South Dakota State University Extension

Adopt-A-Cow: Beef

South Dakota 4-H: Science of Agriculture

Photo courtesy of NCBABaxter Communications

Lessons for:
3rd-5th Grade
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ACKNOWLEDGEMENTS

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Adopt-A-Cow: Beef Overview

Through the Adopt-A-Cow: Beef lessons, youth in grades 3-5 will embark on an adventure to learn about raising beef in South Dakota. Youth will travel back in time to the Dakota Territory and explore a time when beef cattle were first becoming a part of the landscape. From there, youth will create their own cattle brand, learn about cattle traits, and discover how to care for livestock. They will also explore the value that these animals provide to the South Dakota workforce and economy as they dive into how beef arrives at the grocery store and the many byproducts produced. Throughout the program, youth will also engage with a South Dakota beef calf and its mother through videos.

Lessons are designed to be approximately fifty minutes in length; however, each lesson has extra content for youth to explore. This extra content is designed to help youth further explore beef production, but also further address education standards. These extras can be utilized in conjunction with the lesson, or at a later time. A list of books about beef production has also been provided to encourage additional exploration of beef.

Each lesson can serve as stand-alone activity, or the lessons can be utilized chronologically. If lessons are being utilized in chronological order, youth engagement can be enhanced by establishing teams of youth. Teams as small as two or as large as five would work depending on class size. These teams will work together for the entirety of the program to create their own ranch. As a ranch they will:

- Create a name for their ranch
- Design a ranch brand and/or several brands (each ranch hand may have their own brand)
- Identify the genetics of their calves
- Create ear tags for their cattle
- Manage the health of their herd
- Mix up nutritious feed rations for their herd

Educators are provided with lesson plans, PowerPoints, and detailed presentation notes for each lesson.

The content available in this curriculum is eligible for use in approved South Dakota 4-H Youth Livestock Literacy events/programs.

2025 Major Changes:

- Additional farm videos have been added to the curriculum. Educators now have the option to follow a Simental-Angus pair from Werning Cattle Company or a Charolais pair from Vedvei Charolais Ranch.
- A family newsletter has been created to go along with each lesson. These are designed to serve as conversation starters between youth and their families. There is information about the lesson as well as South Dakota beef information and youth friendly beef recipes.

Lesson Overview

Lesson 1: Beef's Impact on South Dakota (50 min)

The average American consumes 59.1 pounds of beef per year (Widmar, 2023). Not only is beef an important part of the human diet, but it is also a major part of the South Dakota economy. South Dakota has nearly 3.45 million head of beef cattle; that's about 4 beef animals for every person in SD. SD ranks 5th for beef cow and calf inventory and 7th for total number of cattle total (USDA/NASS, 2025).

In this lesson youth will explore South Dakota history and the role beef production played in it. Youth will explore the Dakota Territory between 1868 and 1889. Youth will also explore the history of branding cattle and design their own brand.

Lesson 1 also has optional learning opportunities which can be used to further create a multi-disciplinary learning experience. These opportunities can be done along with the base lesson or utilized later.

Cowboys on the Open Range Review: This review will deepen youth understanding of information presented in the lesson. A general review worksheet is provided to go along with the video. Additionally, a virtual escape room is provided to guide youth through reviewing South Dakota history content including but not limited to the Fort Laramie Treaty of 1868, the open range, bonanza ranching, and the Great Sioux Reservation. This expanded learning option is estimated to take an additional 30 minutes.

Fence Design: The end of the open range played a big role in South Dakota history and how cattle are raised in the state. This design activity will encourage youth to think about fencing and apply their mathematical and engineering skills to designing a fence for their property.

Lesson 2: Building Your Herd (50 min)

Today's cattlemen use their knowledge of genetics to build herds that prosper in the SD climate, produce healthy calves, and develop desirable muscle. In this lesson youth will explore how traits are passed from parent to child and will utilize this knowledge to predict the traits of the calved in their herd.

To accommodate a large range of learners using this curriculum, there are four versions of this lesson. In each version, youth are asked to use observation skills to identify physical traits that are inherited by offspring from their biological parents. They explore dominant vs. recessive traits and then utilize a dice to determine their calf's physical traits.

Version 1: In this version, youth are introduced to Punnett squares, but they do not use it in their activity. Youth are provided a cow and bull with specified traits; they then follow their worksheet and use dice to determine the traits their calf will inherited and what their calf will look like.

Version 2: In this version, youth are provided with a completed Punnett square that represents their given cow and bull. Then utilizing dice, they determine which set of traits their calf will inherit and what their calf will look like.

Version 3: In this version, youth are provided with a blank Punnett square for their given cow and bull. Youth will fill out their Punnett square based on the provided information and then they will utilize dice to determine which set of traits their calf will inherit and what their calf will look like.

Version 4: In this version, youth are provided with a blank Punnett square and a bull and cow catalog. Youth will be able to select a bull and cow pairing and complete the Punnett square based on the provided information. They will then utilize dice to determine which set of traits their calf will inherit and what their calf will look like.

Lesson 3: Calf Health (50 min)

The most important job of a rancher is to ensure that his/her livestock remain healthy and safe. In this lesson youth will begin to explore the important role ranchers play in providing care for livestock. Youth will dive into the utilization of vaccinations as well as antibiotics. They will have the opportunity to learn about how veterinarians support ranchers in giving animals care.

Lesson 3.5: Calf Health - Moo Management (50 min)

This bonus lesson, while it can be done at any time, works well following Lesson 3. Through the Moo Management board game, youth have the opportunity to simulate real producer decisions as they operate their own cow-calf operations. These decisions include but are not limitted to vaccinations, selling stock, and general farm repairs.

Lesson 4: Beef Energy Cycle (50 min)

Animals and humans get the energy they need by consuming nutrient dense foods. As ruminants, cattle can easily digest foods, like grasses, that humans cannot. They utilize this energy to create muscle, which can then be consumed by humans as a nutritious protein source. In this lesson youth will investigate how energy transfer occurs through the production and consumption of beef.

Lesson 5: Beef Life Cycle (50 min)

Just like human babies, as baby calves grow they become less dependent on their mothers. While there are similarities between humans and cattle, calves become independent much sooner. At six months old calves are weaned from their mother's milk and begin the next portion of their life. In this lesson, youth will explore what happens once calves are weaned and how their diet and nutrition changes based on their life path.

Lesson 6: A Day Without Cows (50 min)

Beef cattle are raised for the nutritious proteins that their muscle provides; however, that is not the only thing that these cattle give us. Many other products are derived from cattle. Around 98% of the animal is utilized and only about 50% of that is beef. In this lesson youth will explore the many ways that the beef industry impacts their daily lives. They will learn about the many products that are made from beef animals, about the impact that beef has on the local economy, and the number of careers that are related to the beef industry.

Education Standards: 3rd-5th Grade Lessons

Lesson 1: Beef's Impact on South Dakota

Educational Technology

- **ET.EL.2** – with or without support, students build networks of experts and peers to enhance their learning.
- **ET EL.3** – students improve their learning by seeking feedback from others using digital tools and other resources to demonstrate learning in a variety of ways.

English Language Arts

- **3.RI.3** – Explain the relationship between events, ideas, or concepts in a historical, scientific, or technical procedures text, using language that pertains to time, sequence, and cause/effect.
- **4.RI.3** – Explain events, steps in procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text
- **5.RI.3** – Explain the relationships and/or interactions between two or more individuals, events, ideas, concepts, or steps in procedures in historical, scientific, or technical text.
- **RI.4** – Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade topic or subject area.

Science

- **3-LS4-3** – Construct an argument with evidence how some organisms thrive, some struggle to survive, and some cannot survive in a particular habitat. (SEP: 7; DCI: LS4.C; CCC: Cause/Effect)
- **3-LS4-4** – Make an evidence-based claim about the validity of a solution to a change in the environment that affects the types of plants and animals that live there. (SEP: 7; DCI: LS2.C, LS4.D, ETS1.A; CCC: Systems)

Social Studies

- **5.SS.9.I** – The student analyzes and defines the extent to which treaties made between the U.S. government and Native Americans were followed and broken, including the historical and contemporary effects of the Treaty of 1868 and the Agreement of 1877.
- **5.SS.9.J** – The student tells of engagements between U.S. Government forces and Native Americans in the west during and following the Civil War.
- **5.SS.9.L** – The student explains the role of the railroad, bonanza farming, the Black Hills Gold Rush, and open-range cattle ranching on South Dakota History

Lesson 1 Optional Learning

Cowboys on the Open Range Review

Social Studies

- **5.SS.9.I** – The student analyzes and defines the extent to which treaties made between the U.S. government and Native Americans were followed and broken, including the historical and contemporary effects of the Treaty of 1868 and the Agreement of 1877.
- **5.SS.9.J** – The student tells of engagements between U.S. Government forces and Native Americans in the west during and following the Civil War.
- **5.SS.9.L** – The student explains the role of the railroad, bonanza farming, the Black Hills Gold Rush, and open-range cattle ranching on South Dakota History

Fence Design

Mathematics

- **3.MD.C.8** – Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters
- **4.MD.A.3** – Apply the area and perimeter formulas for rectangles in real world and mathematical problems.
- **5.MD.A** – Convert like measurement units within a given measurement system.
- **5.NBT.A.2** – Explain and apply patterns in the number of zeros of the product when multiplying a number by powers of 10. Explain and apply patterns in the placement of the decimal point with respect to the values of the digits in the product or the quotient, when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
- **5.NBT.B.5** – Fluently multiply multi-digit whole numbers using an algorithm, including but not limited to the standard algorithm.

Mathematics Practices

- **SMP 1** – Make sense of problems and persevere in solving them.
- **SMP 2** – Reason abstractly and quantitatively.
- **SMP 3** – Construct viable arguments and critique the reasoning of others.
- **SMP 5** – Use appropriate tools strategically.
- **SMP 6** – Attend to precision.
- **SMP 8** – Look for and express regularity in repeated reasoning.

Science

- **3-5-ETS1-1** – Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost.

Science and Engineering Practices

- **SEP 1** – Asking Questions and Defining Problems
- **SEP 2** – Developing and Using Models
- **SEP 5** – Using Mathematics and Computational Thinking
- **SEP 6** – Constructing Explanations and Designing Solutions

Lesson 2: Building Your Herd

English Language Arts

- **SL.1** – Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) on grade level topics and texts, building on others' ideas and expressing their own clearly.
- **3.SL.2** – Determine the main ideas and supporting details of a text presented in diverse media and formats, such as visual, quantitative, and oral formats.
- **3.SL.3** – Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
- **4.SL.2** – Paraphrase portions of a text presented in diverse media and formats, such as visual, quantitative, and oral formats.
- **4.SL.3** – Identify the reasons and evidence a speaker provides to support particular points.
- **5.SL.2** – Summarize text or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **5.SL.3** – Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.

Educational Technology

- **ET.EL.2** – with or without support, students build networks of experts and peers to enhance their learning.

Science

- **3LS3-1** – Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variations of these traits exist in a group of similar organisms. (SEP: 4; DCI: LS3.A, LS3.B; CCC: Patterns)

Lesson 3: Calf Health

English Language Arts

- **SL.1** – Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) on grade level topics and texts, building on others' ideas and expressing their own clearly.
- **3.SL.2** – Determine the main ideas and supporting details of a text presented in diverse media and formats, such as visual, quantitative, and oral formats.
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- **5.SL.3** – Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.

Educational Technology

- **ET.EL.2** – with or without support, students build networks of experts and peers to enhance their learning.

Science

- **3-LS4-3** – Construct an argument with evidence how some organisms thrive, some struggle to survive, and some cannot survive in a particular habitat. (SEP: 7; DCI: LS4.C; CCC: Cause/Effect)
- **3-LS1-1** – Develop models to describe that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death. (SEP: 1; DCI: LS1.B; CCC: Patterns)

Science and Engineering Practices

- **SEP 1** – Asking Questions and Defining Problems
- **SEP 4** – Analyzing and Interpreting Data
- **SEP 7** – Engaging in Argument from Evidence

Lesson 3 Optional Learning

Moo Management Board Game

Mathematics

- **3.MD.C.9** – Determine the value of a collection of money using dollar sign and decimal point appropriately. Understand that the digits to the right of the decimal represent parts of a whole dollar
- **3.NF.A.1** – Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts (example: 1 part out of 4 equal parts is the same as ¼); understand a fraction a/b as the quantity formed by a parts of size 1/b. (example: ¾ is the same as 3 one-fourths (¼, ¼, ¼)
- **3.NF.A.3.C** – Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.

Mathematics Practices

- **SMP 3** – Construct viable arguments and critique the reasoning of others.
- **SMP 4** – Use appropriate tools strategically
- **SMP 6** – Attend to precision.

Lesson 4: Beef Energy Cycle

English Language Arts

- **SL.1** – Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) on grade level topics and texts, building on others' ideas and expressing their own clearly.
- **3.SL.2** – Determine the main ideas and supporting details of a text presented in diverse media and formats, such as visual, quantitative, and oral formats.
- **3.SL.3** – Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
- **4.SL.2** – Paraphrase portions of a text presented in diverse media and formats, such as visual, quantitative, and oral formats.
- **4.SL.3** – Identify the reasons and evidence a speaker provides to support particular points.
- **5.SL.2** – Summarize text or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **5.SL.3** – Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.

Educational Technology

- **ET.EL.2** – with or without support, students build networks of experts and peers to enhance their learning.

Science

- **3-LS1-1** – Develop models to describe that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death. (SEP: 1; DCI: LS1.B; CCC: Patterns)
- **3-LS4-3** – Construct an argument with evidence how some organisms thrive, some struggle to survive, and some cannot survive in a particular habitat. (SEP: 7; DCI: LS4.C; CCC: Cause/Effect)
- **4-LS.1** – Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (SEP: 7; DCI: LS1.A; CCC: Systems)
- **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. (SEP: 2; DCI: PS3.D, LSI.C; CCC: Energy/Matter)
- **5-LS2.1** – Support an argument that plants get the materials they need for growth chiefly from air and water. (SEP: 7; DCI: LS1.C; CCC: Energy/Matter)

Science and Engineering Practices

- **SEP:1** – Asking Questions and Defining Problems
- **SEP:2** – Developing and Using Models
- **SEP:8** – Obtaining, Evaluating, and Communicating Information

Lesson 5: Beef Life Cycle

English Language Arts

- **SL.1** – Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) on grade level topics and texts, building on others' ideas and expressing their own clearly.
- **3.SL.2** – Determine the main ideas and supporting details of a text presented in diverse media and formats, such as visual, quantitative, and oral formats.
- **3.SL.3** – Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
- **4.SL.2** – Paraphrase portions of a text presented in diverse media and formats, such as visual, quantitative, and oral formats.
- **4.SL.3** – Identify the reasons and evidence a speaker provides to support particular points.
- **5.SL.2** – Summarize text or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **5.SL.3** – Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.

Educational Technology

- **ET.EL.2** – with or without support, students build networks of experts and peers to enhance their learning.

Science

- **3-LS1-1** – Develop models to describe that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death. (SEP: 1; DCI: LS1.B; CCC: Patterns)
- **3-LS4-2** – Use evidence and reasoning to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

Lesson 6: A Day Without Cows

Educational Technology

- **ET.EL.2** – with or without support, students build networks of experts and peers to enhance their learning.

Mathematics

- **3.MD.B.3** – Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.

Mathematics Practices

- **SMP 3** – Construct viable arguments and critique the reasoning of others.
- **SMP 4** – Model with mathematics
- **SMP 6** – Attend to precision

Science

- **3-LS1-1** – Develop models to describe that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death. (SEP: 1; DCI: LS1.B; CCC: Patterns)

Science and Engineering Practices

- **SEP 1** – Asking Questions and Defining Problems
- **SEP 2** – Developing and Using Models
- **SEP 4** – Analyzing and Interpreting Data
- **SEP 5** – Using Mathematics and Computational Thinking
- **SEP 7** – Engaging in Argument from Evidence

Literature To Explore

Opportunities to explore animal agriculture do not end when the lessons end, so here are some great books to keep the adventure going.

The Beef Princess of Practical County. By Michelle Houts

This chapter book follows twelve-year-old Libby as she picks out her first calves to take to county fair.

Beef Strong. By Amanda Radke (recommended with Lesson 5)

Learn from athletes about what it takes to be flexible, driven, and strong while learning about the nutrients provided by beef.

C is for Care. By Amanda Radke (recommended with Lesson 3)

This book covers the A to Z of caring for cattle.

Can-Do Cow Kids. By Amanda Radke (recommended with Lesson 6)

Follow Cody and Cassidy as they help keep their cattle safe and sound while they learn about a variety of agricultural careers.

Cattle Kids. By Cat Urbigkit (recommended with Lesson 1)

This illustrated book follows youth through a year of ranching on the western range.

The Cow Book. By CJ Brown (recommended with Lesson 2)

Explore cattle breeds from A to Z.

Harvey By Michelle Weber (recommended with Lesson 2)

This colorful illustration follows Harvey the Hereford calf through his very first day on the ranch.

The Journal of Rowdy the Cow Kid. By Amanda Radke (recommended with Lesson 4)

Follow Rowdy on a 12 month adventure of being a cow-kid to learn how cattle help the land, water, and air alongside their caring beef farmers and ranchers.

Levi's Lost Calf. By Amanda Radke (recommended with Lesson 1)

It's time to round up the cattle from the pasture, but Levi finds his favorite heifer calf is missing. Follow along as Levi searches the ranch to find his calf.

Little Joe. By S.N. Wallace;

In this chapter book, nine-year-old Eli learns what it means to take responsibility for a living animal as he raises his first bull calf for competition.

The Girl Who Thought in Pictures: The story of Dr. Temple Grandin. By J.F. Mosca

This inspirational illustrated biography follows Temple from her autism diagnosis to becoming an esteemed animal scientist.

Roll, Sprinkle, Spread, Bake! By Amanda Radke (recommended with Lesson 6)

Take and adventure with grandma as she heads to the grocery store and makes pizza.

The Winter Cowboy. By Stephanie White (recommended with Lesson 3)

Caring for cattle during the winter months can be a challenge, follow along and learn how ranchers care for their animals during this cold season.

Whole-y Cow! Fractions are Fun. By Taryn Souders

Follow along with this entertaining cow and her farm friends as they explore fractions.