



Discovering Beef 4-6

Suggested Grade Level: 3-5

Time: 3 lessons, 20-30 minutes per lesson

Subject: Science, Energy, Ecosystems, English Language Arts, Informational Reading, Writing, Speaking and Listening, Agriculture, Food, Health, and Lifestyle, Beef and Beef Industry

Overview: Beef cattle are a major contributor to the global meat supply. In these lessons, students will explore the various byproducts of beef and their applications in everyday life. They will also learn about careers within the beef industry. Lessons 4–6 of *Discovering Beef* build on the concepts introduced in Lessons 1–3.

Objectives:

1. Describe the importance of beef products used daily.
2. List careers associated with the beef industry.

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 essential 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 the spring or 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 feed yards year-round, they help maintain a steady supply for the feed yards. Feed yards 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 feed yards and are finished with a grass and forage diet. The beef is still rich in protein and contains healthy nutrients such as 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—byproducts from beef are used in many everyday items. These include items such as glue, makeup, and even wallpaper. These byproducts 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). Because of this, people with all kinds 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. Kansas ranked 6th nationally in beef production in 2023, 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 constitute 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 cattle and calves, with approximately 6.250 million head of cattle located on ranches and in feed yards 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:

- Beef Byproducts Icon Cards, printed and laminated
- Kansas Kids Connection Magazine “Beyond the Beef Barn”
<https://ksagclassroom.org/resource-center/connection/>



Lesson 4: Kids Connection Magazine Review

Instructional Format:

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

Engagement:

Announce to the class that they will continue learning about beef cattle. Ask: "What do you remember from the last Discovering Beef lesson?" Call on students with their hands raised to answer. Then, explain that they will review information from the Kids Connection "Beyond the Beef Barn" magazine.

Procedures:

1. Pass out copies of the Kansas Kids Connection Magazine "Beyond the Beef Barn" to each student, pair, or group.
2. Read as a group or individually to review what they learned from Discovering Beef Lessons 1-3. Review vocabulary from the magazine.
3. Have students look for the answers to the following questions as they read:
 - What percent of the grain produced in Kansas is fed to livestock? (Answer: 80%, page 2)
 - True or False: Most of the food a 1000-pound steer consumes is dry hay. (Answer: False, page 2)
 - How many parts of the stomach does a ruminant have? (Answer: 4, page 2)
 - How much of a beef cow is used when it is processed into meat? (Counting meat and byproducts) (Answer: 99%, page 3)
 - Regarding nutrients, ZIP stands for zinc, iron, and potassium. (Answer: False – zinc, iron, and protein, page 4)

Lesson 5: Connect the Dots

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: To introduce this lesson, distribute a blank sheet of paper and a pencil to each student. Instruct students to list items made from beef or containing beef parts, whether edible or non-edible. Give an appropriate amount of time, then have students pair-share or share items off their list as a class.



Procedures:*Activity:*

1. Before teaching this portion of the lesson, print (and laminate, if possible) the icon card cutouts.
2. Distribute one icon card from the set you have printed to each student.
3. Have students stand in a circle. When it is their turn, have them share the connection category, such as sports, food, or medicine, OR share one interesting fact they read on their card.

Discussion:

1. Lead a class discussion using the discussion questions below:
 - What are some of the products on your card that you or your family have used?
 - How would your life be different without all of these products that come from the beef animal?
 - What would you miss the most?
 - What surprised you?

Lesson 6: Careers in the Beef Cattle Industry**Instructional Format:**

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

Engagement:

Ask the class, "How many beef-related careers do you think there are?" Then, tell them that many careers from various industries operate alongside and within the agriculture industry, including many that help produce beef.

Procedures:*Activity:*

1. Have students partner up and brainstorm a list of potential careers within the beef industry without using the Internet.
2. Students should share the careers they've come up with with the rest of the class to create a class master list. You can have them jot their answers down on paper, a poster board, or a whiteboard.
3. Next, assign or let students choose a career in the beef industry for a research project. Examples: veterinarian, vet technician, extension agent, trucker, auctioneer, federal meat inspector, animal nutritionist, feedlot manager, cow/calf producer, stocker, truck driver, etc.
4. Have students present their chosen career to the class (using any methods or the teacher's choice), with the information they found.



5. Finally, allow students to use the Internet to search for job descriptions, the required education for various jobs, and the average salaries. Then, have them compare each of the jobs.

Discussion:

1. Optional group/whole class discussion questions:
 - If you were a creative person, which career in the beef industry would cater to you?
 - Are any careers directly related to STEM (science, technology, engineering, and math)? Why is this important in production agriculture?
 - What careers require a lot of education? Hands-on training? Is one more important than the other?

Vocabulary:

- **Calving:** To give birth to a calf.
- **Gestation period:** The length of time a pregnancy lasts.
- **Forage:** Leaves, stems, and stalks that are part of plants used for animal feed.
- **Ruminant:** An animal that has four compartments forming their stomach.
- **Veterinarian:** Someone authorized and qualified to practice veterinary medicine.
- **Weaned:** To detach from a source of milk dependence or remove from the mother so they may no longer obtain milk by nursing the cow.

Kansas Standards:

Next Generation Science Standards

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

Energy

5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

Ecosystems: Interactions, Energy, and Dynamics

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Language Arts

3rd Grade

Reading: Foundational

Fluency

RF.3.4 Read with sufficient accuracy and fluency to support comprehension.

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).

Writing

Research to Build and Present Knowledge

W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

Language in Writing

W.3.11 Demonstrate command of the conventions of standard English capitalization, punctuation and spelling when writing.

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 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.

SL.3.3 Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.

Presentation of Knowledge and Ideas

SL.3.4 Report on a topic or text, tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

4th Grade

Reading: Foundational

Fluency

RF.4.4 Read with sufficient accuracy and fluency to support comprehension.

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.

Craft and Structure

RI.4.4 Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a fourth grade topic or subject area.

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.

Language in Reading: Informational

RI.4.10 Apply acquired skills in writing and speaking.

RI.4.11 Determine or clarify the meaning of unknown and multiple-meaning words and phrases to expand language comprehension.

Range of Reading and Text Complexity

RI.4.13 Read and comprehend high-quality informational text of appropriate quantitative and qualitative complexity for fourth grade.

Writing

Research to Build and Present Knowledge

W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information and provide a list of sources.

Language in Writing



W.4.11 Demonstrate command of the conventions of standard English capitalization, punctuation and spelling when writing.

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: Foundational

RF.5.4 Read with sufficient accuracy and fluency to support comprehension.

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.

Craft and Structure

RI.5.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a fifth grade topic or subject area.

Integration of Knowledge and Ideas

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

Language in Reading: Informational

RI.5.10 Use knowledge of language and its conventions when reading.

RI.5.11 Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on fifth grade reading and content, choosing flexibly from a range of strategies.

Range of Reading and Text Complexity

RI.5.13 Read and comprehend high-quality informational text of appropriate quantitative and qualitative complexity for fifth grade.

Writing

Research to Build and Present Knowledge

W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work and provide a list of sources.

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection and research.

Language in Writing

W.5.11 Demonstrate command of the conventions of standard English capitalization, punctuation and spelling when writing.

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.

SL.5.3 Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.

National Ag Literacy Outcomes:



Agriculture and the Environment

- Explain how the interaction of the sun, soil, water, and weather in plant and animal growth impacts agricultural production (T1.3-5 b.)
- 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.)

Food, Health & Lifestyle

- Diagram the path of production for a processed product, from farm to table (T3.3-5. b)
- Distinguish between processed and unprocessed food (T3.3-5 c.)
- Explain the costs associated with producing and purchasing food (T3.3-5 d.)
- Explain the practices of safe food handling, preparation, and storage (T3.3-5 e.)
- Identify careers in food, nutrition, and health (T3.3-5 f.)
- Identify food sources of required food nutrients (T3.3-5 g.)

Science, Technology, Engineering & Mathematics

- Describe how technology helps farmers/ranchers increase their outputs (crop and livestock yields) with fewer inputs (less water, fertilizer, and land) while using the same amount of space (T4.3-5 b.)
- Provide examples of science being applied in farming for food, clothing, and shelter products (T4.3-5 d.)

Culture, Society, Economy, and Geography

- Describe how supply and demand impact the price of agricultural goods (T5.3-5 a.)
- Discover that there are many jobs in agriculture (T5.3-5 b.)
- Explain the value of agriculture and how it is important in daily life (T5.3-5 d.)
- Provide examples of agricultural products available, but not produced in their local area and state (T5.3-5 e.)

Supporting Resources:

“The Steaks are High” online game

<http://www.myamericanfarm.org/games/the-steaks-are-high>

Kansas Beef Council <https://www.kansasbeef.org/>

BEEF Ag Mag from American Farm Bureau

<https://www.agfoundation.org/recommended-pubs/beef-ag-mag>

“Beef Basics” Lesson Plan by Lynn Wallin <https://agclassroom.org/matrix/lesson/284/>

Poster: “Compliments of Cattle” <https://agclassroom.org/matrix/resource/392/>

“My Family’s Beef Farm” book by Katie Olthoff

https://books.google.com/books/about/My_Family_s_Beef_Farm.html?id=hS-LtAEACA_AJ

“Beef Cattle in the Story of Agriculture” book by Susan Anderson and JoAnne Buggiey

<https://www.goodreads.com/book/show/34006525-beef-cattle-in-the-story-of-agriculture>

“Little Joe” book by Sandra Neil Wallace <https://sandraneilwallace.com/book/little-joe>

Career Information: Feedlot Manager



One critical role in the production of beef is that of the feedlot manager. Feedlot managers oversee the operations of a cattle feedlot. They are responsible for the practical and financial aspects of the lot. They also provide producers with knowledge and support on nutrition, marketing, and environmental conditions. Feedlot managers can work for someone else or be self-employed, but usually need an associate's degree in animal science or agricultural business.

Assessment: Informal assessment could include vocabulary activities such as "write the room" (writing or matching vocabulary words and definitions spread around the classroom) or exit cards requiring students to list three careers in the beef industry.

Author: Adapted by Patricia Wolfe, teacher, Lakemary Center, Paola, KS, 2020 KFAC Teacher of the Year, KFAC Curriculum Advisory Council, and edited by Marissa Cook, Secondary Education Major at KSU, KFAC intern

References:

National Agricultural Statistics Service. (2023, May 1). Kansas Rank in U.S. Agriculture. U.S. Department of Agriculture.
nass.usda.gov/Statistics_by_State/Kansas/Publications/Economic_Releases/Rank/2023/KS-rank23.pdf

Meat Institute. (n.d.). *Industry at a Glance*. Retrieved August 6, 2025, from https://www.meatinstitute.org/Industry_at_a_Glance

Kansas Foundation for Agriculture in the Classroom. (n.d.). Beyond the Beef Barn. *Kids Connection Magazine*. Retrieved January 15, 2025, from <https://ksagclassroom.org/resource-center/connection/>

Kansas Department of Agriculture. (2024). Kansas Farm Facts [Fact sheet]. agriculture.ks.gov/home/showpublisheddocument/9780/638633671812100000



Clothing



Clothing

- Leather shoes, belts, purses, wallets, boots, and gloves are made from cowhides or other leather hides.
- Shoe polish and leather conditioner is often made with beef tallow and/or lanolin.

Cosmetics/Personal Care



Cosmetics/Personal Care

- Cosmetics contain plant and animal fats and oils like lanolin, beef tallow, glycerin, and collagen.
- Many detergents contain beef tallow and glycerin.
- Some deodorants contain glycerin and lanolin.
- Shaving cream often contains products from farm animals like glycerin and lanolin.
- Historically, soap was made with animal fat and lye. Many soaps still use this mixture today.

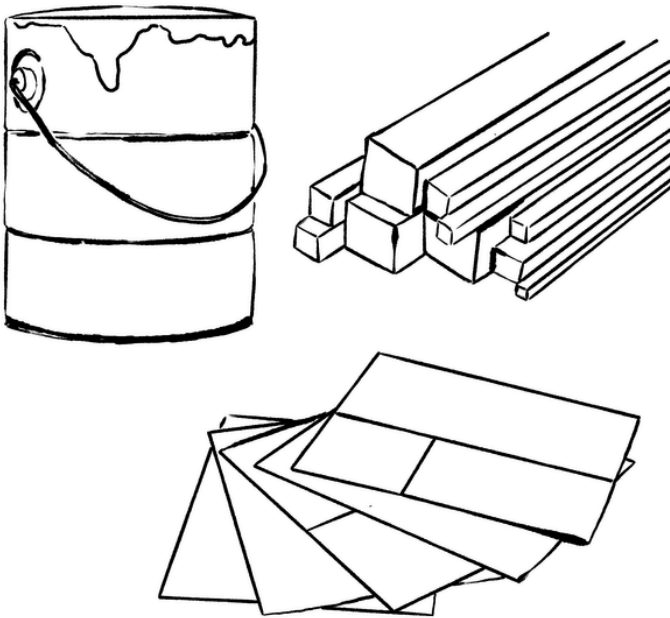
Environment



Environment

- Cattle graze areas where plants must stay short and mowing isn't possible.
- Cattle convert low-quality grass into beef for people to eat.
- Cattle recycle food by digesting byproducts like beet pulp, almond hulls, and citrus pulp.
- Cattle hooves naturally aerate soil, improving air flow to plant roots.
- Grazing helps control noxious weeds.
- By keeping grass short, cattle reduce grassfire risk.
- Animal manure can be used to produce methane, a renewable energy source.

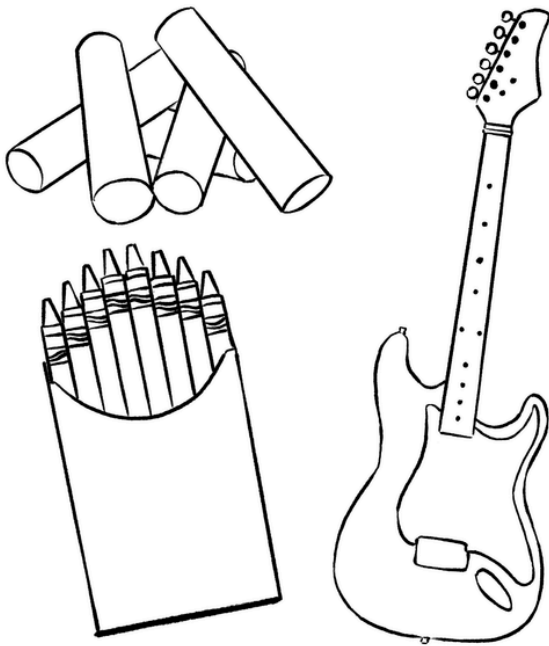
Housing/Construction



Housing/Construction

- Paints and stains use plant- and animal-based emulsifiers and stabilizers.
- Some high-grade steel is made with bone charcoal from cattle and sheep.
- Plywood uses livestock-derived adhesives.
- Insulation includes animal products and tree-based paper.
- Some cements contain ingredients sourced from farm animals.
- Putty uses animal-derived components.
- Linoleum flooring includes animal-based materials.
- Wallpaper contains animal-sourced components.
- Plastics of all types include animal products.

Music/Art



Music/Art

- Some crayons contain beef tallow.
- Chalk is held together with adhesives made from animal products.
- Paste uses adhesives made from hides, bones, hooves, horns, gelatin, and casein, which all come from cows.
- Lubricating oils for metal instruments can include animal-derived ingredients.

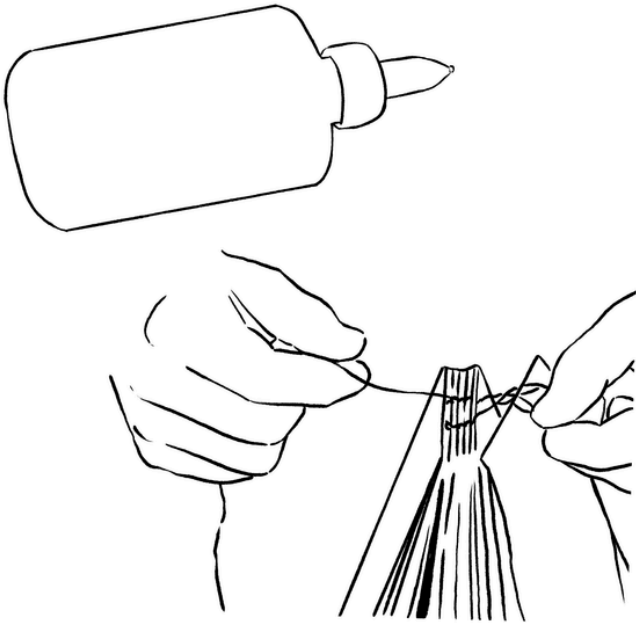
Sports



Sports

- Sporting-event foods like hot dogs, hamburgers, and chips all come from agriculture.
- Most athletic shoes use cowhide leather and bone-based glues.
- A baseball's outer cover is leather.
- Many sports balls—baseballs, soccer balls, footballs, volleyballs, and basketballs—are made from leather.
- Many types of sports gloves—baseball, weightlifting, racecar driver, and hockey goalie/player gloves—are made of leather.
- Lacrosse sticks use wooden shafts and cattle rawhide for stringing.

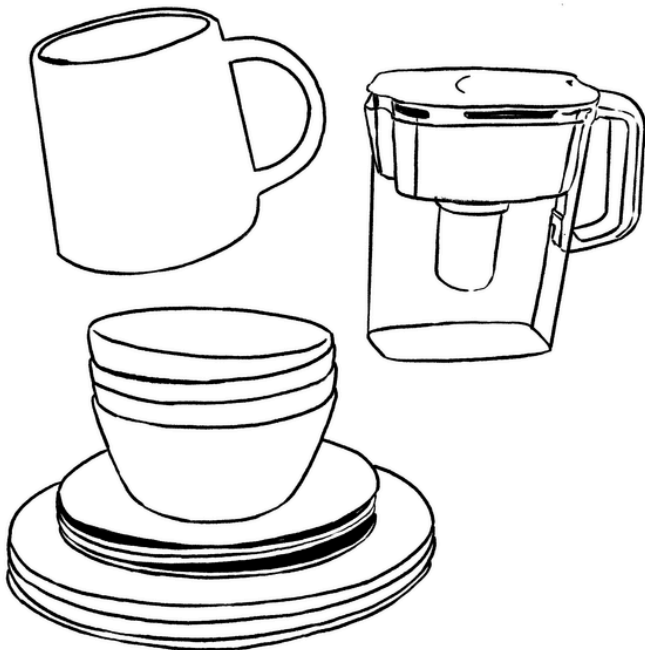
Communication/Shipping



Communication/Shipping

- Glue is made from animal products.
- Leather and cotton for high-quality bookbinding comes from plant and animal sources.

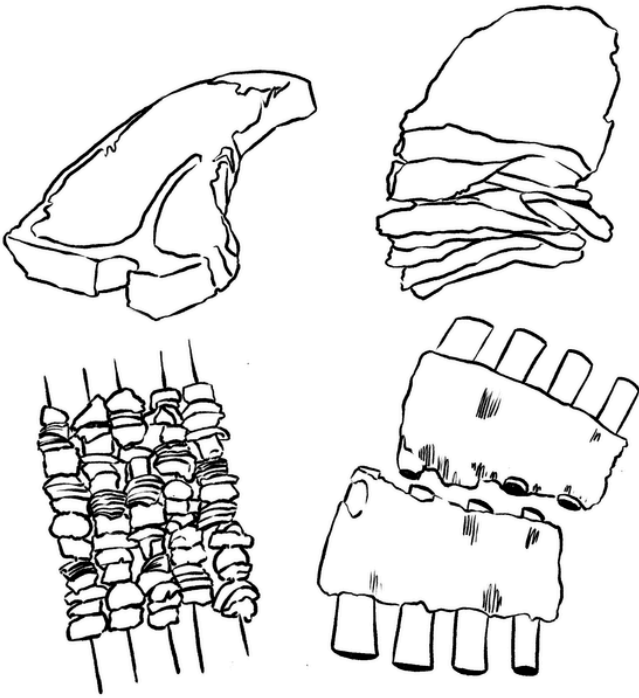
Houseware/Dining



Houseware/Dining

- Bone china dishes are made of cattle bones
- Bone ash glass is made using animal bones
- Bone char is used in some water filters
- Historically, cellophane (plastic wrap) contained products from farm animals
- Floor waxes contain fat from farm animals
- Some ceramic glazes contain products from farm animals

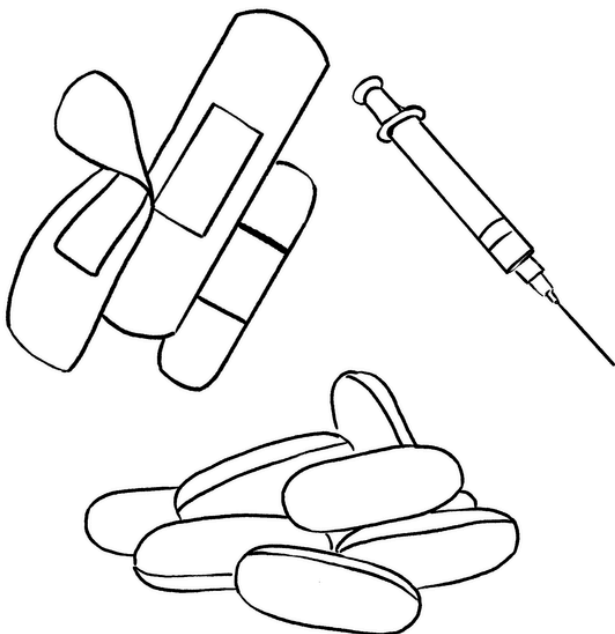
Food



Food

- All beef products are produced on farms and ranches: T-bone steaks, chuck roast, beef stew meat, skirt steak/flank steak (for fajitas), ground beef (for hamburgers, pizza, and tacos), ribs, cubed steak, beef round, brisket, flat iron steak, shoulder roast, kabob steak cubes, and rib eye roast.

Medicine/Health



Medicine

- Some adhesive tapes use glues made from cattle bones, horns, hooves, skin, and cartilage
- Minerals in our diet, like calcium, often come from animal sources such as dairy
- Gelatin from beef cattle is used to make soft-shell medication capsules
- Insulin was once produced from cattle and pig pancreases
- Cattle supply ingredients used in certain anti-rejection and antiviral medications
- Bone and collagen from beef cattle are used in plastic surgery

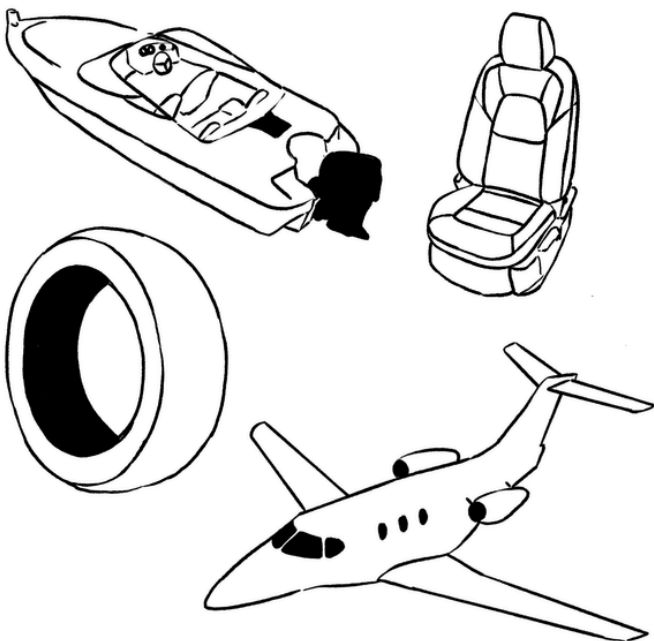
Recreation, Pets, & Gardening



Recreation, Pets, & Gardening

- Meats from all farm animals are used to make pet food.
- Dog chews are often made of animal hides.
- Manure from cattle is used as fertilizer for both organic and conventional agriculture and gardening
- Games that contain paper or cardboard are printed with natural inks or use some type of plastic made from animal products.

Transportation



Transportation

- Leather upholstery for car, plane, and boat seats is made from cowhides.
- Biodiesel can be produced from animal fats.
- Beef fat provides stearic acid used to help rubber tires hold their shape.
- Some asphalt products use beef-derived binding agents.
- Antifreeze contains glycol, which was historically derived from cattle.
- Some jet fuels can be made from beef fats and proteins.
- Some outboard engine oils use additives from animal fats and proteins.
- Automobile bodies may use glues made from bones, horns, hooves, and cartilage.