

Ag Adventure Lesson Plan

Subject Area: CCW

Grade Level: 3

Learning Center: A Cow's Stomach

Objectives:

- ~Students will be able to describe the differences between a cow and human stomach.
- ~Students will be able to explain the role of bacteria in a cow's stomach and its implications for a cow's diet.

Standards:

Materials Needed:

- Fistulated Steer
- Microscope/Monitor
- Picture of a Cow's Stomach

Personnel Needed:

- 3 Volunteers

Lesson Plan

Instructor:

Students:

Part 1: Fistulated Steer

- Have students gather outside of the fistulated steer pen without touching the gate.
- Explain that a cow is a ruminant and what a ruminant is.
- Explain the design of a cow's stomach and how it is different from a human's.
- Show students the fistulated steer. Explain that you are reaching into the rumen and show students the contents. Explain what a fistulated animal is used for.
- Take students over to the microscope.

- Stand quietly without touching the pen and listen.
- Look at the rumen contents without touching.

Part 2: Microbes

- Ask students what they think is moving around. Call on two or three students.
- Explain that microbes are moving around on the screen.
- Tell students what microbes do for the cow.
- Explain why cows are so useful to humans.
- Ask if students have any questions.

- Walk quickly to the microscope area and do not lean on or touch anything on the table.
- Raise hands and answer.
- Raise hands to ask questions.

Assessments:

- How many stomachs does a cow have? 1
- How many compartments are in a cow's stomach? 4
- What is in a cow's stomach that allows them to eat forage? Bacteria

Sources:

- AIPL Kid's Corner. AIPL, n.d. Web. 11 Aug. 2012. <<http://www.aipl.arsusda.gov/kc/kcindex.html>>.
- Brummer, Joe. "Animal Utilization of Forage." SOCR320. Colorado State University, Fort Collins. Spring 2012. Lecture.
- "Ruminant." *Merriam-Webster Encyclopedia*. 2012. Merriam-Webster. Web. 11 Aug. 2012. <<http://www.merriam-webster.com/concise/ruminant>>.

A Cow's Stomach Script

Part 1: Fistulated Steer

Volunteer: Today we are going to talk about the stomach of a cow.

Volunteer: A cow is called a ruminant. A **ruminant** is an animal that chews cud. Cud is partially digested food that the cow brings back up to her mouth from her stomach and chews. Other ruminants are sheep, goats, giraffes and camels.

Volunteer: Humans cannot use the fiber in grass, hay or silage for energy. A cow can eat these because of the way their stomach is designed.

Volunteer: A cow has **one** stomach with **four** compartments. The four compartments are the rumen, the reticulum, the omasum and the abomasum.

Volunteer: *Point to the fistulated steer.* You can see that this cow has a hole in its side. This is called a fistulated steer. The hole allows researchers here at CSU to access the cow's rumen and study how the cow digests its food. Now I am going to reach into the cow's rumen and pull out some of the contents for you to see. *Pull out some of the rumen contents for students to see.*

Volunteer: This is the partially digested food from the cow's rumen. This is the food that the cow will later regurgitate to form the cud. The rumen of a cow can hold up to 50 gallons.

Volunteer: Fistulation does not hurt the cow. When the cow rumen is not being studied a plug is placed in the hole. It is important to keep the area clean and safe so that the cow stays healthy. Now let's move over to the microscope to take a closer look at what is happening in the rumen.

Part 2: Microbes

Move students to the table with microscope and TV.

Volunteer: What do you think those moving spots are? *Call on several students.* Those are actually microbes (bugs) that live in the cow's stomach. The microbes help the cow by breaking down the food that the cow eats.

These microbes allow the cow to eat foods that humans can't and use that energy to produce milk and meat that humans can eat.

Cow can also eat many byproducts that would otherwise go to waste (cottonseed, soybean meal, distiller's grain, etc.).

Volunteer: Are there any questions?

Fact Sheet A Cow's Stomach

A cow has one stomach with four compartments: the rumen, reticulum, omasum and abomasum.

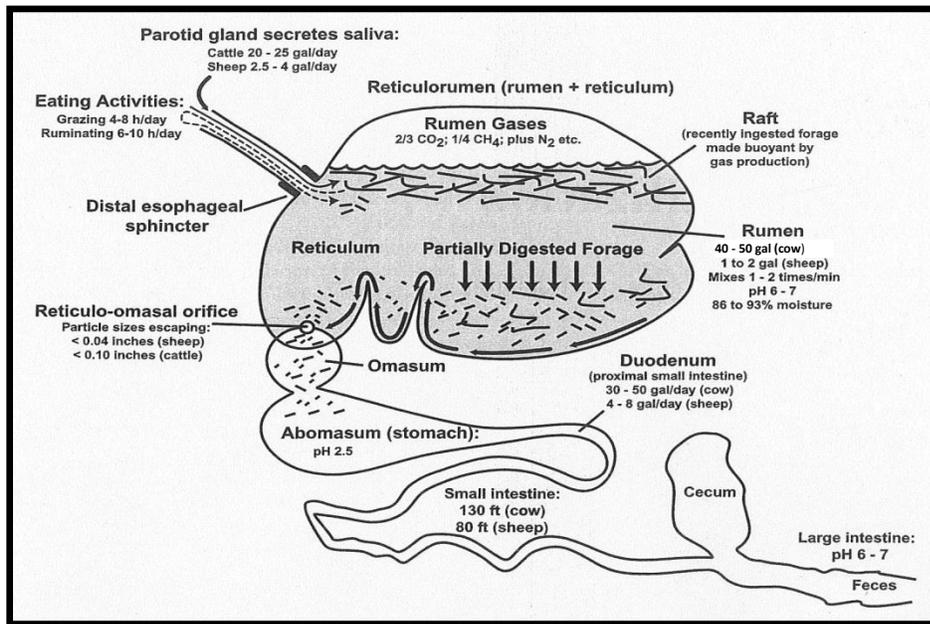
Rumen:

- Can hold up to 50 gallons of partially digested food.
- Contains billions of bacteria.
- Good bacteria help the cow digest food (break down cell walls).

Ruminant- a cud chewing animal that eats quickly to store food in the rumen (softens food) and then later regurgitate and chew cud to breakdown cellulose. When the cow swallows the cud it moves to a different compartment of the stomach.

Cow Facts:

- A cow has 32 teeth.
- 40,000-60,000 jaw movements per day.
- Chew cud to help with digestion by increasing the surface area.
- The abomasum (True Stomach) is similar to our stomach.



References:

AIPL Kid's Corner. AIPL, n.d. Web. 11 Aug. 2012. <<http://www.aipl.arsusda.gov/kc/kcindex.html>>.

Brummer, Joe. "Animal Utilization of Forage." SOCR320. Colorado State University, Fort Collins. Spring 2012. Lecture.

"Ruminant." *Merriam-Webster Encyclopedia*. 2012. Merriam-Webster. Web. 11 Aug. 2012. <<http://www.merriam-webster.com/concise/ruminant>>.

Ag Adventure Lesson Plan

Subject Area: CCW

Grade Level: 3

Learning Center: Nutrition

Objectives:

~Students will be able to compare the required quantity of daily feed inputs for a dairy cow to the volume of daily milk output.

~Students will be able to recognize the process of feed conversion into outputs.

Standards:

Mathematics 3.1 Visual displays are used to describe data.

Materials Needed:

- Milk Gallon Display
- Sample Dairy Ration
- Graphs
- Breed Chart

Personnel Needed:

- 2 Volunteers

Lesson Plan

Instructor:

Students:

Part 1: A Cow's Diet

- Tell students when dairy cows arrived in the U.S.
- Ask students: What do you think a cow drinks?
- Tell students a cow drinks 30-50 gallons of water each day.
- Define a ration.
- Ask students: What do you think a cow eats?
- Show students what a cow eats.

- Listen quietly.
- Raise hand to answer.
- Raise hand to answer.

Part 2: Milk Production

- Ask students: What do you think a dairy cow produces for us?
- Tell students that a dairy cow produces 8 gallons of milk daily on average but up to 20 gallons.
- Remind students that a dairy cow needs a high quality diet to produce milk.

- Raise hand to answer.
- Listen quietly.

Part 3: Breeds of Dairy Cows in the U.S.

- Ask student: What is the most common breed of dairy cow in the U.S.?
- Show students a picture of a Holstein, Brown Swiss and Jersey while explain the characteristics of each breed.

- Raise hand to answer.
- Listen quietly.

Assessments:

Ask Students:

- What types of food does a cow eat?
- What does a dairy cow produce?
- What is the most common breed of dairy cow in the U.S.?

Sources:

AIPL Kid's Corner. AIPL, n.d. Web. 11 Aug. 2012. <<http://www.aipl.arsusda.gov/kc/kcindex.html>>.

Dairy Cattle Information. Livestock Expo, 2009. Web. 16 Aug. 2012.

<<http://www.livestockexpo.org/docs/shoolTours/Dairy09.pdf>>.

The U.S. Dairy Industry A Vital Contributor To Economic Development:

Moo Milk: Download Additional Resources. Circle H Dairy, 2011. Web. 11 Aug. 2012.

<<http://www.moomilk.com/teachers-resources/71-download-additional-resources>>.

Dairy Trivia:

Moo Milk: Download Additional Resources. Circle H Dairy, 2011. Web. 11 Aug. 2012.

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Tyler, Howard D., and M. E. Ensminger. *Dairy Cattle Science*. 4th ed. Columbus: Pearson Prentice Hall, 2006. Print.

Nutrition Script

Part 1: A Cow's Diet

Volunteer: Today I am going to tell you about dairy cows and their diet.

Volunteer: Dairy cows first came to the United States in 1611.

Volunteer: What do you think a cow drinks? *Call on several students.* Your right, cows drink lots of water. Each day a cow drinks between 30-50 gallons of water. A human typically drinks less than ½ a gallon.

Volunteer: Dairy cows need a balanced diet like humans. The mix of different types of food a dairy cow eats is called a ration. There are special nutritionists for dairy cows who help farmers decide what should go into these rations.

- What types of food do you think a dairy cow might eat?

Accept answers from three or four students.

-Let's look at some of the food that goes into a dairy cow's diet. *Show students examples of the different types of feed.*

-We can look at this pie chart to see the parts of a cow's diet. A large part of a cow's diet is hay which is dried grass. They also eat things like corn silage (fermented corn), distiller grains left over from ethanol production and soybean meal. Cows also need vitamins and minerals in their diet.

Volunteers: It is important that a dairy cow eats a balanced diet so that she stays healthy and continues producing high quality milk.

Part 2: Milk Production

Volunteers: What do you think a dairy cow produces for us? *Call on 1-2 students.* That is right, a dairy cow produces milk.

A dairy cow produces about 8 gallons a day on average. A high producing dairy cow can produce more than 20 gallons a day.

Typically a dairy cow is milked 2 times a day.

California produces more milk than anywhere else in the U.S.

Volunteer: Remember a dairy cow uses the nutrients and energy she get from her food to produce milk. She cannot produce high quality milk without a healthy diet.

Part 3: Breeds of Dairy Cows in the U.S.

Volunteer: There are several breeds or types of dairy cows used in the U.S. *If 1 student asks what a breed is use the example of different breeds of dogs like a Labrador and a poodle.*

Does anyone know what breed is most commonly used for dairy cows? *Call on 1-2 students.*

The most common breed is a Holstein. *Show students a picture of a Holstein.* Ninety percent of the dairy cows in the U.S. are Holsteins. They produce more milk than any of the other breeds.

Volunteer: The second most common dairy breed is the Brown Swiss. *Show students a picture of a Brown Swiss.* This is one of the oldest breed of dairy cattle.

Volunteer: Jerseys are known for producing milk with highest amount of butter fat. *Show students a picture of a Jersey.*

Volunteer: Does anyone have any questions? *If there is additional time and no questions you can tell students about the other breeds and their origins.*

Fact Sheet Nutrition

How much milk does a dairy cow produce each day?

8 gallons on average

Up to 18-20 gallons depending on the breed and point in lactation cycle (checked with Dr. Peel)

-California has the highest milk production in the U.S. (21% of U.S. Production)

When were cows first introduced in the U.S.?

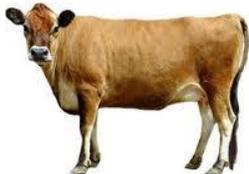
1611 (by the Jamestown settlers)

What is the most common breed of dairy cows in the U.S.?

Holstein (90% of all dairy cows in U.S.)

What other breeds are used in the U.S.?

Jersey, Brown Swiss, Guernsey, Ayrshire

Common Dairy Breeds			
	<p>Holstein Origin: Holland Color: Black and White or Red and White Average Weight: 1,500 lbs. Facts: One of the oldest dairy breeds Produce the greatest volume of milk of all dairy breeds Make up 90% of dairy cows in the U.S.</p>	 <p style="text-align: center;">Guernsey</p>	<p>Guernsey Origin: Channel Islands (between England and France) Color: Tan and White Average Weight: 1,100 lbs. Fact: Produce milk with a yellowish tint, high in fat and protein (beta-carotene provides yellow tint)</p>
	<p>Jersey Origin: Channel Islands Color: Vary from light gray to dark fawn and nearly black Average Weight: 950 lbs. Facts: Produce highest butterfat content</p>		<p>Ayrshire Origin: Scotland Color: Reddish-brown and White Average Weight: 1,200 lbs. Facts: Produce average amount of milk</p>
 <p style="text-align: center;">BROWN SWISS</p>	<p>Brown Swiss Origin: Switzerland Color: Solid Dark Brown or Gray Average Weight: 1,400 lbs. Facts: Oldest Breed of Dairy Cattle Second most common breed of dairy cattle</p>		

Fact Sheet Nutrition

1 gallon of milk= 8.59 pounds

Cows can produce milk for 305 before they need to stop to have their next baby.

How much does the average dairy cow weigh?

Holstein: 1,300- 1,500 pounds

At Birth: 80-110 pounds

Jersey: 900-1100 pounds

At Birth: 60 pounds

How much does the average dairy cow eat (dry matter- hay, grain, grass) each day?

80 pounds

How much water does the average dairy cow drink each day?

30-50 gallons (a bathtub)

-A milk cow chews her cud 50 times per minute and spending 10 hours a day chewing to help with digestion.

-A cow must have a calf to produce milk.

-Commercial cows are typically milked for about 3-4 years (Holsteins are sometimes milked up to six years).

What do dairy cows eat?

Typically a dairy cow eats about 20 pound of grain (ground corn, grain sorghum, oats and soybean meal) and up to 75 pounds of forage (alfalfa hay or silage-whole corn plants).

Dairy Products: Fluid Milk, Butter, Casein (milk protein used for coffee whitener, whipped toppings and baked goods), Cheese, Condensed/Evaporated Milk, Dired Milk, Ice Cream, Cultured Milk Products (Yogurt, Cultured Buttermilk, Sour Cream)

Cow Definitions

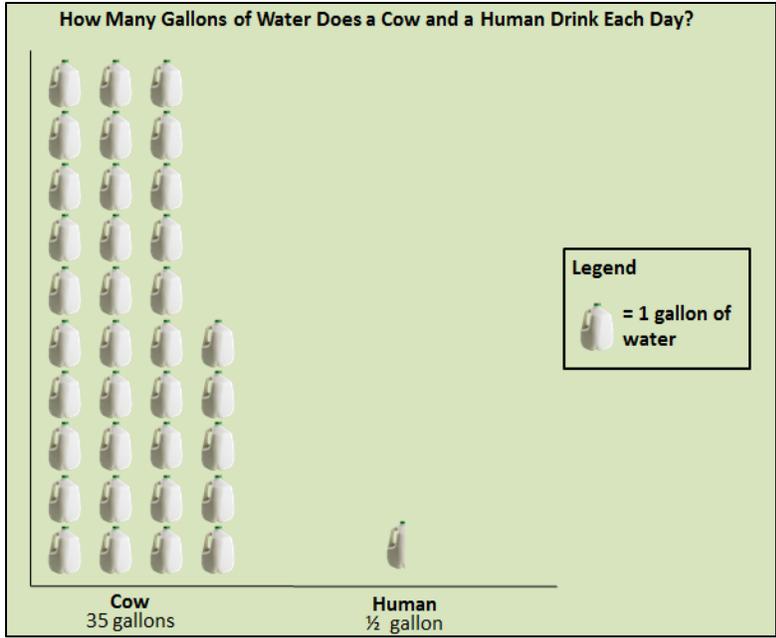
Cud- regurgitated, partially digested food

Heifer- young female cow

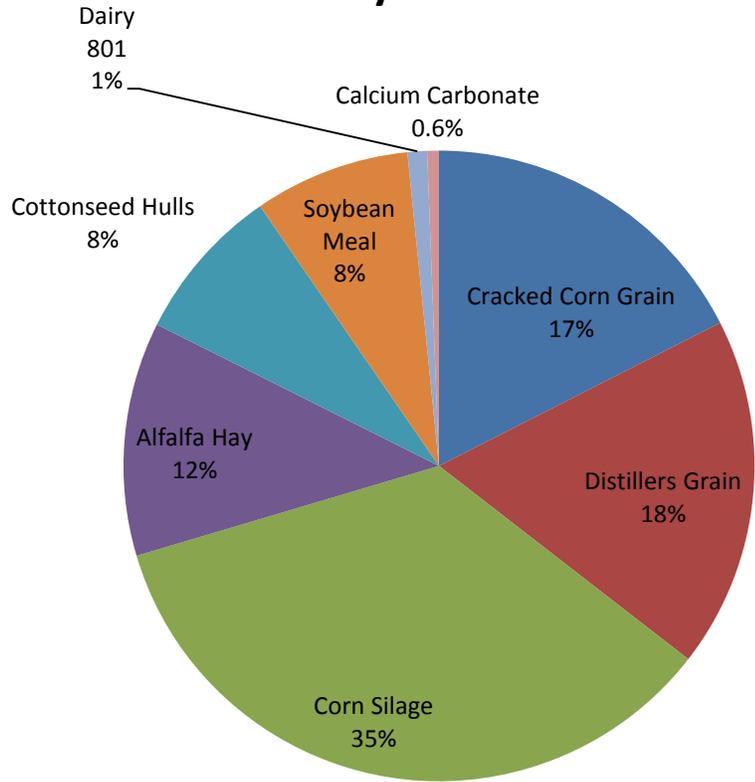
Bull- a male that has not been castrated

Steer- castrated male being raised for beef

Fact Sheet Nutrition



What Does a Dairy Cow Eat? A Dairy Cow Ration



Fact Sheet

Nutrition

References:

AIPL Kid's Corner. AIPL, n.d. Web. 11 Aug. 2012. <<http://www.aipl.arsusda.gov/kc/kcindex.html>>.

Dairy Cattle Information. Livestock Expo, 2009. Web. 16 Aug. 2012.
<<http://www.livestockexpo.org/docs/shoolTours/Dairy09.pdf>>.

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<<http://www.moomilk.com/teachers-resources/71-download-additional-resources>>.

Dairy Trivia

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Ag Adventure Lesson Plan

Subject Area: CCW

Grade Level: 3

Learning Center: Live Animal

Objectives:

- ~Students will be able to describe the role of the cattle industry in Colorado.
- ~Students will be able to estimate difference in weight of a cow and a calf.
- ~Students will be able to identify differences between various breeds and their purposes.

Standards:

Mathematics 4.3 Time and attributes of objects can be measured with appropriate tools.

Materials Needed:

- Live Cow and Calf
- Poster with Common Breeds

Personnel Needed:

- 2 Volunteers

Lesson Plan

Instructor:

Students:

Part 1: The Cattle Industry in Colorado

- Ask students: What do you see in this pen?
- Ask students: What do you call a baby cow?
- Tell students cattle statistics in the U.S.

- Raise hand to answer or call out.
- Raise hand to answer or call out.
- Listen quietly.

Part 2: Beef vs. Dairy

- Ask students: What do cows produce?
- Ask students: Is this a beef or dairy cow?
- Ask students: Does anyone know what breed this cow is?
- Tell students about the breed.
- Ask students: How much do you think this cow/calf weighs?

- Raise hand to answer.
- Raise hand to answer.
- Raise hand to answer.
- Listen quietly.
- Raise hand to answer.

Part 3: Ear Tags and Brands

- Ask students: Does anyone know what the mark on the side of the cow is called?
- Explain the purpose of brands.
- Tell students the importance of ear tags.

- Raise hand to answer.
- Listen quietly.

Assessments:

Ask Students:

- What kind of cow is this? Beef Cow
- What do you call a baby cow? Calf
- How do we know who a cow belongs to? Brand

Sources:

- Colorado Cattle. Colorado Beef Council, n.d. Web. 17 Aug. 2012. <<http://www.cobeef.com/coloradocattle.aspx>>.
- Michigan State University. "Beef Cattle." 15 Apr. 2002. PDF file.
- Rath, Sara. *The Complete Cow*. New York: Crestline, 2011. Print.
- Tyler, Howard D., and M. E. Ensminger. *Dairy Cattle Science*. 4th ed. Columbus: Pearson Prentice Hall, 2006. Print.
- USDA- Cattle. USDA/National Agricultural Statistics Service/Agricultural Statistics Board, 20 July 2012. Web. 17 Aug. 2012. <<http://usda01.library.cornell.edu/usda/current/Catt/Catt-07-20-2012.pdf>>.
- Virginia Tech. "Beef Cattle Breeds." 24 Aug. 2005. PDF file.

Live Animal Script

Please be careful when answering student's questions any of these students are seeing a live cow for the first time. If they ask how we get the meat from a cow **avoid using words such as **kill or slaughter**. One option is to say that we send the animal to a meat processing center.*

**If you do not know the approximate weight of the cow and the calf, please ask someone who does and round to the nearest hundred. You can also approximate using 300-500 lbs. for the calf depending on the age and 1200-1500 lbs. for the cow depending on the breed.*

Part 1: The Cattle Industry in Colorado

Volunteer: What do you see standing in this pen? *Call on several students or let them call out the answer.* That is right; it is a cow and her baby.

Does anyone know what you call a baby cow? *Call on one or two students.* That is right; we call the baby a calf. This calf is ___ months old. *The calf is probably 6-8 months old.*

There are almost 40 million cows in the United States of which about 9 million are dairy cows. There are 2.6 million cows in Colorado. Colorado is ranked 10th in the United States for the most cows. If you count all of the cattle in the United States there are almost 98 million animals. *If teachers or parents ask you can tell them that the difference in the statistics is that a cow is a female that has had a calf vs. all cattle (steers, bulls, cows, heifers).*

Part 2: Beef vs. Dairy

Volunteer: What do cows produce for us? *Call of several students until you hear both milk (dairy products) and beef (meat).*

That is right; cows produce dairy products like milk and beef. Is this a beef cow or a dairy cow? *Call on one or two students.* This is a beef cow.

Volunteer: There are many types of beef cows; the different types are called breeds. Does anyone know what breed this cow is? *Call on one or two students. Check the fact sheet for help identifying the breed beforehand and for information on the breed.* This is a _____. *Share the facts listed on the fact sheet about the breed including where they are from, their color and any facts (not weight).*

Volunteer: How much do you think this calf weighs? *Call on several students. Help students if they are guessing too high by giving them two or three options to choose from. For example, do you think it weighs 300 lbs. or 2000 lbs.?*

That is right; this calf weighs about _____ pounds. Now how much do you think the cow weighs? *Again call on several students and offer help if necessary.* That's right, the cow weighs _____ pounds. The cow weighs about _____ times more than her calf.

Part 3: Ear Tags and Brands

Volunteer: Does anyone know what the mark on the side of the cow is called? *Allow one or two students to answer.* It is called a brand. This tells us that she belongs to CSU. A brand is like a last name for the cow.

Volunteer: The tag that you see in her ear has numbers on it. This number is like the cows first name. Ranchers keep detailed records about each individual cow so they can look up information about the cow. For example if we looked up this cow's number we could find out if she has had other babies, if they were boys or girls and how much they weighed.

Volunteer: Do you have any questions about beef cows?

Fact Sheet **Live Animal**

Cattle in Colorado

- There are 2.6 million cows in Colorado
- Colorado ranks 10th in total number of cows in the U.S.

Cattle in the United States

Total Number of Cattle- 97,800,000 head (July 2012)

Total Number of Cows (that have calved)- 39,700,000 head

Total Number of Beef Cows (that have calved)- 30,500,000 head

Total Number of Dairy Cows (that have calved)- 9,200,000 head

Why do we need to brand cattle and use ear tags?

- Ear tags are necessary to help farmers and ranchers keep records on individual cows. These records can be used to make decision on breeding/calving, culling (selling or removing animals from the herd), feeding or medical treatments. Identification is very important for registering with breed associations.
- Branding is necessary to prove ownership of animals. A brand can be used to reclaim stolen cattle. State brand board keeps track of brands and their owners.

Types of Branding

Hot Iron Branding- This is the traditional branding method in the west. The iron burns the hide enough to scab but not enough to leave deep scar tissue.

Freeze Branding- uses a super chilled copper branding iron, cooled with dry ice or liquid nitrogen, which is placed on the hide for 20 seconds after clipping. This depigments the hair follicles. The hair is permanently white. If done correctly the hide is not damaged and it is painless for the animal. It can be used on white cattle if the iron is left on longer to permanently remove the hair.

Ear Tags

Ear Tags are used for identification of cattle. They can be made of steel, aluminum, nylon or plastic. The tags are easy to attach. Plastic and nylon tags tend to remain in the ear longer than metals ones.

Common Breeds	
	<p style="text-align: center;">Angus</p> <p>Origin: Scotland Color: Black Facts: -The angus breed registry is the largest beef breed registry in the world. -Angus cattle are born without horns (polled)</p>

Fact Sheet Live Animal

	<p>-Originally breed exclusively for their beef Cow Weight: 1200-1400 lbs. Birth Weight: 60-80 lbs.</p>
	<p style="text-align: center;">Brahma</p> <p>Origin: India Color: Light Gray or Red/Black Facts: -large hump/crest -droopy ears Cow Weight: 1400-1600 lbs. Birth Weight:</p>
	<p style="text-align: center;">Brangus</p> <p>Origin: Color: Black (must be polled) Facts: -Cross between Brahman and Angus -Must be 3/8 Brahman and 5/8 Angus -Popular with many of the larger cattle producers in the U.S. Cow Weight: Birth Weight:</p>
	<p style="text-align: center;">Charolais</p> <p>Origin: France Color: White Facts: -large -white pigmented skin -grow quickly -make good mothers Cow Weight: 1300-1500 lbs. Birth Weight:</p>
	<p style="text-align: center;">Texas Longhorn</p> <p>Origin: United States/Spain Color: Varied Facts: -trademark widespread horns -grow slowly Cow Weight: 900-1100 lbs. Birth Weight:</p>
	<p style="text-align: center;">Hereford</p> <p>Origin: England Color: Red with White Facts: -can be polled (born without horns) or horned Cow Weight: 1200-1500 lbs. Birth Weight:</p>

Fact Sheet Live Animal



Simmental

Origin: Switzerland
 Color: Light to Dark Red with White
 Facts:
 Cow Weight: 1300-1600 lbs.
 Birth Weight:



Galloway/Belted Galloway

Origin: Scotland
 Color: Black
 Facts:
 -The white belt of a Belted Galloway is a dominant genetic trait
 Cow Weight: 1000-1300 lbs.
 Birth Weight: 75-80 lbs.

Cow Definitions

Cud- regurgitated, partially digested food

Heifer- young female cow

Bull- a male that has not been castrated

Steer- castrated male being raised for beef

References:

Colorado Cattle. Colorado Beef Council, n.d. Web. 17 Aug. 2012.
 <<http://www.cobeeff.com/coloradocattle.aspx>>.

Michigan State University. "Beef Cattle." 15 Apr. 2002. PDF file.

Rath, Sara. *The Complete Cow*. New York: Crestline, 2011. Print.

Tyler, Howard D., and M. E. Ensminger. *Dairy Cattle Science*. 4th ed. Columbus: Pearson Prentice Hall, 2006. Print.

USDA- Cattle. USDA/National Agricultural Statistics Service/Agricultural Statistics Board, 20 July 2012.
 Web. 17 Aug. 2012. <<http://usda01.library.cornell.edu/usda/current/Catt/Catt-07-20-2012.pdf>>.

Virginia Tech. "Beef Cattle Breeds." 24 Aug. 2005. PDF file.