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Do you know  
your moo?

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# Breakout Box: Do you know your moo?

## Grade Level: Middle School / High School

### Overview

As cities grow, many people move away from an agricultural understanding, even though it is essential to their lives. Kansas is one of the largest beef- and corn-producing states, and agriculture is the largest industry in Kansas. This breakout is designed to provide students basic knowledge of the beef industry, an industry our students should be familiar with. Students will learn about the common breeds of cattle, the beef life cycle, products made from beef, beef cuts, and facts about grain- and grass-finished beef. Many cross-curricular connections can be made using this breakout box activity and teachers are encouraged to adapt this activity to meet their lesson's objectives and learning outcomes. Starting a lesson with this breakout activity will create general awareness that can lead to more in-depth investigations and activities that will keep the conversation going about the beef industry. A great intro to a STEM activity!

### Next Generation Science Standards (NGSS)

#### *Middle School Science*

- **MS-LS1.** From Molecules to Organisms: Structures and Processes.
  - **MS-LS1-1.** Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
  - **MS-LS1-7.** Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
- **MS-LS2.** Ecosystems: Interactions, Energy, and Dynamics.
  - **MS-LS2-1.** Analyze and interpret data to provide evidence for the effects of resource availability on organisms and population of organisms in an ecosystem.
  - **MS-LS2-2.** Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
  - **MS-LS2-3.** Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- **MS-ESS3-3.** Earth and Human Activity.
  - Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

#### *High School Science*

- **HS-LS3-1.** Heredity: Inheritance and Variation of Traits.
  - Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
- **HS-LS4-5.** Biological Evolution: Unity and Diversity.
  - Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

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### Kansas FACS Standards

- **5.1.** Apply nutrition basics in making healthy food choices.
- **5.5.** Analyze food sources and practices that impact the nutritional value of the food we consume.
- **5.6.** Demonstrate food preparation and food safety concepts when preparing healthy food.

### Learning Objectives

- Students will be able to identify four of the main cattle breeds in the United States.
- Students will be able to identify different cuts of beef.
- Students will be able to discuss information related to grain- and grass-finished beef.
- Students will understand the different stages of the beef life cycle.

### Breakout Edu Tips

If this is your first time using a Breakout Edu box, you are in for a treat. Once you've done one breakout box your students will be ready for the next time.

- You can use breakout boxes as a whole class, in addition to small groups.
- You have the opportunity to give students hints. Every box comes with at least two hint cards. If you have a high performing group, you may want to challenge them with less hints, while a different hour may need more hints.
- Having a visual timer for students while they are working is really helpful. It allows them to budget their time and when they may want to use their hints.
- As the teacher, you have the discretion to hide things wherever in your room you deem best. Feel free to make adjustments. Just make sure the clues for the locks don't change. Otherwise, students may not be able to get in.

### Background Information

Currently, there are more than 700,000 cattle farms and ranches in the United States, with an average herd size of 40 cattle, that produce 19 percent of the world's beef. Here are some Facts at a Glance to share with your students.

**50**

STATES ARE HOME TO  
COW-CALF FARMS AND  
RANCHES

**91%**

OF FARMS AND RANCHES  
IN THE U.S. ARE FAMILY  
OWNED AND OPERATED

**40**

HEAD IS THE AVERAGE  
SIZE HERD

**4-6**

IS TYPICALLY THE  
NUMBER OF MONTHS  
CATTLE SPEND AT A  
FEEDLOT

**130**

COUNTRIES IMPORT U.S.  
BEEF DUE TO GLOBAL  
DEMAND

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### *Popular Breeds of Cattle*

Cattle come in many different shapes and sizes. While there are various physical differences, they all provide high-quality, nourishing beef that can be part of a healthy diet. The four most popular beef cattle breeds in the U.S. are Angus (red and black), Charolais (pronounced “char-lay”), Hereford, and Simmental.

### *The Beef Life Cycle*

The journey of raising beef is among the most complex of any food. Due in part to their changing nutritional needs throughout their lifetime, beef cattle oftentimes will change hands and ownership up to three or four times over the course of one and a half to three years, as they move through their various life stages. Across this process, however, one important thing remains constant – and that’s the beef community’s shared commitment to raising cattle in a safe, humane and environmentally sustainable way by using the latest technology and resources. Working together, each segment of the beef life cycle aims to make the best use of vital natural resources like land, water and energy - not just for today, but also for the future.

### *Beyond the Beef: Cattle By-Products*

Beyond delicious and nutritious steaks, roasts and burgers, there are hundreds of uses for cattle by-products. Do you own a car, take a bus or ride a bike? If so, you’re utilizing by-products in the tires on your vehicle and the asphalt on the road. Even items that may seem trivial, such as dyes, inks, adhesives and plastics, are made from cattle by-products.

Here are a few ways in which cattle by-products touch our lives:

- Hides from cattle are tanned into leather, becoming shoes, purses and wallets.
- Cattle organs and glands are used in the production of medicine, insulation, antifreeze, shampoos/conditioners and instrument strings.
- Photo film, vitamin capsules, charcoal and glass all are derived from bones and horns of cattle.
- Inedible beef fat provides us with airplane lubricants, hydraulic brake fluid, biodiesel and medicines.

### *Grain-Finished and Grass-Finished Beef*

All cattle spend a majority of their lives eating grass on pastures. But beef can be finished in a variety of ways, giving you choices -at the meatcase in your local grocery store or at a restaurant.

Grass-finished cattle spend their entire lives grazing and eating from pastures. These cattle may also eat forage, hay or silage at the feedyard. As well, grass-finished cattle may or may not be given FDA-approved antibiotics to treat, prevent or control disease and/or growth-promoting hormones. Beef cuts from cattle consuming mostly grass/forage tend to be marginally lower in fat than those from grain-finished beef, mostly at the expense of monounsaturated fats, the heart-healthy fats found in olive oil.

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Grain-finished cattle, like grass-finished, spend the majority of their lives eating grass and forage in pastures. When beef is grain-finished, cattle are free to eat a balanced diet of grain, local feed ingredients, and hay or forage at the feedyard. Through better management of cattle nutrition, farmers are able to take local feed ingredients (by-products) common in their region, such as almond hulls, beet tops and potato starch, and feed that to cattle instead of letting it go to waste. Similarly to grass-finished cattle, grain-finished cattle may or may not be given FDA-approved antibiotics to treat, prevent or control disease and/or growth-promoting hormones. Grain feeding can result in beef with increased levels of monounsaturated fat.

### *Beef Cuts*

Beef cut posters are the most effective tools to learning more about the various cuts of beef, where they come from on the carcass, and the recommended cooking method for each cut. No matter which cut you choose, all beef cuts contain 10 essential nutrients, including protein, zinc, iron and many B vitamins. When visiting the meat section of a grocery store or a meat market the staff who prepare the cuts of meat are very knowledgeable and can assist with questions as you make your meat selection.

### **Breakout Activity**

#### *Game Name*

Do You Know Your Moo?

#### *Game Designer*

Kansas Beef Council, Kansas Corn Commission and Jessica Sadler

#### *Content Areas*

STEM, Agriculture, Corn, Beef, Science

#### *Recommended Ages*

Can be used for all ages, but recommended for middle school and high school audiences.

#### *Ideal Group Size*

Can be used small group or whole class

#### *Suggested Time*

30-40 minutes

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### Story

Welcome back to, “Do You Know Your Moo?” Today’s contestants are all from Kansas and will be battling it out to be crowned, Beefmaster. Not only will they receive this prestigious title, but they will also walk away with some “mooovalous” prizes. They’ll be answering questions on everything from cuts of beef to differences in grain- and grass-finished beef. Sit back, relax, and get ready to play along with “Do You Know Your Moo?”

### Lock Combinations

The following codes will open the locks on the box

#### *3-Digit Lock - 3 Numbers*

245

#### *4-Digit Lock - 4 Numbers*

5, 8, 3, 6

#### *Directional Lock - 5 directions for the directional Multilock*

Up, Down, Up, Right, Left

#### *Color Lock - 5 colors for the color Multilock*

Red, Orange, Yellow, Blue, Magenta

#### *Key Lock - Where is the key hidden?*

Teacher’s Choice

### Setup Instructions

#### Steps

1. Cut apart the five cattle breeds photo cards, five cattle breed information cards, red, black or cream card and the ABC card. You will place these pieces inside the small black box and lock it with the key lock. The ABC card hints that the students need to alphabetize the cattle breeds information cards. Once alphabetized, they need to match the information cards to the photo cards. The photo cards will contain the numbers needed to unlock the lock. This is how they will get the numbers in the correct order for the 4-digit lock on the main Breakout Box. The red, black or cream card is a wild card used to provide more information but is not used to unlock the box.

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2. Use the “Products Made from Cattle” infographic to help students find the hidden key. This infographic should be printed off. Look over the list and find something you have in your classroom or can easily bring in. Using the invisible ink pen to circle the item. Then write “Find it to find the key.” You may want to leave the blacklight by this clue. If you have a group that works really quickly you can hide the light and even the batteries to make it work. Whichever item you circle in the infographic, have it out somewhere in the room with the key underneath it. I like to hide it in an area under an item they may not traditionally look under without the clue.
3. Cut apart the six directional cards and QR code card. One card will not have an arrow. For students to solve the directional multilock, they will need to use the Beef Cycle QR code. This code will bring up a website that will take them through the cycle of their beef. Students will need to use this website to place the Beef Cycle cards in order. Once the cards are in order, students should be able to enter in the directional arrows starting from the top and going down. This will cause the directional multilock to open.
4. Cut out the nine grain-finished and grass-finished fact cards. For students to solve the 3-digit lock, they will need the Plate Sort template. The top left-hand corner gives students a clue (with the number 2 in bold) that they will be solving for the 3-digit lock combination. Print out the Plate Sort template and leave the nine different plate sort cards laid out with it. Students will read the cards and place them in the correct group. When they are finished, they should have four facts in the grass-finished section and five facts in grain-finished section. This is how they get the code 2-4-5.
5. Around the room, feel free to place the documents: beef cuts, cellphone text message and multicolored steer. You can place them next to one another or hide them to make it more of a challenge. The Cell Phone Text Message document talking about getting meat from the market will help students figure out the color lock. They will need to use the Beef Cuts document to find what primal cut the text message is discussing. Once they find that cut of meat, they will notice the title for the column matches cuts found on the Multicolored Steer document. When they match the primal cut name to the steer, it will give the color they need. The order the color goes in matches the amount the mother asked for in the text message.
6. Add some kind of reward in the large box. Candy is always popular. Another option is to have information about their next project which could be connected to what they learned from this Breakout Box activity. The Kansas Beef Council and the Kansas Corn Commission are working on additional activities that you will be able to use in the future to keep the conversation going about the beef industry.

Fun certificates are provided to have a group photo taken after they finish the activity.

### Assessment

To assess learning, students will complete *Do You Know Your Moo?* worksheet (pg. T9-10).

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### Resources

Visit [www.kansasbeef.org](http://www.kansasbeef.org) and [www.kscorn.org](http://www.kscorn.org) for updated resources in the future.

### Reflection and Conclusion

At the completion of this breakout, students should have a better understanding of beef, the different cattle breeds that exist in United States, and how beef plays a daily role in their lives. Feel free to give students the following questions as an exit ticket or knowledge check at the end of the breakout. If you have groups that do not breakout, go over the information/clues that would have led to the last locks coming off.

1. What is the difference between a primal cut and a retail cut of beef?
2. What did you learn about grass-finished and grain-finished cattle?
3. Name five beef by-products and what part of the animal they are made from.
4. What are the four main cattle breeds in the United States?
5. What are the main stages of the beef life cycle?
6. What are some social skills that you used or could have used to experience success for this breakout?

### Cross Curricular Connections

Below are suggested ways you could incorporate cattle/beef into your lessons.

#### *Social Studies*

- Migration of different breeds. \*This could be compared/contrasted with human migration.

#### *Language Arts*

- Compare and contrast different breeds. Cuts of meat (primal and retail) to connect to roots of words.

#### *Science*

- Heredity and genetics (breeding)
- Life cycle of beef compared to other life cycles (stars, humans, certain animals, carbon, water, etc.)

#### *Family and Consumer Sciences*

- Great introduction to any beef unit.
- Presentation on both grain- and grass-finished cattle.
- Create your own beef recipe with constraints (cheapest, healthiest, least amount of ingredients, etc.)

#### *Engineering and Design*

- Create and design a solution for feeding grass-finished cattle in the winter when there may be snow.
- Construct a more efficient bunk line for feeding cattle.



# Do You Know Your Moo?

Name: \_\_\_\_\_

## *Beef Cuts*

1. What is the difference between a primal and a subprimal cut? (Use the Beef Cuts graphic for help if needed.)
2. All lean beef cuts have less than how many grams of total fat?

## *Beef Breeds*

1. \_\_\_\_\_ and \_\_\_\_\_ angus cattle are popular among farmers for their good mothering traits and producing high-quality meat.
2. Besides the two color variations of Angus, what are the other cattle breeds discussed? (Hint: There are three.)

## *Beef By-Products*

1. The majority of by-products listed on the infographic are derived from which part of cattle?
2. Which by-product surprised you the most to find out it's made from cattle?

## *Grass-Finished & Grain-Finished*

1. Is most beef raised grain- or grass-finished?
2. True or False: Both grain- and grass-finished cattle may or may not be given FDA-approved antibiotics to treat, prevent or control disease and/or growth-promoting hormones.

## *Beef Life Cycle*

1. How many stages of the beef life cycle are there?
2. At what stage do calves transition from a diet of mostly milk, to eating a variety of grasses, hay and other plant-based feeds?

## Do You Know Your Moo?

### Beef Cuts

1. What is the difference between a primal and a subprimal cut? (Use the Beef Cuts graphic for help if needed.) **A primal cut is a piece of meat separated from the carcass of the animal during butchering. Subprimal cuts are derived from the primal cuts and are the cuts sold at retail that you would see in your grocery store.**
2. All lean beef cuts have less than how many grams of total fat? **10 Grams**

### Beef Breeds

1. **Black** and **Red** angus cattle are popular among farmers for their good mothering traits and producing high-quality meat.
2. Besides the two color variations of Angus, what are the other cattle breeds discussed? (Hint: There are three.) **Charolais, Hereford, Simmental**

### Beef By-Products

1. The majority of by-products listed on the infographic are derived from which part of cattle? **Fat**
2. Which by-product surprised you the most to find out it's made from cattle? **Answers will Vary**

### Grass-Finished & Grain-Finished

1. Is most beef raised grain- or grass-finished? **Grain-finished**
2. True or False: Both grain- and grass-finished cattle may or may not be given FDA-approved antibiotics to treat, prevent or control disease and/or growth-promoting hormones. **True**

### Beef Life Cycle

1. How many stages of the beef life cycle are there? **Five Stages (Cow-Calf, Stockers & Backgrounders, Livestock Auction Markets, Feedyard, Packing Plant)**
2. At what stage do calves transition from a diet of mostly milk, to eating a variety of grasses, hay and other plant-based feeds? **Stocker & Backgrounders**