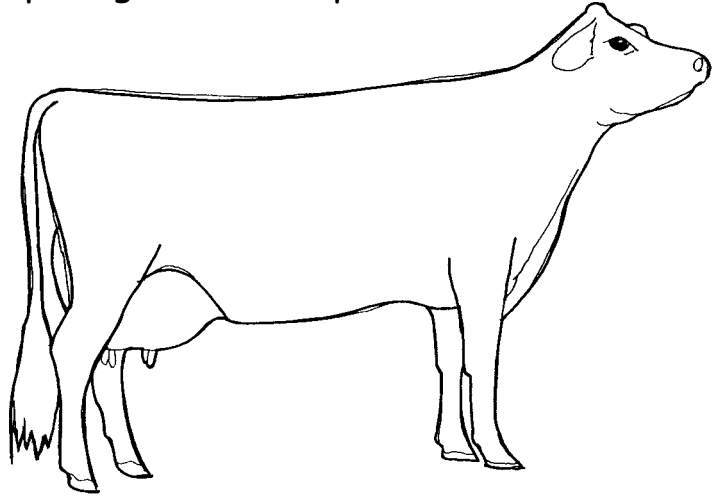
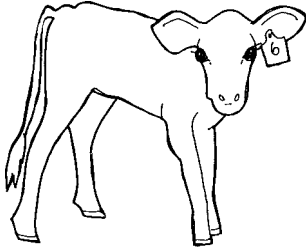
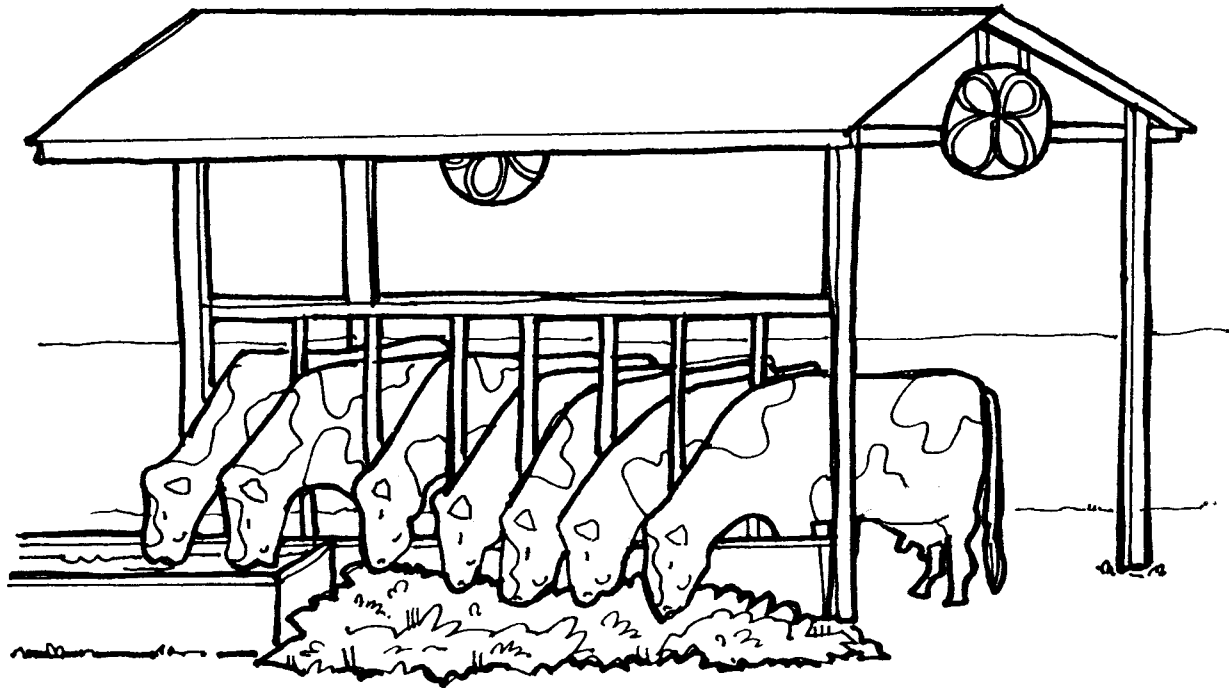
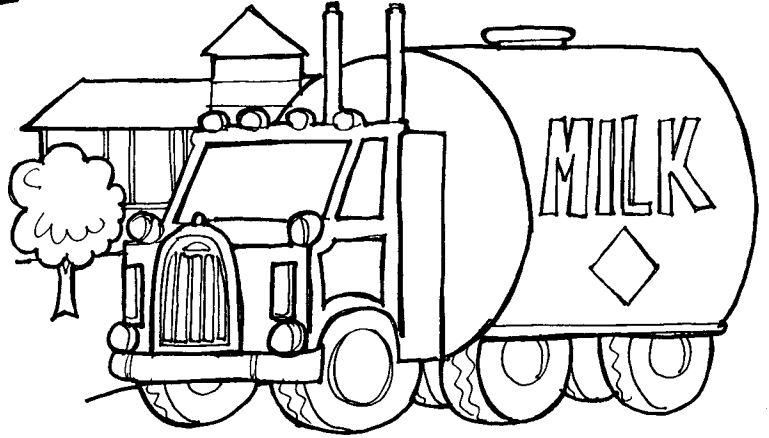
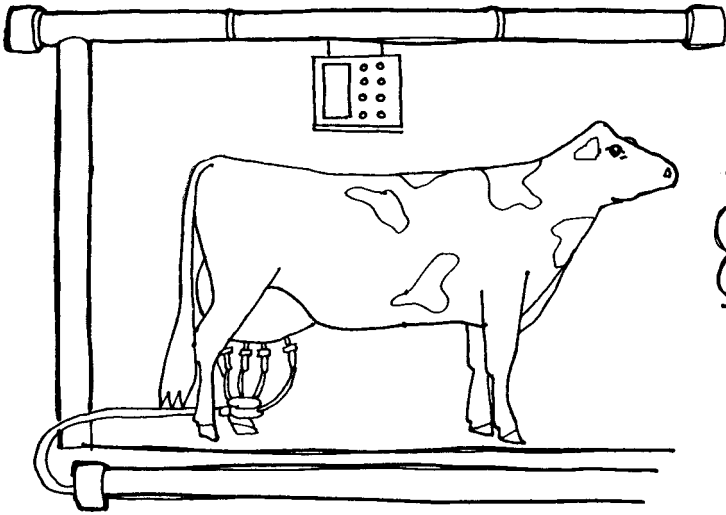


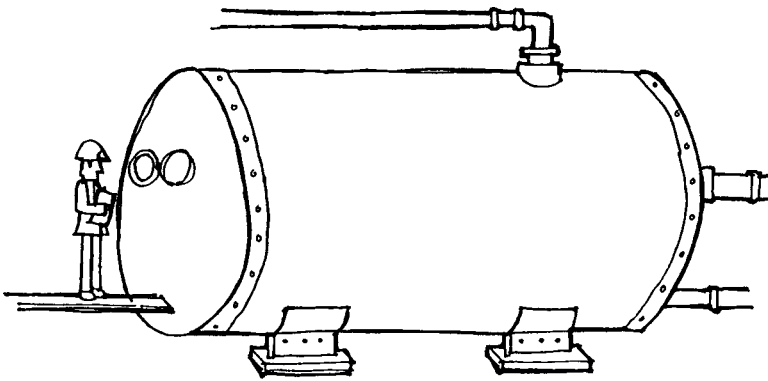
Title: _____

Write a report or narrative that explains the process of milk from cow to cheese. Use the illustrations to help you. Proof read for correct sentence structure, grammar, punctuation, capitals and spelling. Color the provided illustrations.









Share your report by reading it aloud to the class.

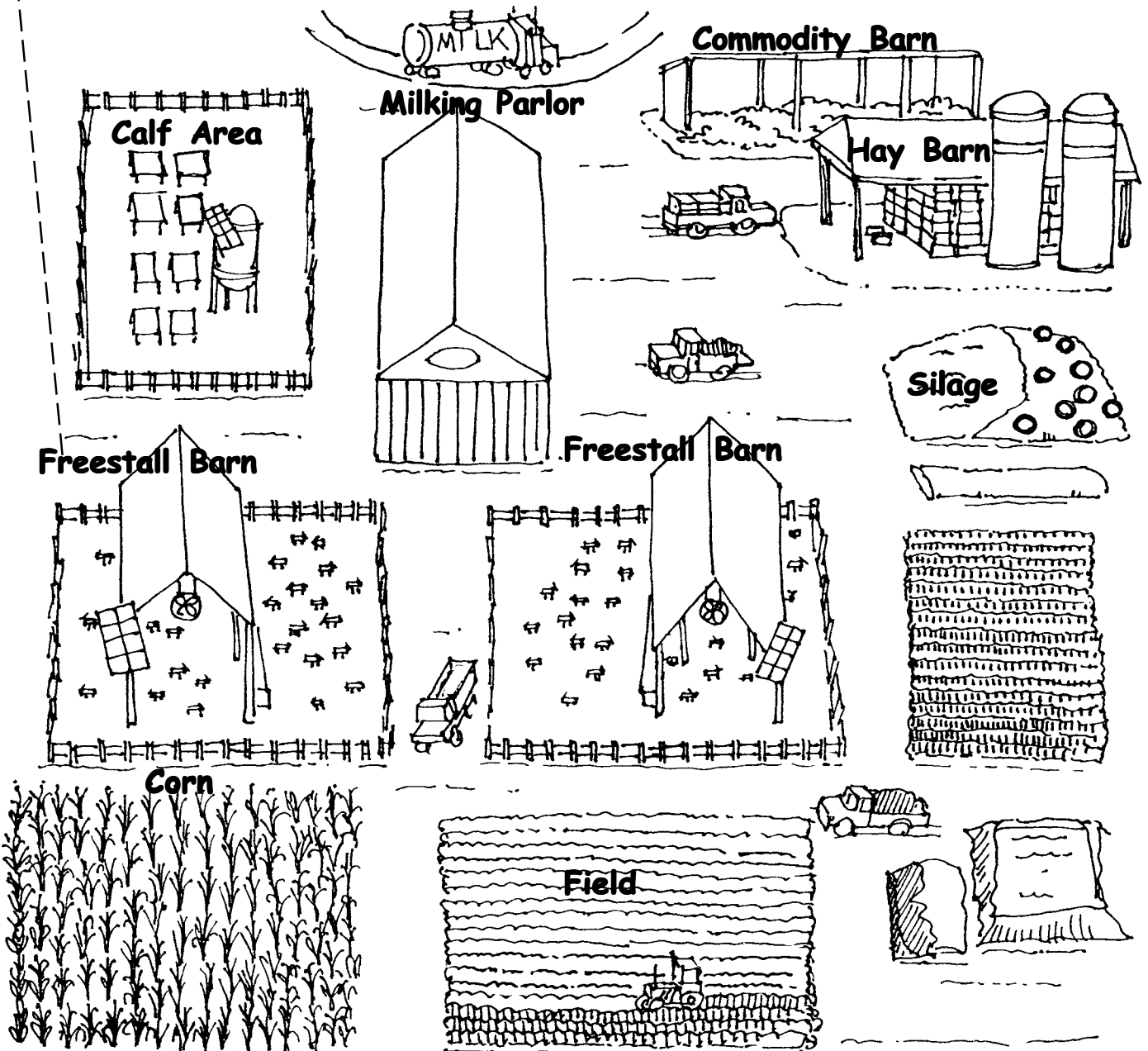
All About the Dairy

Dairy families care for their cows and the land. Family members and employees are responsible for different jobs in addition to feeding and milking the cows. Connect the job to its location on the farm by drawing a line.

Turn on fans, misters and add bedding to keep cows comfortable in the **Freestall Barn**.

Check the temperature of the milk and make sure the cooling water is recycling for use in the wash pen in the **Milking Parlor**.

Meet with a dairy nutritionist to analyze feed nutrients to ensure a nutritious, balanced meal for the cows in the **Commodity Barn**.



Apply nutrients to the field so crops, like **Corn**, will grow.

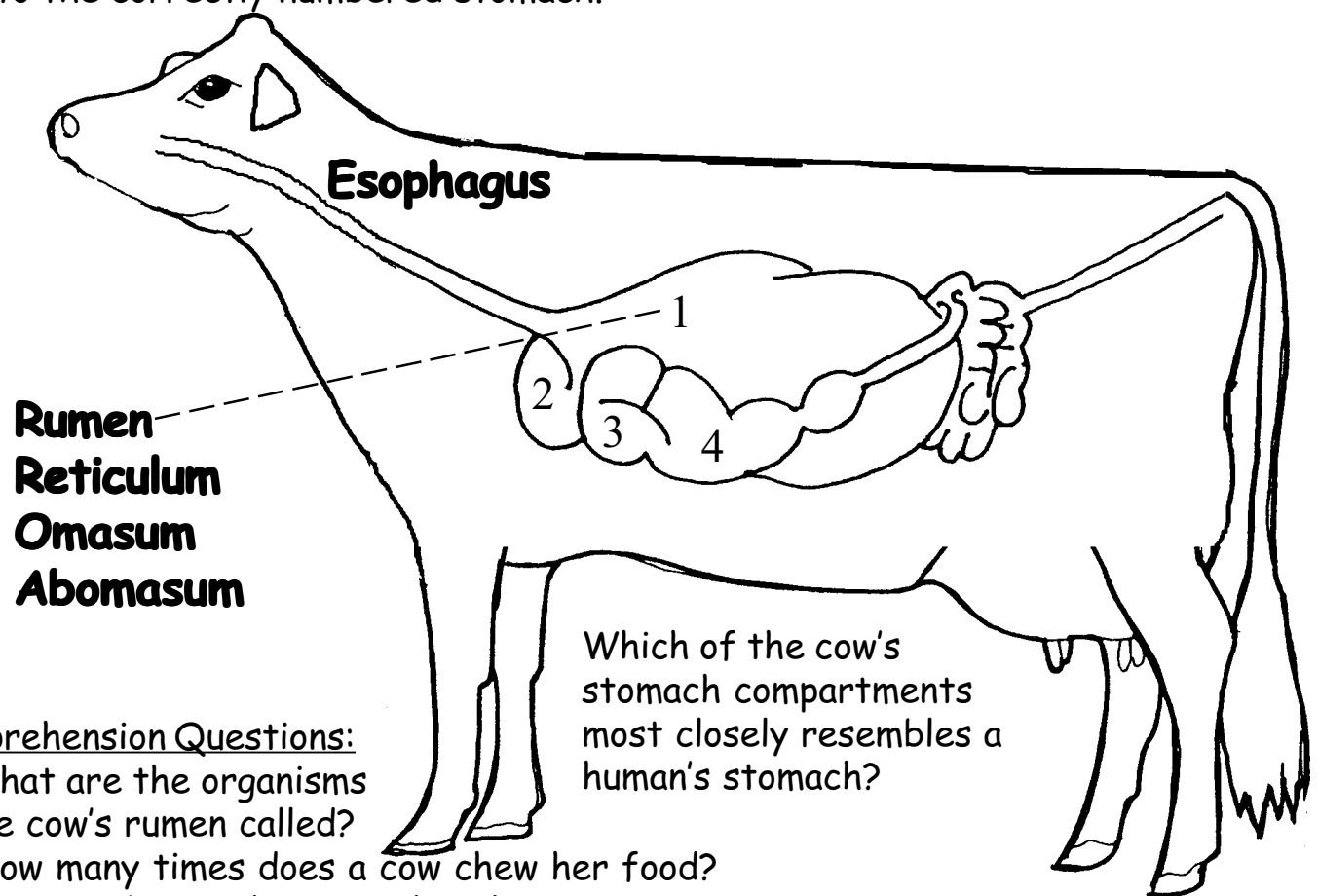
Check owl boxes in the **Field**.

Why Can Cows Eat Grass?

The cow is an herbivore. She eats only plant material. She is a ruminant animal with four stomach compartments. The largest stomach is the rumen. The rumen contains special tiny organisms, called microbes that help the cow digest and break down her food. She can digest foods that human and single stomach animals cannot. The reticulum (second stomach) forms the cud (small ball of food). A ruminant animal eats fast then later burps up the cud to be chewed thoroughly. The omasum (third stomach) absorbs water. The abomasum (fourth stomach) is the "true stomach" that functions to digest food like a human stomach.

The ruminant digestive system allows the cow to eat many different things. Dairy nutritionists create rations (meals) for the cows. Cows recycle by eating by-products - what is left over after making the first product. For example, cows eat the almond hull that covers the outside of the almond nut we eat. Cows enjoy sugar beet pulp, the by-product from making sugar from sugar beets.

Color the different stomach compartments. Draw a line from the compartment name to the correctly numbered stomach.



Comprehension Questions:

1. What are the organisms in the cow's rumen called?
2. How many times does a cow chew her food?
3. How are by-products produced?
4. What kind of educational background do you think a dairy nutritionist would have?
6. Describe the type of teeth a ruminant would have.

All About Milk

Learn the definitions and choose the word that fits best into the story.

bull: boy (male), father

calf: a baby cow

cow: has had a calf, mother

grain: corn mixture the cow eats

heifer: girl (female) calf

hay: cut, dried grass the cow eats

milk: white, nutritious liquid

milking machine: used to milk cows

ruminant: four stomach compartments

teats: release milk from the udder

udder: the cow's milk sac

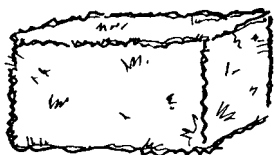
water: what the cow drinks

Lifecycle



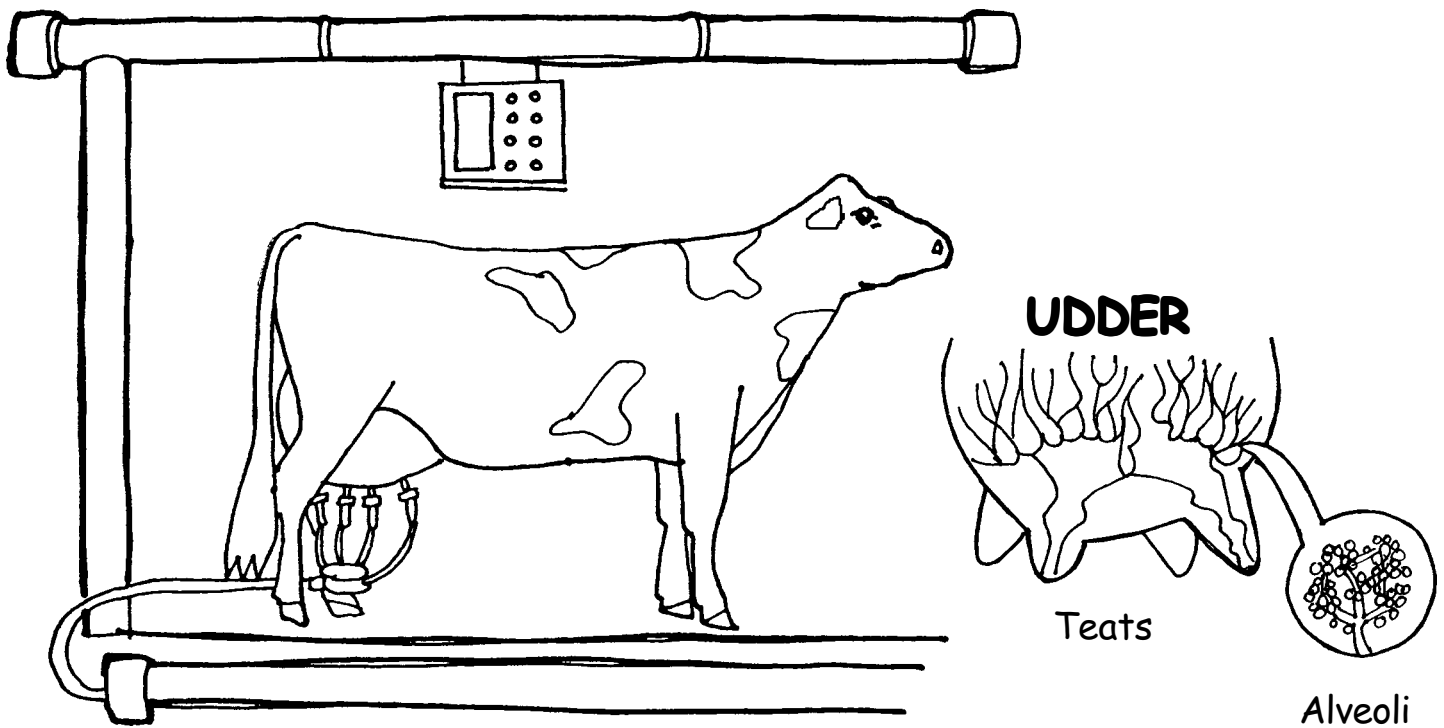
A baby cow is called a _____. The mother is called a _____. The father is called a _____. A girl (female) calf is called a _____. Together they are called cattle.

After a heifer gives birth, she is called a cow. A cow must be a mother and have a _____ each year to produce milk. A _____ will produce milk for 10 months and rest for two months before her next _____ is born.



Digestion

Cows are _____ animals with four stomach compartments. A cow eats over 50 pounds of _____, by-products and _____ each day. A cow drinks 30 to 50 gallons of _____ each day. That equals a bathtub full of water! The food the cow eats is turned into nutrients. Nutrients are essential for all animals to live.



Milking the Cow

The nutrients are turned into milk in the udder.

The _____ is the milk sac between the cow's back legs. The udder has four _____ on the bottom where the milk comes out. The _____ has milk making cells called alveoli. The alveoli release _____ to flow through the large milk ducts and out the teats.

Cows are milked two or three times every day by a _____. The milking machine pulses gently to release the milk.

As each cow is milked, the _____ travels through the hoses and pipes of the dairy barn to the milk tank where it is cooled. The milk is picked up by tanker trucks and delivered to a factory where it is processed into cheese, yogurt, ice cream or milk.

All About Science

Many things change form. For example, water can be a solid called ice. Water can be a liquid called water. Water can be a gas called steam. Milk products change form also. Circle the best answer.



Milk is a Solid Liquid Gas



Cheese is a Solid Liquid Gas



Ice Cream is a Solid Liquid Gas

Cheesemaking Definitions

Number the terms in alphabetical order.

- _____ **cheese press**: presses the curds into blocks of cheese.
- _____ **pasteurize**: heating a liquid to kill any harmful bacteria.
- _____ **color**: natural orange color (annatto) added to color cheddar.
- _____ **culture**: good bacteria added to give cheese texture and flavor.
- _____ **rennet**: causes the milk to separate into solids and a liquid.
- _____ **salt**: added for flavor and to preserve cheese.
- _____ **curds**: the solids.
- _____ **whey**: the liquid.
- _____ **cheese tower**: presses the curds into barrels of cheese.
- _____ **milk pipeline**: pipes for delivering the milk to the cheese vats.
- _____ **cheese vat**: large tub for making cheese.



Whey Processing Definitions

Number the terms in alphabetical order.

- _____ **molecule**: the smallest possible particle
- _____ **ultra filtration**: filter system separating molecules by size
- _____ **reverse osmosis**: filter system separating molecules by pressure
- _____ **concentrate**: increase strength by removing foreign elements.
- _____ **centrifuge**: spins a mixture to separate ingredients.
- _____ **crystallize**: to form or shape.
- _____ **evaporator**: concentrates by removing the water.

The Cheesemaking Sequence

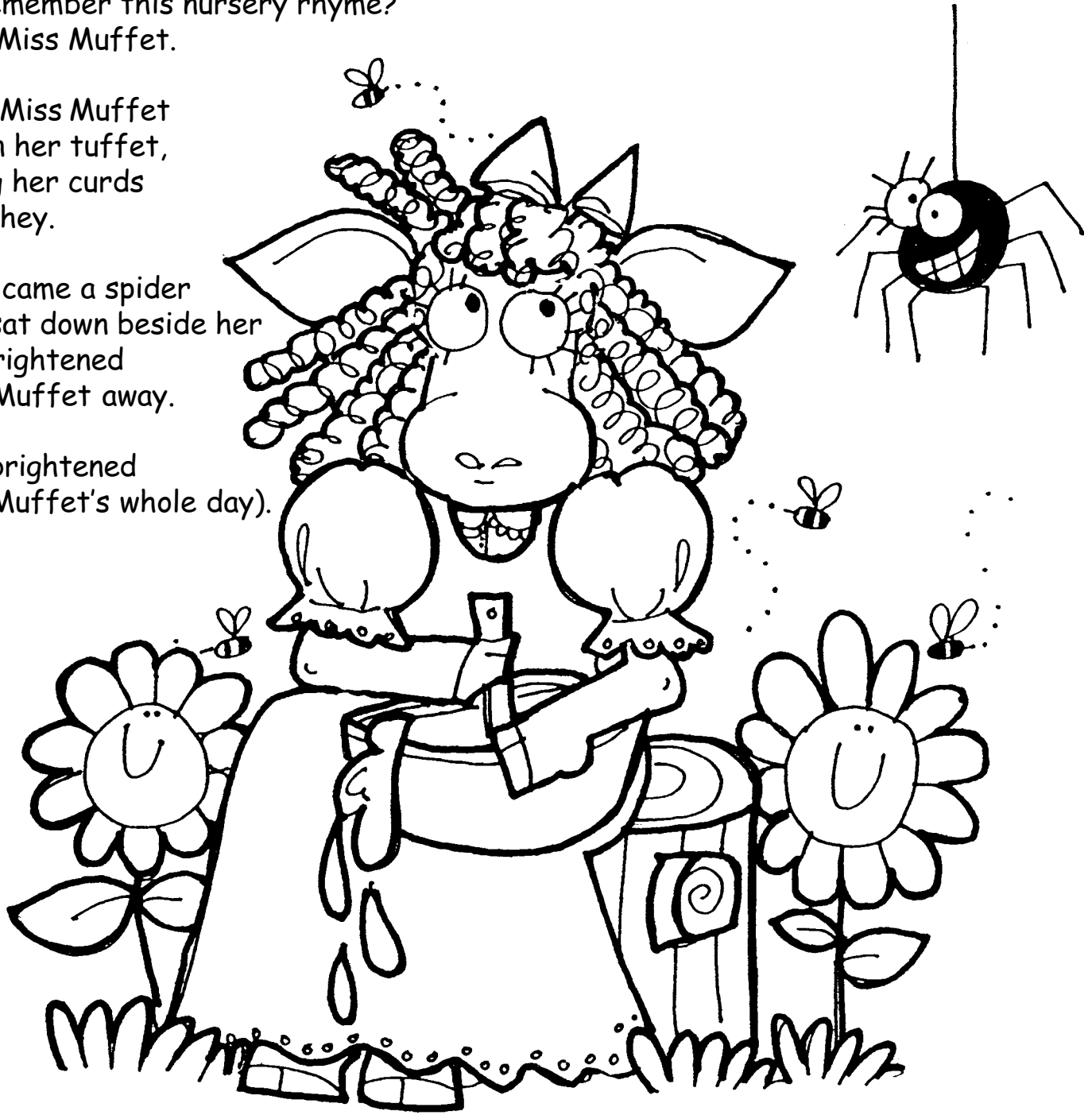
Milk from many dairies is delivered to the cheese plant. The laboratory samples the milk to ensure its high quality. The milk is pasteurized to kill any harmful bacteria. Orange color, starter culture and rennet are added. The milk is cooked and stirred, turning it into curds and whey. The curds are the solids that are salted and pressed into cheese. The whey is the liquid that is drained and dried into other products. Do you remember this nursery rhyme?

Color Miss Muffet.

Little Miss Muffet
Sat on her tuffet,
Eating her curds
And whey.

Along came a spider
Who sat down beside her
And frightened
Miss Muffet away.

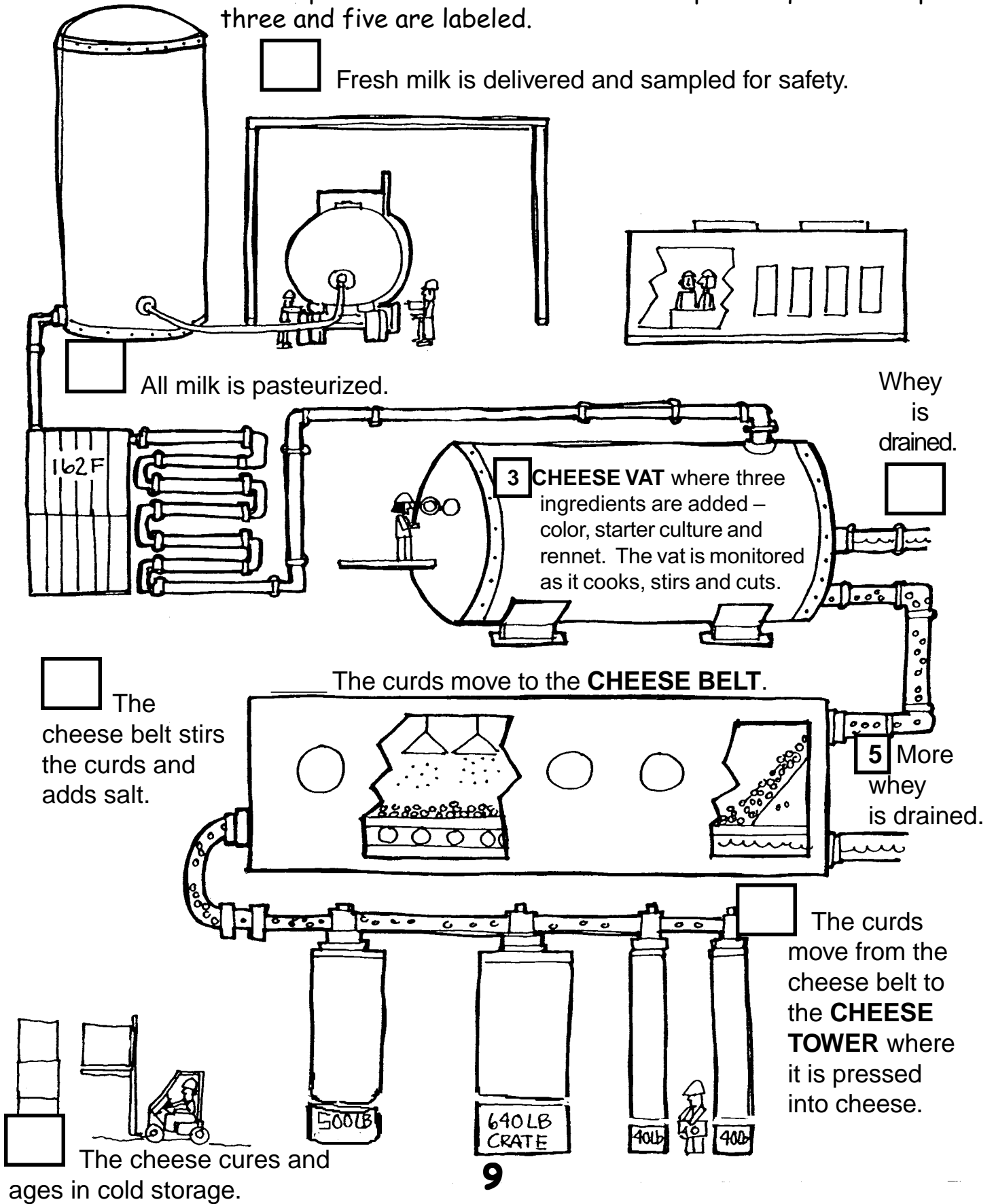
(And brightened
Miss Muffet's whole day).



What was Miss Muffet eating? _____

All About Cheddar Cheesemaking

Most large cheese processing facilities have automated cheesemaking systems. The system is efficient and enclosed. The milk is never touched by human hands from cow to cheese. Follow the product flow and number the steps in sequence. Steps three and five are labeled.



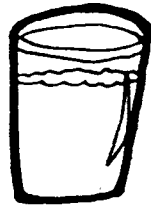
All About Recycling - Whey Cool!

Whey is the liquid co-product from making cheese. The whey is processed into many diverse food products. Identify how many edible products are created from milk.

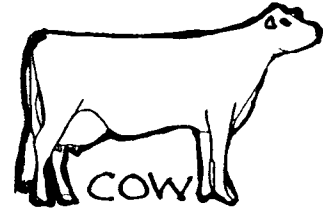
Lactose is milk sugar dried for use in candy and other products. Lactose is 1/4th as sweet as the sugar we use at home.



LACTOSE



WATER



COW

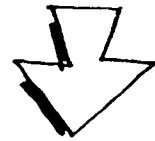
Check how you recycle:

- Aluminum cans
- Plastic
- Cardboard and Paper
- _____

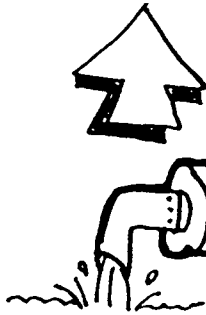


PROTEIN

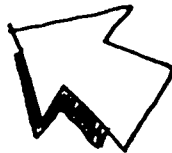
Protein Powder is the dried whey protein. It is used as an ingredient in energy bars, health foods and baby foods.



MILK



WHEY



CHEESE



Look for whey, whey protein concentrate and lactose powder on the labels of the foods you eat. Underline the whey products in the nutrition labels below. Bring an empty product label from home that contains whey, whey protein concentrate or lactose. Make a class list of the variety of products created from milk co-products.

Candy Bar Ingredients: milk chocolate (sugar, cocoa butter, chocolate, lactose, skim milk, soy lecithin, artificial flavor), peanuts, corn syrup, sugar, skim milk, butter, milk fat, partially hydrogenated soybean oil, lactose, salt, egg white, soy protein, artificial flavor.

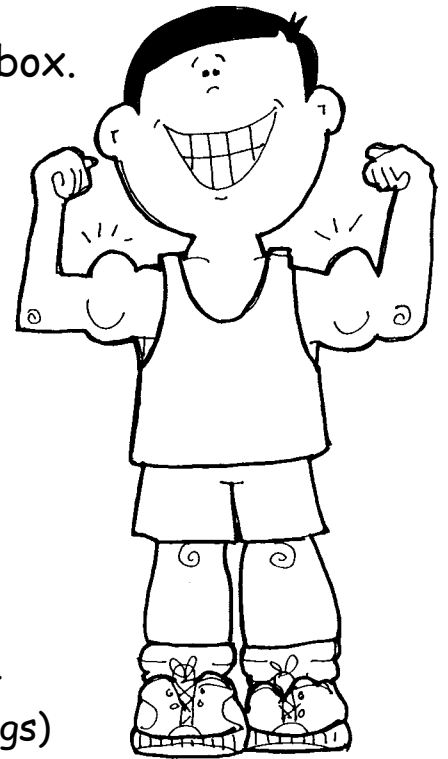
Infant Formula Ingredients: water, nonfat milk, lactose, high oleic safflower oil, coconut oil, soy oil, whey protein concentrate.

All About Calcium

A healthy diet includes eating foods from all of the food pyramid groups. Cheese, milk and yogurt are good sources of calcium, proteins and vitamin B. Calcium makes your bones and teeth strong and healthy.

How much calcium do you need? Color your age group box.

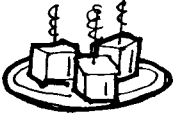







- 4-8 years of age. You need 800 mg. of calcium.
- 9-18 years of age. You need 1300 mg. of calcium.



How much calcium are you getting?

1. Check the box in front of the foods you like to eat.
2. Write how many times each day you eat this food (servings).
3. Multiply the number of servings times the milligrams of calcium.
4. Add up how much calcium you will give your bones!

How many times I will eat this food each day (servings)

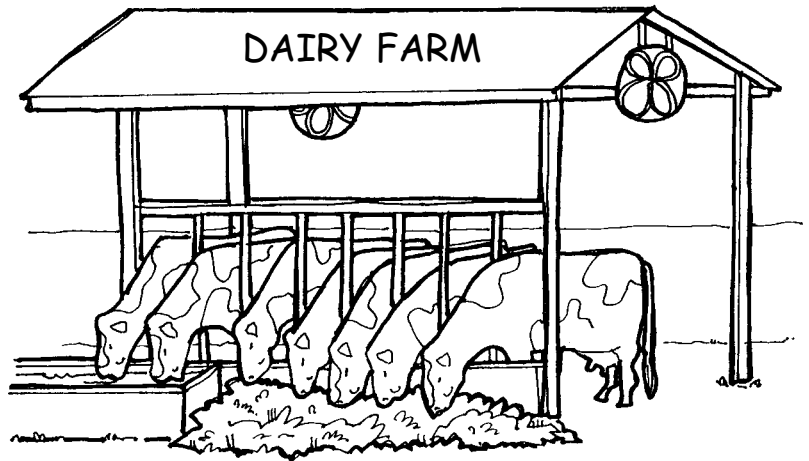
	<input type="checkbox"/> Cheese (1.5 oz)		_____ X 300 mg. = _____
	<input type="checkbox"/> Milk (1 cup)		_____ X 300 mg. = _____
	<input type="checkbox"/> Yogurt (1 cup)		_____ X 300 mg. = _____
	<input type="checkbox"/> Tofu with Calcium (1/2 cup)		_____ X 258 mg. = _____
	<input type="checkbox"/> Macaroni & Cheese (1/2 cup)		_____ X 220 mg. = _____
	<input type="checkbox"/> Spinach (1 cup)		_____ X 115 mg. = _____
	<input type="checkbox"/> Broccoli (1/2 cup)		_____ X 80 mg. = _____
	<input type="checkbox"/> Bok Choy (1/2 cup)		_____ X 80 mg. = _____

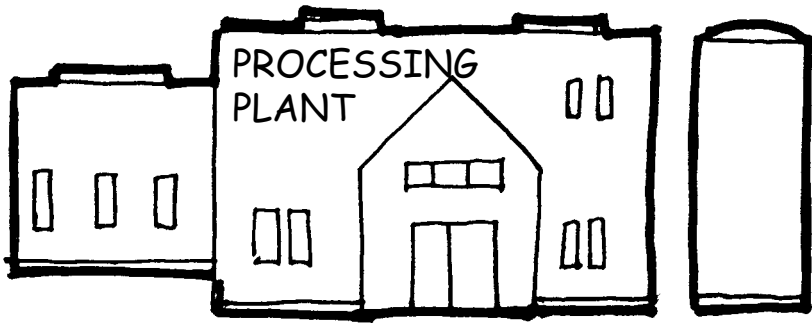
ADD YOUR TOTAL CALCIUM = _____mg.

All About Agriculture Careers

Hundreds of jobs are involved in providing our high-quality food supply. Think of different jobs associated with the illustrations. Any others? How many can you name?









RESTAURANT

