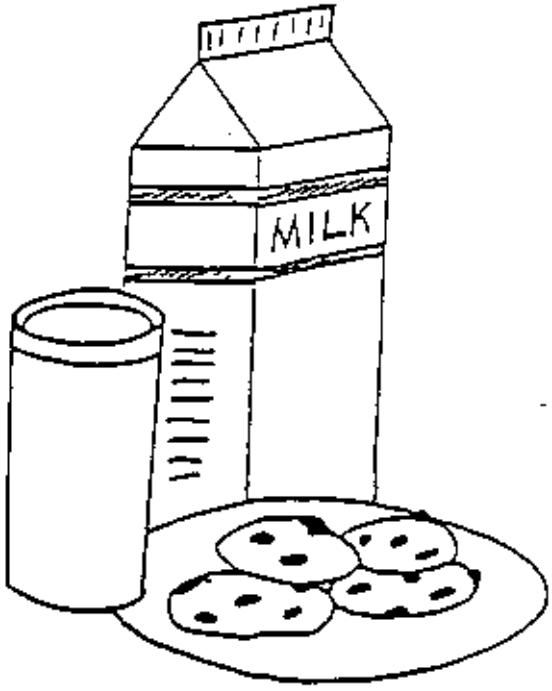
PRODUCING MILK

1

What can you make with water, grass, grain and a cow?

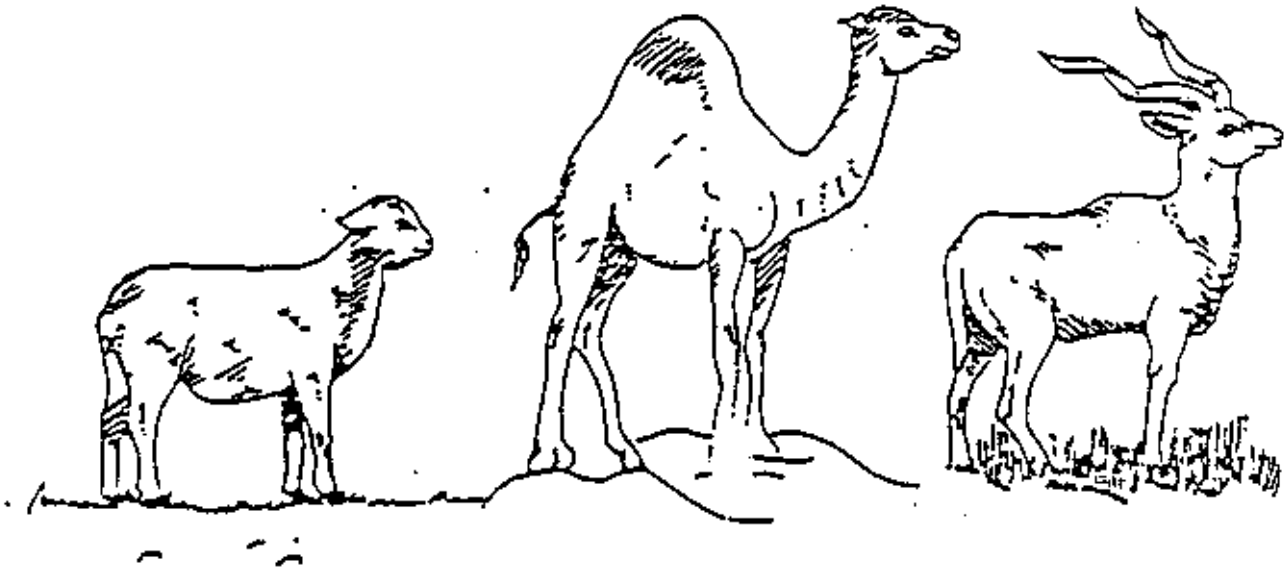


Milk

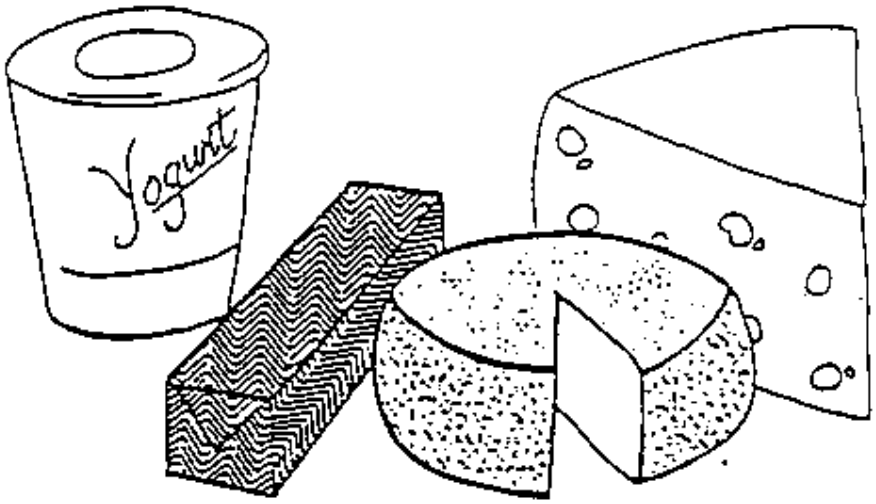


3

People get milk from goats, sheep reindeer, llamas, camels, Yaks, and even water buffalo.



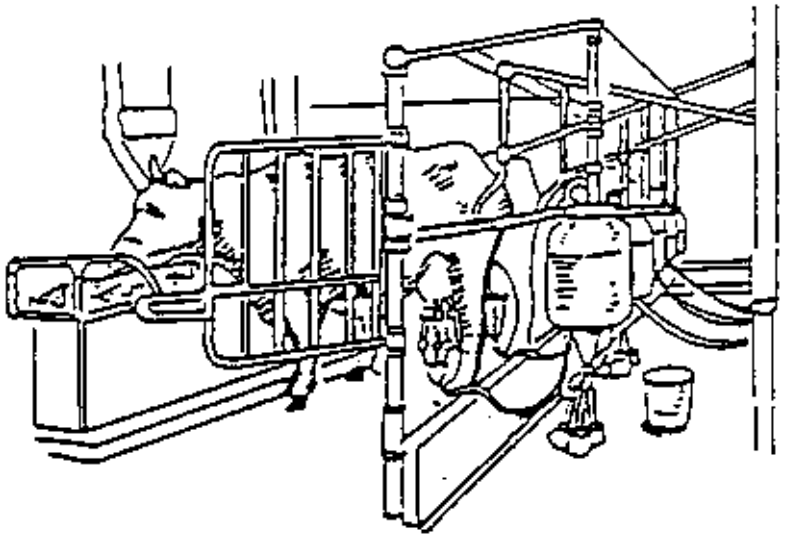
Sometimes they drink it, but often they make butter, cheese, and yogurt.



5

The dairy cow is a fabulous machine that weighs about twelve hundred pounds. In one year, one cow eats several truckloads of grain, hay and grass. She drinks about seven thousand gallons of water (seventy bathtubs full)! She produces five thousand quarts of milk.

The cow used to be milked by hand. A modern farmer milks his cows with a machine in a specially equipped barn.



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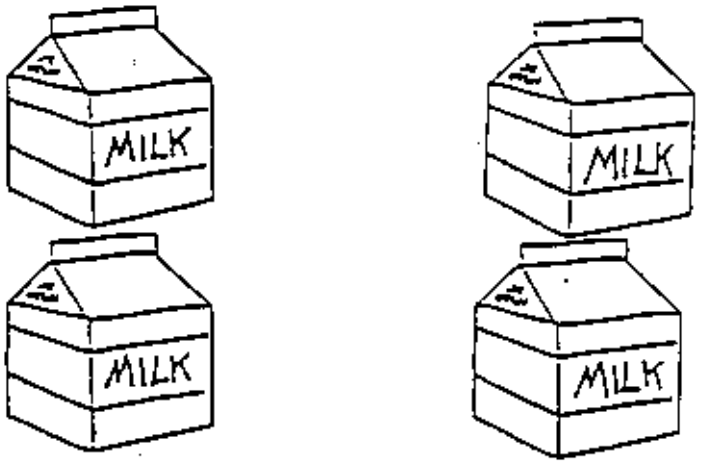
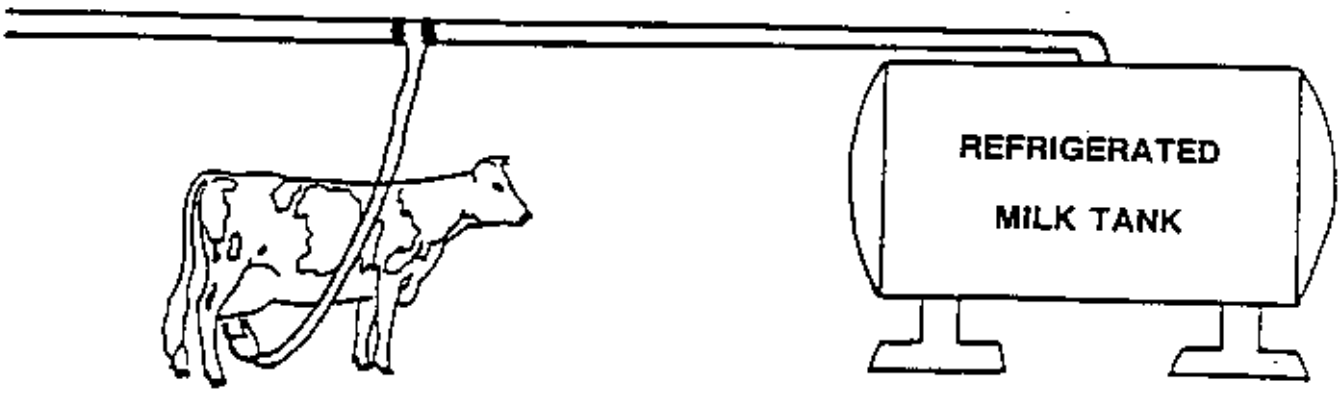


8

Part of the food is used by the cow's body. The rest goes to the cow's udder, where milk is produced and stored.

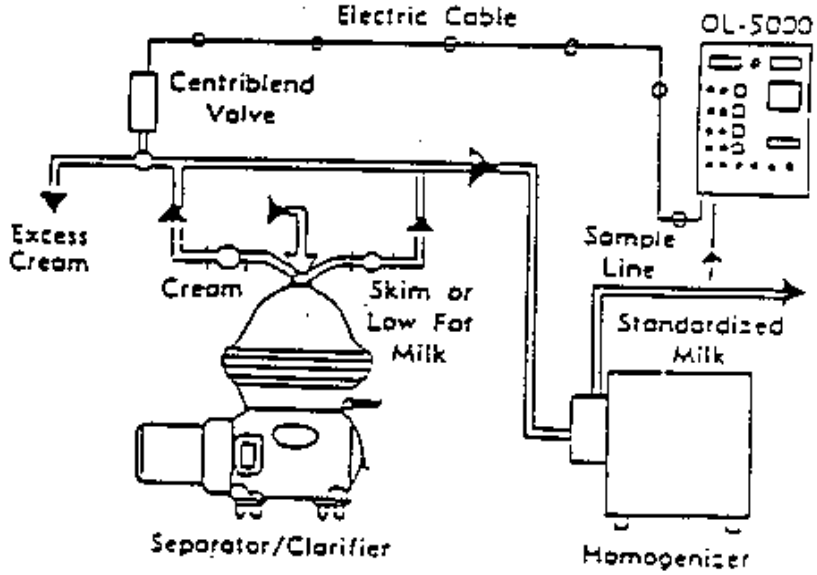
Before milking time, all the milking machine parts are cleaned and sterilized. The cows udder is thoroughly washed, too.

The milk goes from the cow through pipes into a refrigerated storage tank. There it is cooled quickly to keep it from spoiling.



Each day a tank truck comes to take the milk from the farm to the dairy processing plant. The tank truck is insulated to keep the milk cool all the time.

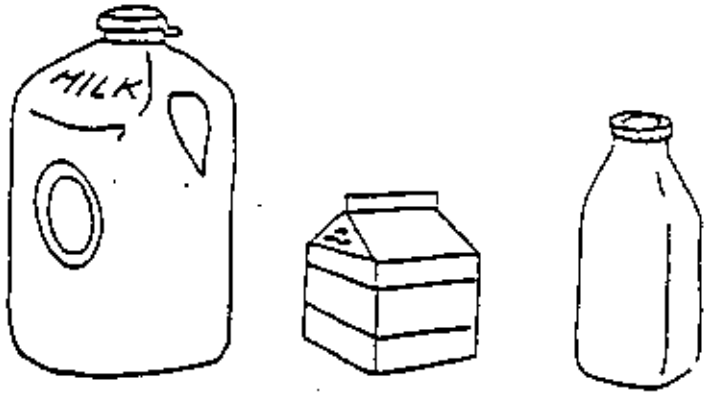
At the dairy processing plant the milk is first put through a clarifier. This removes any dirt or tiny particles. It also separates the cream from the milk.



Next, Vitamins A and D are added to the milk. Then the milk is heated very hot for a short time. This is called pasteurization. It kills harmful bacteria.

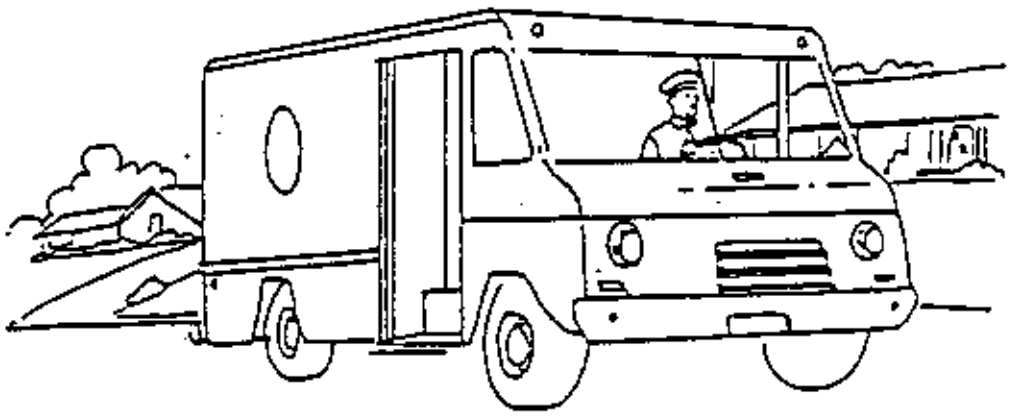
Next, the milk is homogenized. This means that the cream which was put back into some of the milk is mixed in.

Finally, the milk is cooled again and poured into bottles or cartons.



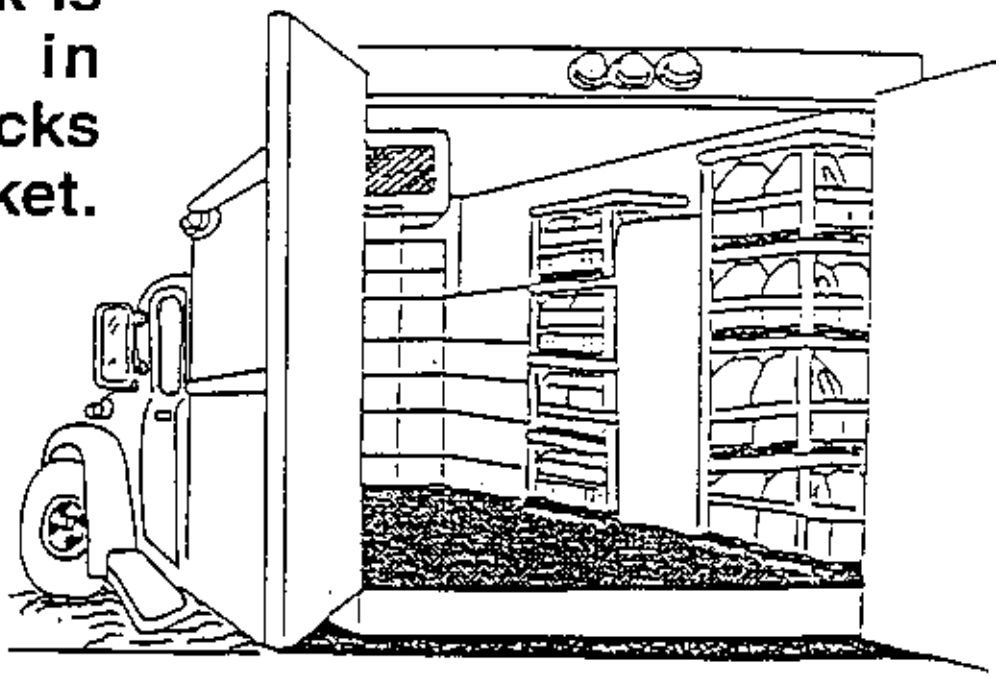
15

Some people have milk delivered from the dairy processing plant right to their homes.



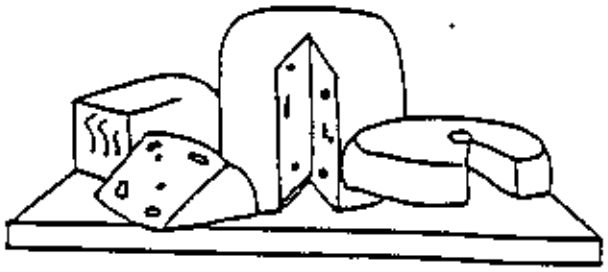
16

Most of the milk is transported in refrigerated trucks to the supermarket.



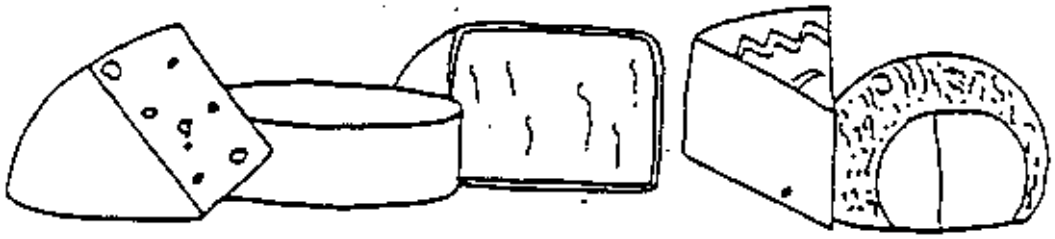
17

Some milk is not processed at the dairy. It is sent to a cheese factory. Hundreds of different kinds of cheese can be made.

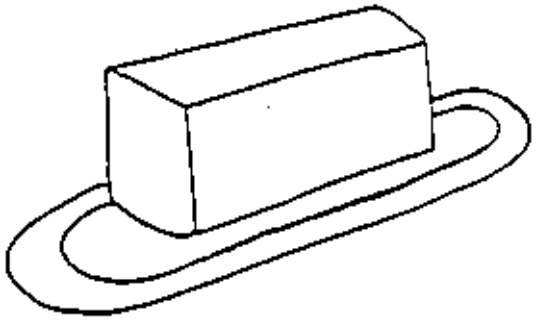


18

List different kinds of cheese.



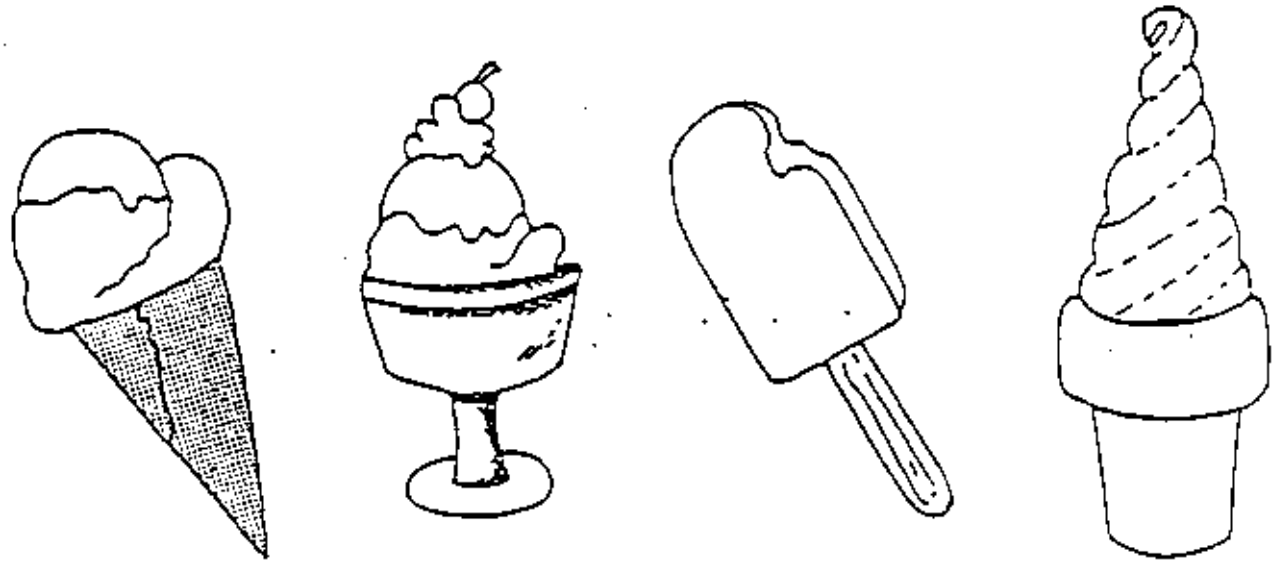
Remember the cream that was separated from the milk to be used for other things? One of those things is whipped cream. Butter is made from cream.



Ice milk, sherbet, frozen custard, and frozen yogurt are different desserts made from milk. Which "frozen milk" do you like best? _____

22

Ice cream is made from cream, sugar, milk and flavorings. Then it is frozen.

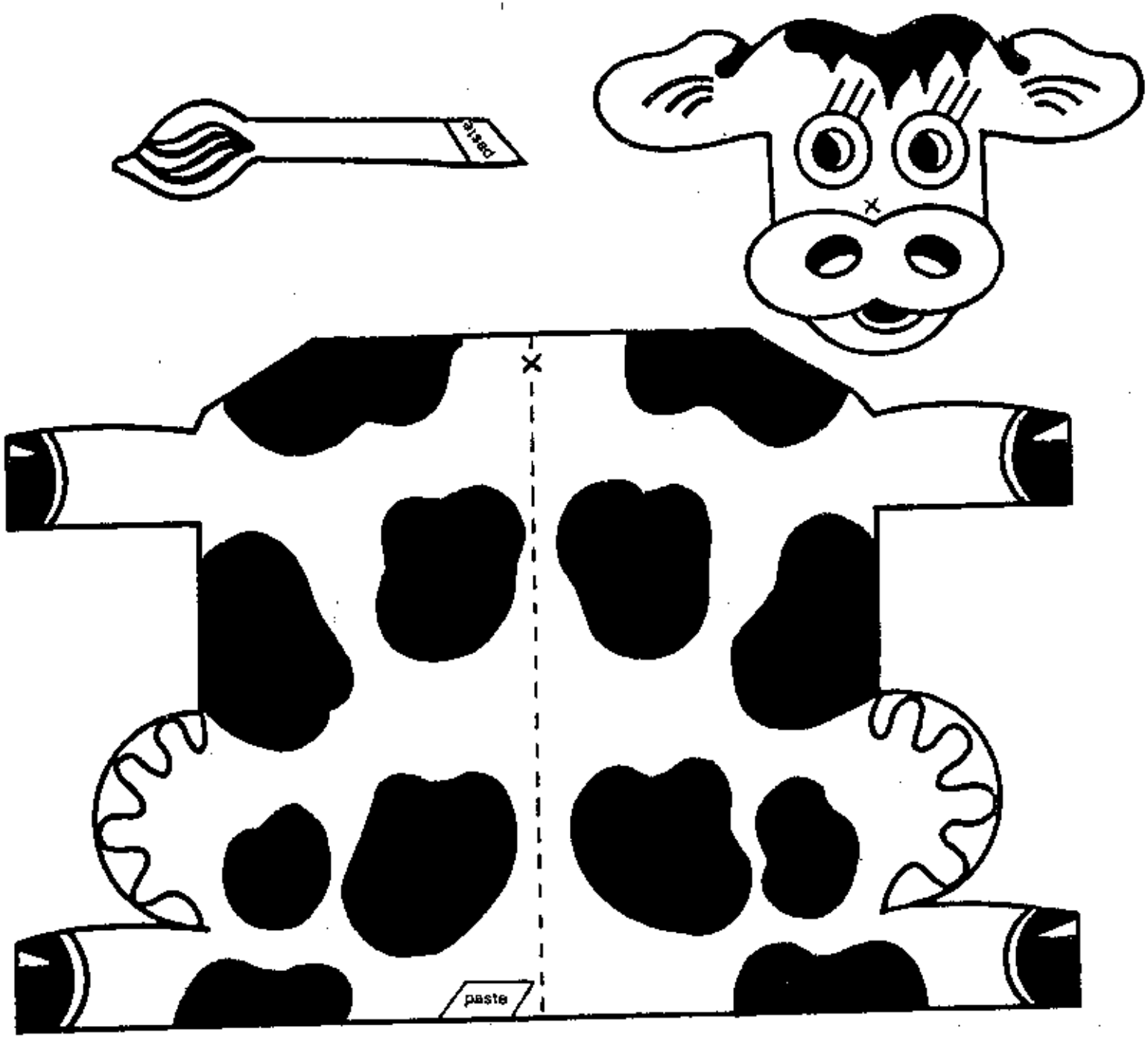


List products made from milk.

23

This book was produced by

24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A DAIRY FARMER'S STORY

Fill in the blanks in A Dairy Farmer's Story. Choose from the answers given in the box below and put the letter of the correct answer in the blank.

1. Hi! I am a dairy farmer. I have a herd of 160 cows. I have a _____ which helps me and my son milk 16 cows at a time.

2. Before milking, the cow's udders are _____ to keep the milk clean.

3. Each cow gives about _____ pounds of milk each morning.

4. The milk company picks it up each day. They make some milk into butter and _____.

5. The cows eat grain, hay, and _____.

6. I grow my own hay and _____. This keeps me busy planting and harvesting.

7. Each year, every cow must have a _____. If not, the cow stops giving milk.

8. I match each cow to a _____ whose mother produced a lot of milk.

9. Careful _____ is one reason cows today give a lot of milk. Better feed is another reason.

10. Dairy farming is hard work. The herd must be milked _____ times a day, every day. It's a good thing I like my job!

A. milking parlor	F. corn
B. silage	G. bull
C. 2	H. breeding
D. calf	I. 30
E. washed	J. ice cream

This activity was taken from Agriculture in Maryland, developed by the Maryland State Department of Education in cooperation with the Maryland Farm Bureau, The Maryland Department of Agriculture, and The University of Maryland.

FROM CREAM TO BUTTER

MATERIALS YOU WILL NEED

1/2 pint whipping cream
1-4 clean 8 oz. jars with lids
1/4 C measuring device

ACTION (COMMUNICATING, OBSERVING, AND INFERRING)

Participants will:

1. Pour 1/4 cup whipping cream into jar.
   Put lid on jar and tighten.
2. Take turns shaking jar vigorously.
3. After several minutes of shaking the cream will begin to thicken.
4. Continue shaking until a ball of butter has formed.
5. Open the jar, pour off the liquid.
   Observe and taste.

SCIENCING

Communicating and Observing: Describe what happened as you shook the cream.

(It thickened and then turned into a ball of butter.)

Inferring: Explain how it might be said that butter is made of grass? (Cow eats grass, cow gives milk with cream, cream is churned to butter)

Teach students to rap the following as the butter is being churned:

BUTTER MAKER

I am a butter maker
I thump and thump my churn
Now and then I peep inside to watch the butter turn
It whirls to specks of gold that form into a lump
I'm glad I have a little churn
So I can thump and thump

ICE CREAM

Make ice cream. Use several types of freezer with clear lids so students can watch the freezing process. Flavor some of the ice cream with New Mexico grown pecans or other state products. Create your own new flavor.