Discovering Beef 1-3

Suggested Grade Level: 3-5

Time: 3 lessons, 15-30 minutes per lesson

Subject: Science, Biology, Earth and Human Activity, English Language Arts, Informational Reading, Speaking and Listening, Agriculture, Beef, Beef Production Cycle

Overview: This lesson focuses on the beef production cycle, helping students understand how cattle progress through various stages before being converted into food and useful products for people. Students will first learn how cattle's unique digestive system allows them to convert grass and other plants into high-quality protein for humans. Then, they will explore the stages of the beef production cycle—cow/calf, weaning, stockers, feedyards, and processing—through a class discussion and diagram. Finally, students will discover how beef byproducts are used in everyday items and consider the wide range of careers connected to the beef industry.

Objectives:

1. Describe the critical role that natural resources play in beef production.
2. Explain the differences between each stage of the beef life cycle.
3. List beef animal products that people use regularly.

Background Information:

Cattle are ruminant herbivores, meaning they can regurgitate food and digest it in a way that people and other animals cannot. This is an important function because it allows cattle and other ruminants to graze on grass and other plant material, converting forages into an edible meat source for humans. Beef is a high-quality protein and nutrient source for humans. In the food web, herbivores get nutrition from producers or plants, which are dependent on soil, sunlight, and water. Cattle's digestive system, including their teeth and four stomach compartments, allows the animals to break down and obtain nutrients from high-fiber food sources that would be unavailable for humans to utilize directly. This would include grass or stalks, stems, and leaves from mature crop plants left in the field after harvest. This forage is called residue.

The beef production cycle is divided into stages: cow/calf, weaning, livestock auction markets, stockers, feedyards, and processing. During the cow/calf period, the producer focuses on producing calves and improving their genetic breeding program. Choosing to calve in either the spring or the fall, the producer aims to have most of the calf crop born within a short period of the year. This helps ensure a dependable amount of weight for

sale to the buyer. The producer takes the necessary steps to protect his herd and the calves that are born; this may include daily checks and veterinarian visits when needed. After calves are weaned at around six to eight months old, producers sell them to livestock auction markets or stockers. Stockers are beef producers who focus on adding weight to the cattle, typically by allowing them to graze on pastures and other forages. They keep the calves for several months as they grow, and because stockers can send calves to feedyards year-round, they help maintain a steady supply for the feedyards. Feedyards are the next step in the beef life cycle. Here, the animals spend four to six months fed a primarily grain diet consisting of corn, soybean meal, and other grains high in proteins and carbohydrates. However, many cattle never go to feedyards and are finished with a grass and forage diet. The beef remains rich in protein and contains essential nutrients, including zinc and iron. Finally, the beef is harvested at a processing plant and sold at restaurants and grocery stores. But cattle provide more than just meat—by-products from beef are used in many everyday items. These include items such as glue, makeup, and even wallpaper. These by-products are essential to our daily lives and often go unnoticed. Many different jobs and careers are involved in the beef industry from start to finish. These careers are diverse and suit a wide range of interests, skills, and backgrounds (Kansas Foundation). As a result, people with a wide range of talents can find a place in the industry. Some examples of these careers include nutritionist, veterinarian, range management specialist, feed production manager, feedlot manager, meat scientist, geneticist, truck driver, packaging manufacturer, food safety technician, meat quality grader, chef, restaurant worker, and many more.

Kansas Connections:

The beef cattle sector has long been—and continues to be—the largest and most significant part of the agriculture industry in Kansas. This vital industry plays a central role in the state's economy, supporting thousands of jobs across various stages of production, from farming and ranching to processing and distribution. In 2023 alone, cattle in Kansas produced over 4 billion pounds of milk, highlighting the scale and importance of the livestock industry in the state (Kansas Department). That’s big business! The impact of the beef industry doesn’t stop at the farm. Meatpacking and the manufacturing of prepared meat products make up the largest segment of the food processing industry in Kansas. These industries make a significant contribution to the state’s economy by generating jobs and driving food production. Companies involved in producing, processing, distributing, and selling meat products employ more than 532,000 people nationwide. On a national level, the influence of the Kansas beef industry is also significant. In 2021, the U.S. meat industry produced an impressive 27.95 billion pounds of beef, a portion of which came from Kansas (Meat). According to the United States Department of Agriculture, Kansas ranked third in the nation for the number of beef cattle, with approximately 6.250 million head of cattle located on ranches and in feedyards across the state as of 2022. Kansas also ranked third

nationally in 2022 in red meat production, producing over 6 billion pounds that year alone (National).

Materials:

Lesson 1: Beef Animal Life Cycle

- Beef Life Cycle Cutouts (provided)
- Story for instructor to read to class (provided)
- Beyond the Beef Barn: Kansas Kids Connection Magazine
- Beef Life Cycle Cards

Lesson 2: Animal Care Support Web

- Spool of Yarn
- Stuffed Cow Toy
- Photos of resources pasted on colored paper:
  -Food (hay, corn, etc.) on green paper
  -Water (tank, creek, river, etc.) on blue paper
  -Shelter (barn, lean-to, windbreak, etc.) on brown paper
  -Health Care (boluses, syringes, veterinarian, stethoscope, etc.) on purple paper
  -Protection from harm, including accidents or predators (Enclosed pens with high and dense fences; dog, Mule, barns or corrals, barbed wire fences, smooth wire fences) on yellow paper
- Photo of Web

Lesson 3: Beef for All - There's a Cow in My House!

- Beef for All - There's a Cow in My House Student Worksheet

Lesson 1: *Beef It Up! Beef Animal Life Cycle*

Instructional Format:

1. Review Background Information.
2. Conduct engagement exercise.
3. Lead a class discussion.
4. Optional: conduct assessment exercise.

Engagement: Display a photocopy of beef cattle grazing in a pasture in your classroom. Give students time to view it and discuss.

Procedures:

Discussion

1. Before teaching the lesson, prepare by researching the different stages of the beef life cycle. The cards should have a short label describing each stage.
2. Read through the story with the class while students use the cards to piece together the timeline using clues in the story.

STORY: When you ride down the road or highway and see cattle grazing in a pasture, you are probably witnessing a family farm or ranch in action. Most beef calves are born

and raised on family-owned farms and ranches. Farmers and ranchers who own beef cattle are called beef producers. The family is involved in caring for their cattle, land, fences, and buildings on a daily basis. Their life revolves around caring for their animals. A pregnant cow carries her calf for 9 months. Farmers and ranchers give the cows extra care when they are about to give birth (calve). If the cow has trouble giving birth, the owner and sometimes the veterinarian will help. When a calf is born, it weighs 50 to 100 pounds. *(Note: Ask students how much they weigh right now and compare that weight to the birth weight of a calf.)* While calves can be born year-round, most farmers and ranchers will try to avoid having calves born in the coldest part of the winter because of the possibility of bad weather, such as a blizzard. After the calf is born, the beef producer ensures that the calf stands and gets milk (nurses) from the cow. The first milk that a cow produces protects the calf from getting sick until its immune system can develop; this milk contains colostrum. When calves are young, they mainly get their nutrition from milk. Calves will begin to nibble on grass, but it will be a while before they can eat all the foods adult cattle enjoy. Beef calves stay with their mothers until they no longer require milk. At this point, the calves weigh between 450 and 700 pounds and are between six and 10 months old. Beef producers ensure plenty of fresh, clean water for the cattle to drink and enough healthy plants in the pasture to eat at all times. If there are not enough plants in the pasture for cattle to eat, the farmer or rancher brings them extra food, such as hay bales -- the grass cut, dried, and bundled up (baled) in the summer and stored. When the grass is not growing in winter, farmers feed their cattle hay. Farmers and ranchers also provide cattle with salt blocks and minerals to keep them healthy, much like the vitamins and minerals many children take. Just as important as caring for their animals, farmers and ranchers care for the environment. This is so important to them because it is the same environment in which they raise their children, who, one day, will take over the farm or ranch. When the cattle are 600 to 800 pounds, most will be sold at an auction market. However, farmers may keep the best females to produce more calves. At the auction market, buyers bid against each other until one buyer is willing to pay more than the others. The best cattle bring the most money, so a beef producer must strive to raise the healthiest and highest-quality cattle. After the auction market, most animals are shipped to a feedlot by truck. Upon arrival, cattle are carefully monitored and assigned a unique number to facilitate their management. The people who work at the feedlot keep excellent records of all the animals they care for. A veterinarian closely monitors the cattle and administers medicine if they become sick. Feedlot managers place cattle in pens, where they are fed special diets consisting primarily of corn and corn products, supplemented with hay, vitamins, and minerals. At approximately 18 to 22 months, or when the animal weighs 1,200 to 1,400 pounds, it is considered finished and can be sent to market. Some of the cattle may be raised for grass-fed beef, meaning they will continue to eat grass until they are fully grown and ready for market. Cattle are trucked to a processing plant and processed into meat. Meat Inspectors verify that safety practices are being upheld and the beef produced is safe to eat.

3. After you have read the story, check that the students put the cards in the correct order.
4. Discuss with students each step and the importance of that step in the life cycle.
5. Use the discussion questions below to guide the discussion.
    - What part of the life cycle is the most important? Least important?
    - Where in the life cycle do beef cattle vary quite differently from a pet's life cycle? Where is it similar?
    - What are the producer's roles in each stage of the beef life cycle?
    - How does each of the stages impact the others?
    - How do beef animals help humans?
    - How do humans help beef animals?

Lesson 2: Beef It Up! Animal Care Support Web

Instructional Format:

1. Review background information.
2. Conduct engagement exercise.
3. Complete the activity.
4. Lead a class discussion.
5. Optional: conduct assessment exercise.

Engagement: Have students brainstorm the five resources that cattle need. Write them on the whiteboard: Food, Water, Shelter, Health Care, and Protection From Harm.

Procedures:

Activity

1. Before the activity, create resource necklaces using photos, colored paper, and yarn. On one side, write the resources (food, water, shelter, health care, and protection from harm). On the other side, paste a photo of the resources. You could incorporate this step into the activity by assigning students a resource and having them conduct their own online research. They should print a picture of their resource.
2. Give each student a card with two holes punched in the top and thread a two-foot length of yarn through the holes, tying them so they create a "necklace."
3. Students will form a circle with necklaces in alternating colors. There shouldn't be two or more students with cards of the same color standing next to each other.
4. Have all the students pass the spool of yarn between each other. When they receive the yarn, they hold onto their piece and don't let go to preserve the "Web," then pass the yarn ball to another student across the circle who holds it. After 3-4 students have hold of the yarn, set the stuffed cow toy down on the web. The toy should fall through the cracks. Discuss with students why cattle need more than one resource to support their care and survival.

5. Pass the yarn between several more students and try again with the stuffed cow toy. It should still fall to the ground. Repeat with the other resources until each student is holding onto the yarn, forming a tight web of yarn between the circle of students. Place the stuffed toy in the center, ensuring it stays in the air and is supported. Discuss with students the importance of having all the resources working together to “support” the beef animal.

Discussion

1. Lead a class discussion guided by the discussion questions below.

- What happens if several animal care categories or roles are left out (e.g., drought or shortage of water, shortage of feed or grass, or no protection from harm)? How does the beef animal survive?
- Do you need to have each type of resource supporting the cow multiple times to ensure she is well cared for and protected?
- What can be done to address the lack of care and restore balance? (Take several students out of the circle, dropping their part of the yarn web to simulate a lack of care.) How does this affect everyone else? How can they provide the needed support for the cow?
- How do these basic needs of cattle compare with those of a pet or companion animal? How do the same types of resources meet your pets' needs?
- How do these basic needs of cattle compare with those of your friends and family? How are your basic needs met?

Lesson 3: Beef for All - There’s a Cow in My House!

Instructional Format:

1. Review background information.
2. Conduct engagement exercise.
3. Lead a class discussion.
4. Optional: conduct assessment exercise.

Engagement:

Read aloud from one of these short stories.

- Awesome Agriculture Beef from A to Z, Susan Anderson and Joanne Buggy
- The Cow in Patrick O’Shannahan’s Kitchen, by Diana Prichard.
- Life on a Cattle Farm by Judy Wolfman

Procedures:

Discussion

1. After reading, pass out the Beef for All There’s a Cow in My House student worksheet to each student.
2. Instruct your students to circle the beef products or beef byproducts on the student worksheet.

3. Discuss with students the importance of beef and beef by-products in everyday life. Explain that we use more than just beef and milk daily. Use the discussion questions below as a guide.
- What are some products that we don't typically think of as being from a beef animal? What are some common ones?
- What would happen if we didn't have access to these byproducts?

Student Worksheet Answers:
Football, leather gloves, hamburger, blush (makeup), paint, paintbrush, crayons

Vocabulary
- **Forage:** leaves, stems, and stalks that are part of plants used for animal feed, which is called residue.
- **Ruminant:** an animal that has four compartments forming their stomach.
- **Weaned:** to detach from a source of dependence on milk or to remove from the mother so they may no longer obtain milk by nursing the cow.
- **Feedyard/Feedlot**: A place where cattle are fed a high-energy grain diet to reach market weight.
- **Stocker**: A producer who raises weaned calves on forage and pasture to add weight before they enter a feedyard.

Kansas Curricular Standards:
Next Generation Science Standards
3rd Grade
Biological Evolution: Unity and Diversity
3-LS4-3. Construct an argument with evidence that in a particular habitat, some organisms can survive well, some survive less well, and some cannot survive at all.
4th Grade
From Molecules to Organisms: Structures and Processes
4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
5th Grade
Earth and Human Activity
5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Language Arts
3rd Grade
Reading: Informational
Key Ideas and Details
RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.

RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
Integration of Knowledge and Ideas
RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why and how key events occur).
Speaking and Listening
Comprehension and Collaboration
SL.3.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse on third grade topics and texts, building on others' ideas and expressing their own clearly.
SL.3.2 Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively and orally.

4th Grade
Reading: Informational
Key Ideas and Details
RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
RI.4.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.
RI.4.3 Explain events, procedures, ideas or concepts in a historical, scientific or technical text, including what happened and why, based on specific information in the text.
Integration of Knowledge and Ideas
RI.4.7 Interpret information presented visually, orally or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
Speaking and Listening
Comprehension and Collaboration
SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners on fourth grade topics and texts, building on others' ideas and expressing their own clearly.
SL.4.2 Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively and orally.

5th Grade
Reading: Informational
Key Ideas and Details
RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
RI.5.2 Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas or concepts in a historical, scientific or technical text based on specific information in the text.
Speaking and Listening
Comprehension and Collaboration

SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners on fifth grade topics and texts, building on others' ideas and expressing their own clearly.
SL.5.2 Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively and orally.

National Ag Literacy Outcomes:
Agriculture and the Environment
- Recognize the natural resources used in agricultural practices to produce food, feed, clothing, landscaping plants, and fuel (e.g., soil, water, air, plants, animals, and minerals) (T1.3-5 e.)

Plants and Animals for Food, Fiber, & Energy
- Discuss similarities and differences in food, clothing, shelter, and fuel sources among world cultures (T2.3-5 a.)
- Understand the concept of stewardship and identify ways farmers/ranchers care for soil, water, plants, and animals (T2.3-5 e.)
- Provide examples of specific ways farmers/ranchers meet the needs of animals (T2.3-5 d.)

Food, Health & Lifestyle
- Diagram the path of production for a processed product, from farm to table (T3. 3-5 b.)

Supporting Resources:

"All About Beef" Beef Heritage and Nutrition Games from www.MyAmericanFarm.org

Beef Byproducts poster
https://ksagclassroom.org/supporting-resources/beef-byproducts/

Beef Life Cycle poster https://ksagclassroom.org/supporting-resources/beef/

"Beef Strong" by Amanda Radke (Book)
https://amandaradke.com/products/childrens-book-beef-strong

Cattle Fun Facts poster https://ksagclassroom.org/supporting-resources/cattle-fun/

"From the Farm to the Table BEEF" by Kathy Coatney (Book)
https://www.kathycoatney.com/beef/

"It's All About that Beef" by Rianna and Sheridan Chaney (Book)
https://www.rebeccalongchaney.com/chaney-twins-series

Kids Connection: Beyond the Beef Barn
https://ksagclassroom.org/resource-center/connection/

Ohio 4H: Other Lesson Plans
https://ohio4h.org/statewide-programs/animal-sciences/livestock/livestock-resources/animal-sciences-lesson-plans

Career Information: Meat Inspector
Meat inspectors help keep beef safe by checking for contamination and making sure USDA rules are followed before packaging. They inspect beef and other meats to protect public health and ensure quality. Most meat inspectors have a high school diploma and a degree in Food Science, Microbiology, or Meat Science.

Assessment: A simple pretest and/or post-test could be given by asking students to list known beef byproducts.

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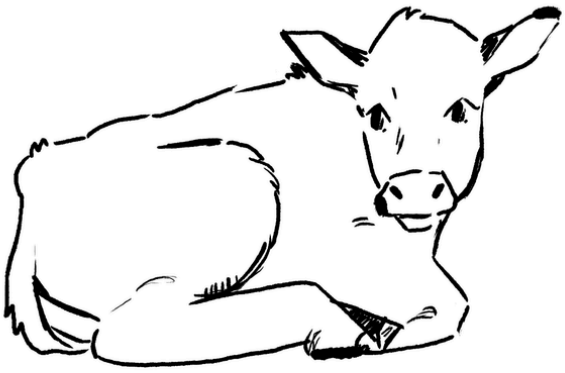
RIVER
CORRAL

Name: _____ Date: _____

There's a Cow in My House! Student Worksheet

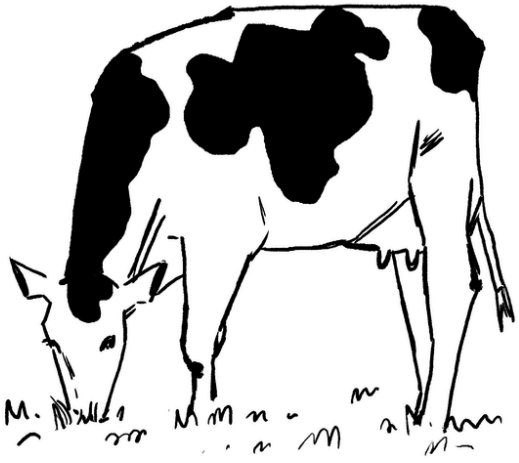
Circle the SIX products that are made with beef or beef byproducts.

Beef It Up! Animal Life Cycle Cutouts

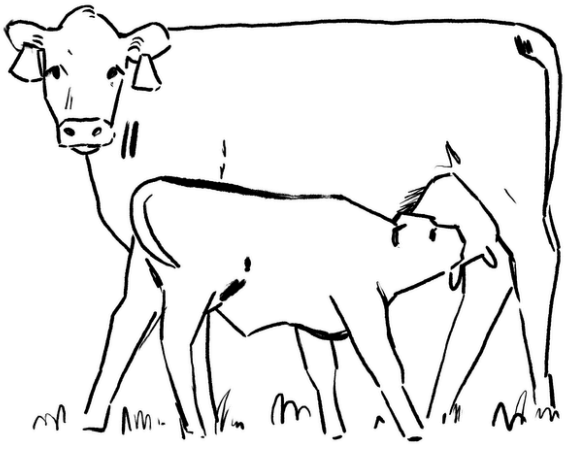


Baby calf

Boy eating a hamburger

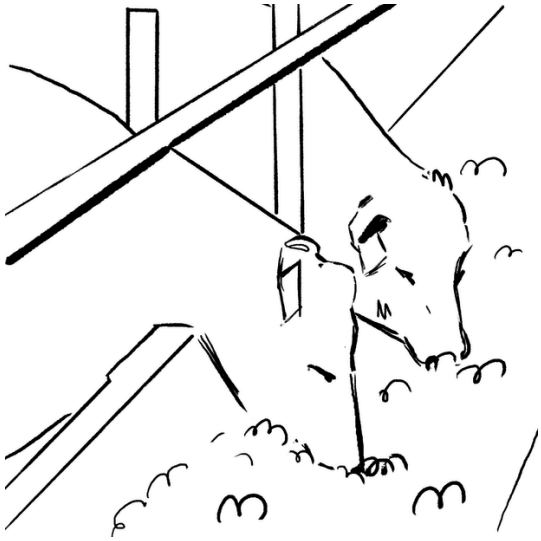


Grazing cow

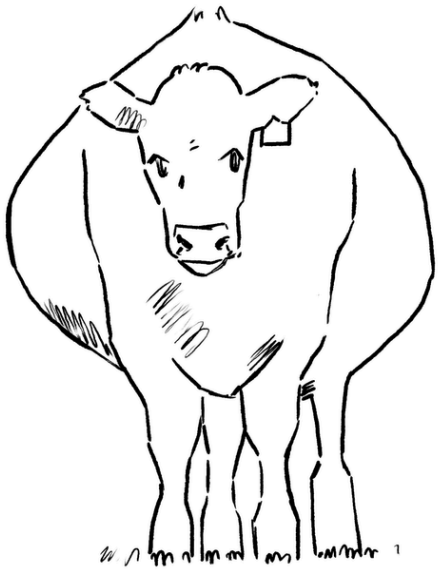


Cow/calf

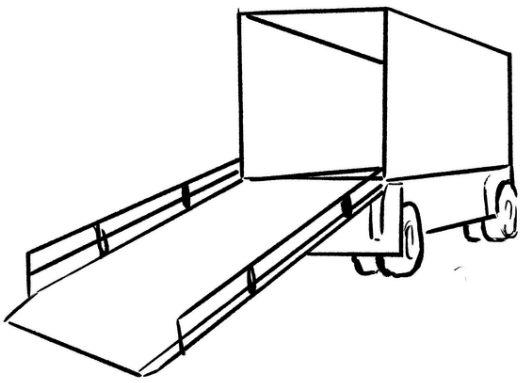
Beef It Up! Animal Life Cycle Cutouts



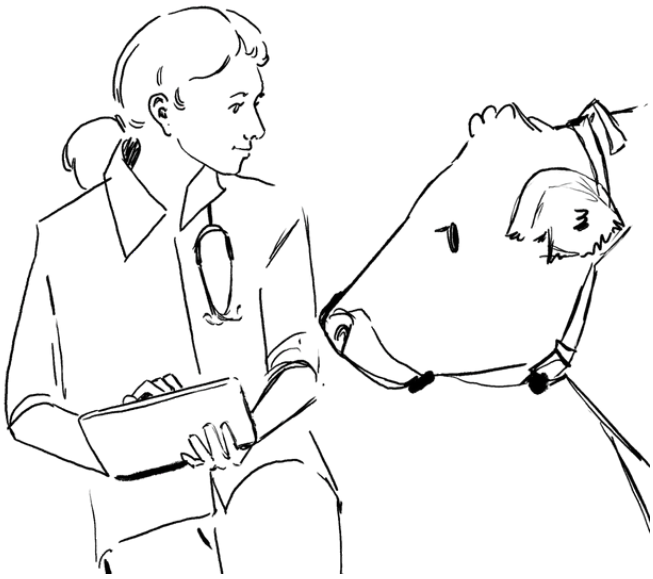
Feed Yard



Pregnant cow



Trailer



Veterinarian with cow