SOLE Sciences of Life Explorations: Through Agriculture Grades 4 and 5

Low March Low March Low Control Low Contro



Teacher Guide Unit: Miss Moo and You

UNIT PLAN

UNIT TITLE Miss Moo and You

GOAL

In this unit, students will learn about cows and the products we get from them. Additionally, students will compare human and **cattle** foods and how they relate to health, and discuss the workings of the four-chambered cow stomach (**rumens**). Students will learn that no two Holstein **cattle** are marked the same way, and are **unique** just as they are. This lesson will cause them to consider what is special about themselves.

OBJECTIVES

Students will

- 1. Use basic mathematical concepts and computations to measure and solve problems by completing questions on how much a cow eats. (NYS Learning Standard 3a: Universal Foundation Skills: Elementary 1)
- 2. Make estimates to compare to actual results when learning to make butter. (NYS Learning Standard 3: Mathematics: Elementary 6)
- 3. Learn that living things are both similar to and different from each other and to nonliving things by describing the characteristics of and variations between living and nonliving things. (NYS Learning Standard 4: Science: Elementary 1)
- Learn what dairy and beef products and by-products are, and for whom they are produced. (NYS Learning Standard 4: Economics: Elementary 1, Food and Fiber Systems Literacy: I: Understanding Food and Fiber Systems: A, K-1)
- Identify products that come from cattle and give examples of ones they use themselves. (Food and Fiber Systems Literacy: I:Understanding Food and Fiber Systems: C,K- 6. Explain how cattle provide some of people's basic needs such as calcium and identify those products and needs. (Food and Fiber Systems Literacy: I: Understanding Food and Fiber Systems: A, 2-3)
- 6. Describe the sequence of steps along the journey of milk from the farm to the consumer. (Food and Fiber Systems Literacy: I:Understanding Food and Fiber Systems: B, 2-3)
- Identify animal products that serve as ingredients for products that meet needs other than food, clothing and shelter (by-products). (Food and Fiber Systems Literacy: I: Understanding Food and Fiber Systems: C, 9-12)
- Illustrate how agriculture provides food, clothing, and shelter and classify agricultural products into these categories. (Food and Fiber Systems Literacy: II: History, Geography, and Culture: A, K-1)
- 9. Examine how **cattle** transform natural resources into consumer products. (Food and Fiber Systems Literacy: III: Science, Technology, and Environment: B, 4-5)
- 10. Identify the role of **cattle** in agriculture. (Food and Fiber Systems Literacy: III: Science, Technology, and Environment: B, 6-8)
- 11. Illustrate products that people and animals eat. (Food and Fiber Systems Literacy: V: Food, Nutrition, and Health: A, K-1)
- 12. Use measurements to compare milk data through bar and pie graphs (NYS Learning Standard 9: Mathematics: Elementary 5)

TERMS

- **Beef** meat that comes from the muscle of an adult cow; also used to describe **cattle** raised for meat
- **Bovine** scientific name for a family of animals that includes cows, oxen, and buffalo; females are called cows, males are called bulls
- **Breed** a group of organisms with common ancestors and specific characteristics; part of a species developed, maintained, and controlled by humans
- **By-product** a product that is made from what's left over in the process of making something else
- **Cattle** used to domesticated **bovines**, often used for meat and **dairy products**, such as cows, steers, bulls, and oxen
- Cud plant material after it has been processed in the rumen and comes back up for chewing
- Dairy cattle (cows) raised for their milk
- Dairy products products from cattle, such as milk, cream, butter, and cheese
- **Graze** a slow, day-long way of feeding on grass or in a pasture done by cows and similar animals
- **Homogenize** (homogenization) a process which reduces the size of the fat particles in milk and distributes them equally
- **Mammal** a warm-blooded animal that is covered in hair, generally gives birth to live young, and produces milk to feed them.
- **Microbe** a microorganism, present in the stomachs of ruminents (like cows), that helps to break down grass into nourishment for the animal
- **Pasteurize** (pasteurization) heating a product to a high temperature to kill certain microorganisms and prevent disease and spoilage
- Ruminant animal (including cattle, sheep, and goats) which has four stomachs
- Rumens the first and largest part of the stomach of ruminants, which collects food after it is swallowed
- Unique special, different, not like others, the only one of its kind

Integrated Pest Management is a specialized form of environmental management wherein scientific research and real world application work together to reduce pests such as insects, diseases or weeds.

- 1. Properly identify pests
- 2. Learn the pest/ host biology
- 3. Sample the environment for pests
- 4. Determine an action threshold
- 5. Choose the best tactic
- 6. Evaluate results

Standards Matrix for this Lesson:

							Stand	da	rds	:
Month	Unit	Math/Science/and Technology	English Language Arts	Social Studies	НЕАLTH	ARTS	Food & Fiber Literacy	CDOS	Other Languages	Interconnectedness
9	Miss Moo and You	3a:2 e1	3a:2 e1	4:17 e1			I A K-1			
		3:9 e5					I C K-1			
		3:9 e6					1 A 2-3			
		4:10 e1					I B 2-3			
							1 C 9-12			
							II A K-1			
							III B 4-5			
							III B 6-8			
							V A K-1			

Matrix Key:

NYS Learning Standards arranged by Standard: Category, Level

e = elementary i = intermediate

Categories:

1 Career Development

2 Universal Foundation Skills

3 Language for Information and Understanding 12 Interconnectedness: Common Themes

4 Language for Literary Response and Expression

- 5 Language for Social Interaction
- 6 Communication Skills
- 7 Analysis, Inquiry, and Design
- 8 Information Systems
- 9 Mathematics

- 10 Science
- 11 Technology
- 13 Interdisciplinary Problem Solving
- 14 History of the United States and NY
- 15 World History
- 16 Geography
- 17 Economics

ADDITIONAL RESOURCES

http://www.agclassroom.org/kids/stats/newyork.pdf http://www.crazyforcows.com/fow/fow6.shtml

SUPPLIES AND EQUIPMENT Overhead projector Graph paper Classroom art supplies

BACKGROUND FOR TEACHERS

Terminology

The term "**cattle**" is not a plural, but a mass noun. Thus, one may refer to "some **cattle**," but not "three **cattle**." The word "**cattle**" did not originate as a name for **bovine** animals. It derives from the Latin word for head, and thus originally meant "unit of livestock" or "one head." The word is closely related to "chattel," a unit of property, and to "capital," in the sense of property.

Young **cattle** are called "calves." A young female who has not had any calves yet is called a "heifer." An uncastrated male is called a "bull." The adjective applying to **cattle** is "**bovine**."

What is a **breed**?

The classic definition of a **breed** is usually stated as a variation of this one: Animals that, through selection and **breeding**, have come to resemble one another and pass those traits uniformly to their offspring.

Why do we have livestock at all? Don't they just eat the food that would be better utilized by being given directly to people?

Agricultural animals have always made a major contribution to the welfare of human societies by providing food, shelter, fuel, fertilizer and other products and services. They are a renewable resource, and utilize another renewable resource – plants - to produce these products and services. In addition, manure produced by animals helps improve soil fertility and thus aids the plants. In some developing countries the manure cannot be utilized as a fertilizer but is dried and burned as a fuel source. Also, cows eat plants that humans can't, and graze on land that is not suitable for growing crops for human consumption.

Food is by far the most important contribution of agricultural animals, although they rank well behind plants in total quantity of food supplied. Plants supply over 80 percent of the total calories consumed in the world. Animals are a more important source of protein than they are of calories, supplying one-third of the protein consumed in the world. **Cattle** raised for human consumption are called "**beef cattle**."

The sex of **cattle** is very important, from the time of their birth. Young cows are considered more valuable than bulls, which are used solely for **beef**. Cows of certain **breeds** that are kept for the milk they give are called "**dairy** cows." Holstein **cattle** have been selected primarily for milk production, and are the highest milk producing **cattle**. A **dairy** is a facility for the extraction and processing of animal milk.

Cattle Husbandry

Cattle are often raised in herds that are allowed to **graze** on the grasses of large tracts of land called ranches. Raising **cattle** in this manner allows the productive use of land that might be unsuitable for growing crops.

Routine practices involve ear tagging, dehorning, leading, medical operations, vaccinations, and hoof care, as well as training for agricultural shows.

The Cow

Dairy heifers are treated well by farmers, as they form the farmer's future herd of cows. Since a cow cannot produce milk until after calving (giving birth), most farmers will attempt to **breed** heifers as soon as they are fit, at about fifteen months of age. A cow's gestation period is about nine months. Most heifers give birth and become cows at about two years of age. A cow will produce large amounts of milk over its lifetime. The average for all milk cows in the US in 2005 was nearly 10 tons.

What Dairy Cows Eat

Every day, the average cow eats 20 pounds of hay, 20 pounds of corn silage, 10-20 pounds of corn, 6-12 pounds of supplement (fortified with protein, energy, vitamins & minerals). Oats, barley, or soybean may be incorporated as well. Oat hay or silage has a high phosphorous content especially needed by dry **dairy** cows (cows not producing milk at the moment). Barley can effectively meet some of the protein demand of the milking **dairy** cow, as well as provide significant amounts of energy needed for good milk production. Corn and alfalfa balance the nutritional demands of the **dairy** cow for energy, protein, and fiber. When energy and protein demands cannot be met by crops produced on the farm, feed such as corn grain and soybean meal is purchased.

Cattle are **ruminants**, meaning that they have a digestive system that allows them to utilize otherwise undigestible foods by repeatedly regurgitating and rechewing them as **cud**. **Cattle** have one stomach, with four compartments. The **rumen** being the largest. After the **cud** has been rechewed, it is then reswallowed and further digested by specialized microorganisms that live in the **rumen**. These **microbes** are primarily responsible for breaking down celluose and other carbohydrates. The human stomach cannot process grasses and grains the way a cow's can. The cow processes those materials into forms that are usable as food by us: **beef** and milk.

QUESTIONS FOR STUDENTS What do you know about **cows**? What products do we get from **cows**? What foods do you like to eat? Are all **cows** the same? What is special about you?

INTEREST APPROACH ACTIVITIES

WE ALL SCREAM FOR ICE CREAM!

Teacher Information:

This is a great way to get students interested in **dairy products** and start talking about where they come from. This recipe yields 1-2 servings.

Materials:

Large and small zippered plastic bags lce cubes or crushed ice Sugar Flavoring (optional) Spoons or cups Coarse salt (rock salt or kosher salt) Whole milk Vanilla Mittens or towel (optional)



- 1. Place in a large zippered plastic bag:
 - a. 2 cups salt
 - b. 8-10 large ice cubes or 2 cups of crushed ice
 - c. Place in a small (pint size) zippered plastic bag:
 - d. 2 cups whole milk
 - e. 1 tablespoon sugar
 - f. 2 teaspoons vanilla
 - g. Maple sugar or other flavoring (optional)
- 2. Seal the small bag and place (opening side up) inside the large bag, and seal.
- 3. Pass the bags around and have students gently knead, squeeze, and shake the bags until ice cream becomes firm (about 5 minutes).
- 4. If the students' hands get too cold, they can hold the bag using mittens or a towel
- 5. When the ice cream is ready, open the large bag carefully over a sink, bowl, or wastebasket.
- 6. Remove the small bag. Eat with a spoon from the bag or serve in cups.

(Refer to Worksheets #2 and #3 for reinforcement activities)

GOT ENOUGH DAIRY?

- 1. Why are **dairy** foods important in a healthy diet? Discuss as a class.
- 2. Are you getting enough?
 - a. A nutrition page is provided at the end of the unit.
 - b. Keep track of the **dairy products** you have every day in your journal, using a chart like the one below.
 - c. If you are getting three servings a day, congratulations!
 - d. If not:
 - i. Try to eat more of your favorite flavors of milk, cheeses, and yogurt
 - ii. As a class, try to think of other good sources of the same nutrients

(Refer to Worksheet #4 for reinforcement activities)

Week #	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Milk							
Cheese							
Yogurt							

Got Enough Dairy?



ALL BUTTERED UP

Teacher Information:

Where does butter come from? A few generations ago, a lot of people still made their own butter at home. This was a job children often helped with, and had a lot of fun doing!

Materials (per group):

1 cup whipping or heavy cream at room temperaturePlastic jar that seals securelyTwo or three marblesColander (strainer)BowlWooden spoonButter knifeCrackersCrackers



Questions for Students:

- 1. What are the marbles for?
- 2. How long do you think it will take to make butter? (5-10 minutes)
- 3. How can we tell if it's working? (Hint: listen carefully to the marble inside the jar)
- 4. How much butter do you think we will make?

Student Activity

- 1. Divide the class into small groups and supply each group with cream, jar, and marbles.
- 2. Add cream and marbles to the jar and fasten the lid securely.
- 3. Record predictions on how long it will take to make butter and starting times.
- 4. Pass the jar around the group. Each student should shake the jar several times and listen for change in sound.
- 5. Continue shaking the jar and passing from student to student.
- 6. Record times when you notice a difference in sound.
- 7. When students see a lump of butter surrounded by a thin liquid, butter is finished.
- 8. Place the colander over a bowl, and carefully empty the jar into it. The liquid that runs into the bowl is buttermilk; chill it to taste later on.
- 9. Pour a little cold water over the butter in the colander to rinse it off.
- 10. Gently press butter against colander with a wooden spoon to remove extra water and place in a small bowl.
- 11. Spread on crackers and taste.

(Refer to Worksheets #2 and #3 for reinforcement activities)

FROM FIELD TO JUG: THE STORY OF MILK

- 1. Ask students:
 - A. Where do we get milk from?
 - B. How does it get from the farm to us?
 - C. What happens along the way?
- 2. Use the cluster map on the following page as an overhead transparency to display while discussing milk's journey from the cow to the store with students.

(For related activities please refer to student worksheets #2 and #3)



HOW MISS MOO EATS

Materials:

Part I: Overhead projector Diagram of Miss Moo the **Dairy Cow Cow's** digestive system diagram Crayons, markers, pencils Large sheets of paper (or smaller sheets taped togather) Part II:Crackers Desk or table

Questions for Students:

How does a **cow** chew? How does a **cow** digest food? Why can **cows** eat grass? How big is a **cow's** stomach? How big is a human stomach? Can cows and humans eat the same things?

I. EATER'S DIGEST

Procedure:

- 1. Using an overhead projector, project the drawing provided for "What Do We Get from **Cows**?" onto a wall or bulletin board covered with paper. Try to make the image life-sized (about 5 feet tall).
- 2. Provide students with pencils, crayons, and markers, and have them trace the outline of the cow.
- Project an image of the digestive system of the cow for students to trace. (A sample image can be found at http://www.admani.com/AllianceBeef/images/Rumen%20Diagram.jpg or by doing an web image search for "rumen diagram")
- 4. Label the different parts of the digestive system.
 - A. Esophagus
 - B. Rumen (or all chambers of the stomach)
 - C. Intestine
- 5. Discuss and draw as a class the path that food takes as the cow digests it. How is the **cow's** digestive system different from a human's?
 - A. Four-chambered stomach vs. one-chambered stomach
 - B. A cow can eat grass because of the microbes in its stomach
 - C. Food returns as **cud** for further chewing in a **cow**; our food passes directly into the intestine

II. THE LAWS OF JAWS

Background:

A cow, like a human, chews by moving its lower jaw. There are some differences, however. A cow has no upper teeth, only bottom. The cow takes a mouthful of grass using her bottom teeth. Then, she uses her lower jaw to grind it back and forth between her bottom teeth and her hard top jaw, until she forms a ball of half ground-up feed.

Before sharing the background information about how cows chew, try this eye-opener activity.

Procedure:

- 1. Ask students to hold up one hand, pretend it is an animal's mouth, and demonstrate chewing.
 - A. Most students will use the thumb as the lower jaw and the four fingers as the upper jaw.
 - B. They will move both jaws up and down, or possibly just the upper jaw, as if operating a hand puppet.
- 2. Pass out a cracker to each student.
- 3. Have students kneel on the floor and gently rest their noses on the edges of their desks while they chew the cracker.
- 4. Pass out a second round of crackers.
- 5. This time, have students chew while resting their chins on their desks.
- 6. Ask which way is harder, which way is easier, and why.
 - A. See if the class can conclude that cows, like humans, chew by moving their lower jaw.



GRAPHING EXERCISES

A. Survey Projects

- 1. Favorite Ice Cream Flavors
 - a. Ask your classmates what their favorite ice cream flavors are.
 - b. Count how many people like each flavor.
 - c. Make a bar graph of the class's results and put it up in the hallway.
- 2. Lactose Intolerance
 - a. Discuss what lactose intolerance is.
 - b. Have students find out how many of their classmates are lactose intolerant and how many are not.
 - c. Instruct students to divide the number of those who are lactose intolerant by the total number of students they asked to get a percentage. Do the same for those who are not.
 - d. Have students research lactose intolerance.
 - e. Instruct them to make a pie chart of their results and include their definitions.
- B. What Is Milk Made Of?
 - 1. Ask students what they think milk is made of. Discuss the different components of milk.
 - 2. Discuss how much of each component goes into milk and create a pie graph using the percentages listed below.
 - a. 87% water
 - b. 5% lactose
 - c. 4% butter fat
 - d. 3% protein
 - e. 1% vitamins and minerals

C. How Much Milk Does It Take?

- 1. Ask students how much milk they think it takes to make each product listed below.
- 2. Share the information below with them
- 3. Have them create a bar graph representing the different amounts and comparing them with their original guesses.
- 4. Are there any surprises at the difference between their predictions and the actual figures?
 - a. 21 lbs whole milk = 1 lb butter
 - b. 6 lbs skim milk = 1 lb cottage cheese
 - c. 12 lbs whole milk = 1 lb ice cream
 - d. 10 lbs whole milk = 1 lb cheese



Adapted from Florida Agriculture in the Classroom

- I. Introduction: Dairy Cows
 - A. Introduces students to the what makes cows **unique**
 - B. Provides 5 questions to initiate student interest.
- II. What do you know about cows?
 - A. Introduces the terms cattle, bovines, dairy, animals, mammals, beef, and by-products.

- III. What do we get from cows?
 - A. A picture of a cow which students can fill with drawings or paste pictures of **dairy products** and **by-products**.
- IV. What does Miss Moo like to eat?
 - A. Pictures of common **cattle** feeds and human foods, used to introduce students to the idea that cows and humans eat very differently.
 - B. Introduces the terms **microb** and **rumen.**
- V. Cows versus Humans
 - A. Comparing a **cow's** stomach to a human's
- VI. Value of Cattle
 - A. Discusses the many beneficial things cows do for us.
 - B. Students are asked to think about things they do that are beneficial to others

TEACHING-LEARNING ACTIVITIES

- I. Introduction: **Dairy** Cows
 - A. This page can be read as a class or individually
 - B. The interest questions can be used to initiate a class discussion
- II. What do you know about cows?
 - A. This page can be read individually or as a class
 - B. Students should answer the questions on their own, use their answers to spark a class discussion.
 - C. Students can draw pictures of **dairy prod**ucts and **by-products**, or cut out magazine pictures of the above products and make a collage
- III. What do we get from cows?
 - A. Students can draw pictures of **dairy prod**ucts and **by-products** or cut out magazine pictures of the products and make a collage
- IV. What does Miss Moo like to eat?
 - A. This page can be completed individually
 - B. Students should put an X through the things they like to eat and circle the items that Miss Moo likes to eat
- V. Cows versus Humans
 - A. Students complete worksheet
 - B. A discussion on rumination and the cows digestive tract may follow
- VI. Value of Cattle
 - A. Read this page as a class
 - B. Ask students to complete the list
 - C. Review their answers as a class

VII.Are all Cows the Same?

- A. Provides pictures of the top five **breeds** of **cattle** used in the **dairy** industry:
 - i. Guernsey
 - ii. Brown Swiss
 - iii. Ayrshire
 - iv. Jersey
 - v. Holstein

VIII.Test Your Knowledge

- A. This page contains questions relating to the key concepts learned in the lesson.
- IX. Vocabulary
 - A. Provides definitions of all the highlighted terms in the lesson
- X. Lesson Supplements

TEACHING-LEARNING ACTIVITIES

- VII.Are all Cows the Same?
 - A. Look at this page as a class
 - B. (Optional activity) Using classroom resources, have students research the common characteristics of the top five **dairy breeds** listed.
- VIII.Test Your Knowledge
 - A. Students should answer the questions individually
 - B. This can serve as a review or as a quiz grade
- IX. Vocabulary

A. Provided for student reference

X. Lesson Supplements

Student Lesson: Miss Moo and You **Dairy** Cows

How much do you know about **dairy** cows? If you grew up on a **dairy** farm, you'd know a lot! If you grew up in a busy town or city, you may not know anything except that cows produce milk.

Cows are pretty special. Each one is **unique**. That means each one is different than the others. No two are alike. That sounds a lot like you! You are special and **unique**.

In this lesson we are going to talk about the many products we get from cows.

You have a lot to offer, too. You have talents, and interests that are **unique** to you. You even have special likes and dislikes that no one else shares.



Questions to think about: What do you know about cows? What products do we get from cows? What **dairy** foods do you like to eat? Are all cows the same? What is special about you? Student Lesson: Miss Moo and You What do you know about cows?

What is a cow?

What are **cattle**?

All cows and **cattle** are **bovines**. It is the scientific way to describe them. Have you heard of canines (dogs) and felines (cats)?

Cows are females (women); bulls are males (men). We use the word "cows" when we are talking about the **dairy** industry, because only female **cattle** can produce milk. **Cattle** are **mammals**. All female **mammals** produce milk to feed their young.

Dairy = Milk products

Beef = Meat products

Can you think of three foods we get from milk?

What is your favorite product we get from cows?





We all understand that everything should be used and not wasted. For instance, when the Plains Indians of North America hunted buffalo, they used every part of the animal. Nothing was wasted. The same should be true with **dairy** cows and **cattle**.

Products such as leather and piano keys are called **by-products**. This means using what's left over and not wasting it.

Another example of something we use the **by-products** from is wheat. It is grown as a grain for food. What is left is just the stem of the plant, which is straw. So, straw is a **by-product** of wheat.



Student Lesson: Miss Moo and You What does Miss Moo like to eat?

What things do you like to eat? What things does Miss Moo the cow like to eat?

Circle the things Miss Moo likes to eat. Put an X though the things you like to eat.



Cows eat grains and grasses, but they do not get their nutrition directly from these foods. Later, we will learn how **cattle** use **microbes** and their special stomachs (**rumens**).



- 3. How many compartments does the cow's stomach have? _____
- 4. How do the man's stomach and the cow's work differently?



name

Student Lesson: Miss Moo and You Value of **Cattle**

Cows seem to do a lot of standing around and chewing, but did you know cows do a lot of things that are helpful to us?

Cattle use land that farmers can't use. **Cattle** can **graze** on land that is too hilly or rocky to plow.

Cattle provide free fertilizer to farmers - their manure.

Cattle keep the farmer's fields growing by pressing grass seeds into the soil as they move around.



Cattle are fire fighters! As they **graze**, they keep grasses from getting tall and drying out. This helps to stop the spread of wildfires.

Cattle provide us with **dairy** and **meat** products, and their **by-products** provide us with a lot of medicines, household products and many, many other things!

(For instance, antifreeze for cars contains a product made from **beef** fat!)

What are some special things you do to help others?

1	 	 	
2		 	
- 3	 		

Student Lesson: Miss Moo and You Are all cows the same?

Guernsey

Brown Swiss

Ayrshire

Jersey

Holstein

<image><image><image><image>





http://encyclopedia.laborlawtalk.co Holstein_cows_large.jpg Student Lesson: Miss Moo and You Test your knowledge

What did you learn? Complete this review to find out.

1. **Unique** is a word that means something is special and different.

yes		no			
2. What do we call female and male cattle ?					
3. Mammals are anin	nals that produce	for their young.			
4. A by-product is an	other name for milk from a	COW.			
yes		no			
5. Calcium is something our bodies need to make strong bones.					
yes		no			
6. Cows have	_ more stomach chambers	than we do. (read carefully!)			
7. Cow stomachs diges	st food differently than we d	0.			
yes		no			
8. Holstein cows are bla Do any two cows, of a	ack and white. Guernsey co any breed , have the same	ows are brown and white. exact spots?			
yes		no			
9. Write a sentence that	t describes a special thing	about yourself			

name_

Student Lesson: Miss Moo and You Vocabulary

- **Beef** meat that comes from the muscle of an adult cow; also used to describe **cattle** raised for meat
- **Bovine** scientific name for a family of animals that includes cows, oxen, and buffalo; females are called cows, males are called bulls
- **Breed** a group of organisms with common ancestors and specific characteristics; part of a species developed, maintained, and controlled by humans
- **By-product** a product that is made from what's left over in the process of making something else
- Cattle used to domesticated **bovines**, often used for meat and **dairy products**, such as cows, steers, bulls, and oxen
- Cud plant material after it has been processed in the rumen and comes back up for chewing
- Dairy cattle (cows) raised for their milk

Dairy products - products from cattle, such as milk, cream, butter, and cheese

- Graze a slow, day-long way of feeding on grass or in a pasture done by cows and similar animals
- **Homogenize** (homogenization) a process which reduces the size of the fat particles in milk and distributes them equally
- **Mammal** a warm-blooded animal that is covered in hair, generally gives birth to live young, and produces milk to feed them.
- **Microbe** a microorganism, present in the stomachs of ruminents (like cows), that helps to break down grass into nourishment for the animal
- **Pasteurize** (pasteurization) heating a product to a high temperature to kill certain microorganisms and prevent disease and spoilage
- Ruminant animal (including cattle, sheep, and goats) which has four stomachs
- Rumens the first and largest part of the stomach of ruminants, which collects food after it is swallowed
- Unique special, different, not like others, the only one of its kind

And And And And And And

Integrated Pest Management is a specialized form of environmental management wherein scientific research and real world application work together to reduce pests such as insects, diseases or weeds.

- 1. Properly identify pests
- 2. Learn the pest/ host biology
- 3. Sample the environment for pests
- 4. Determine an action threshold
- 5. Choose the best tactic
- 6. Evaluate results

Teacher Information for Student Worksheets

Student Worksheet 1

How much do you know about dairy cows?

Some students don't recognize a cow if it's brown instead of black and white. This lesson will touch on some of the things that make cows interesting. An important focus is to use cows to discuss the idea of individuality.

Student Worksheet 2:

What do you know about cows?

Some basics are discussed on this page. Remind students that the word "cows" refers to the females only. Often, cows are the ones we see **grazing** in the fields, because not every farm has bulls or lets them **graze** with the females. Since cows are the milk producers, they represent the **dairy** industry. Perhaps you can remind students that cows are not pets but a product. They are cared for and raised well, to be happy and healthy, but **cattle** are raised as a food product, and what's left is efficiently processed into **by-products**. Teachers can choose how they discuss the production of **meat** and animal **by-products**.

Answers:

Fill-in: Cheese, Butter, Yogurt Favorites will vary

Student Worksheet 3

What do we get from cows?

Products and **by-products**. Students may choose to list or draw various products we obtain from cows. You may add the fact that leather comes from hides. A list of **by-products** is included at the back of this lesson. **By-products** comprise an amazingly long list of items we use every day. For example, it is estimated that 400 lbs of a (1000 lb) **beef** steer is processed as meat and 600 lbs is used as **by-products**. Discuss with students whether the products and **by-products** provide food, clothing, shelter, or additional services.

Worksheet 4

What do you like to eat?

Students should complete this task by using an X or O to designate what they would eat vs. what Miss Moo the cow would eat. Then, introduce the concept of the special cow stomach called the **Rumen**. Cows are **ruminants**, which means they have a big, four-chambered stomach. The first chamber is the large **rumen**. **Ruminants** store large quantities of grass or other plants in the **rumen**, where it softens. After the plant material is processed by **microbes** in the **rumen**, it is regurgitated for more chewing and called **cud** (rumination). The chewed **cud** next goes directly to the other chambers of the stomach (the reticulum, omasum, and abomasum, in that order). Additional digestion, with the aid of various essential microorganisms, and not directly from the grasses.

Student Worksheet 5

Cows vs. Humans

- 1. The cow's stomach is bigger, longer, has more parts, etc.
- 2. One
- 3. Four

4. Food goes into the man's stomach and then moves on into the intestines. Food in the cow's stomach gets stored and then chewed again later.

Cattle and other **ruminants** spend a lot of time chewing. They must eat a large volume of food due to their size. Students might consider the idea of regurgitating food to be re-chewed to be either cool or disgusting!

Ask them to consider the size of the cow's stomach and its compartments. The first one alone can be many times the size of a car's gas tank. The fourth of the stomach chambers (abomasum) is the most similar to the stomach of other **mammals**. Sheep, goats, deer and camels are other **ruminants**.

Student Worksheet 6

What do cows do to help humans?

This activity focuses on the value of helping. Remind students of ways they help others. It is part of their value system. Everyone reacts to kindness, and often the helper feels as good as the one who was helped. While **cattle** are not necessarily helpful on purpose, there is value in the part that they play in the ecosystem.

Student Worksheet 7

Are all cows the same?

This activity reminds students that cows are not all black and white, and shows the top five **breeds** of **cattle** used in the **dairy** industry. As an optional activity students can use classroom resources (computers, library books, etc) to research the characteristics for each of the five **dairy breeds**.

Student Worksheet 8

Test your knowledge A review for students to do as an assignment or quiz.

Answers:

- 1. Yes
- 2. Cows are female; bulls are male
- 3. Milk
- 4. No
- 5. Yes
- 6. Three
- 7. Yes
- 8. No
- 9. Answers will vary

<u>Student Worksheet 9</u> Vocabulary Provided for student reference

Lesson Supplements

Cattle By-products List

collagen injections pill capsule gelatin estrogen progesterone rennet pepsin thyroid replacement cortisone epinephrine heparin anti-coagulent sutures bone marrow bone meal cartilage insulin nitroglycerin chewing gum oleo sausage casings adhesives buttons cosmetics glue wallpaper paste chalk deodorants floor wax porcelain enamel crochet needles dice

industrial oils insecticides linoleum antifreeze paints paraffin perfumes pet foods protein shampoos putty shoe polish soaps solvents textiles tires water proofing agents paint brushes belts emery boards leather apparel wallets combs glycerine anti-aging cream crayons detergents fabric dye bone china cellophane tape fertilizer

Calcium makes bones and teeth healthy and strong.

First... how much do you need? Most people do not get enough!

1-3 years old	500 mg/day (means milligrams per day)
4-8 years old	800 mg/day
9-18 years old	1300 mg/day
19-50 years old	1000 mg/day
51 years old or more	1200 mg/day

Earing **dairy** foods is the easiest way to get calcium in our diets:

1 cup of 2% milk provides 300 mg of calcium

8 ounces of plain yogurt provides 275 mg of calcium

1 cup of cottage cheese provides 138 mg of calcium

Some people do not eat **dairy products** because they have an allergy to them, they don't like them, or they don't think they should use an animal product.

If you don't eat dairy foods, you must find other sources of calcium!

Cooked white, navy or pinto beans Almonds Cooked kale Cooked beet greens Cooked broccoli Cooked tomatoes Steamed scallops (seafood) Orange Boiled amaranth (a grain) Fortified rice or soy beverage Blackstrap molasses 1/2 cup provides 65 mg
1/4 cup provides 90 mg
1/2 cup provides 100 mg
1/2 cup provides 85 mg
1/2 cup provides 35 mg
1/2 cup provides 35 mg
7 scallops provide 105 mg
1 orange provides 55 mg
1/2 cup provides 150 mg
1 cup provides 300 mg
1 tablespoon provides 145 mg

Using a separate sheet of paper, pick one or more of these non-**dairy products** and add up the number of servings or cups you'd have to eat to get the minimum number of milligrams listed above for your age!

Do you think you are getting enough calcium?