

Steam Flaking Corn: Student Experiment

Introduction

In this activity, you will design and conduct an experiment to create steam flaked corn in your classroom using dried whole dent corn and compare it to a sample of professionally steam-flaked corn.

Safety Notice

- You will be working with heat sources (boiling water, steam, or microwaves). Always use caution to avoid burns.
- Do not touch hot surfaces or steam directly. Use protective equipment (tongs, gloves, or towels) as needed.
- When using a roller or flattening device (rolling pin, book, or other tool), ensure your surface is stable and apply pressure carefully to avoid injury.
- Always follow your teacher's instructions and ask for help if needed.

Part 1: Background Research

Before designing your experiment, answer the following questions using the provided reading on steam flaking corn:

- Why is whole corn not the most efficient feed for cattle?
- What is the purpose of steam flaking? How does it change the corn?
- What happens to the starch in the corn during steam flaking?

Part 2: Designing Your Experiment

Now, you will develop a plan to attempt steam flaking corn using materials available in a classroom setting.

Available Materials:

- Dried whole dent/field corn sample
- Pre-flaked steam-flaked corn sample (for comparison)
- Heat source (boiling water, microwave, or steam from a humidifier/kettle)
- Roller or flattening device (rolling pin, heavy book, etc.)
- Paper towels, trays, measuring tools
- Notebook for observations

Step 1: Hypothesis

Based on what you know about steam flaking, predict how you can replicate the process with classroom tools.

- Write your hypothesis (your best guess about what will happen when you steam and flatten the corn):

Example: "If we expose whole corn to steam for X minutes and then flatten it, the starch will gelatinize, making it softer and more digestible."

Step 2: Experiment Plan

Describe how you will attempt to create steam flaked corn using the materials provided.

- How will you apply steam to the corn? (e.g., Boil it? Hold it over a steaming kettle?)
- For how long will you apply steam before flattening the corn?
- How will you flatten the corn? (e.g., Use a rolling pin? Press between books?)
- How will you measure whether your experiment is successful?

Part 3: Conducting the Experiment & Observations

Complete the experiment based on your design and record your observations:

- Before Steaming - Describe the texture and appearance of whole corn before processing.
- After Steaming - How did the corn change in color, texture, or moisture?
- After Flattening - How well did the corn flake? Did it look similar to the professional sample?
- Comparison to Professional Steam-Flaked Corn - What differences do you notice between your homemade version and the sample provided?

Part 4: Data Analysis & Conclusions

- Did your steam flaking process work? Why or why not?
- What challenges did you experience?
- If you were to repeat this experiment, what changes would you make?
- How does this experiment help you understand the importance of steam flaking in cattle nutrition?

Wrap-Up Discussion

After completing your experiments, discuss your results with your classmates. Did everyone have similar outcomes? What did you learn about starch gelatinization and its role in livestock nutrition?

Processing Feeds for Beef Cattle

by Dr. John Matsushima, *Beef Cattle Feedlot Industry*, published 2022

Many feeds, particularly whole corn, for beef cattle in their original form is not very suitable for digestion. During the early years when whole corn was fed to finishing cattle a large percentage of the grain passed through the digestive tract without being utilized. Consequently, various methods of processing were adopted.

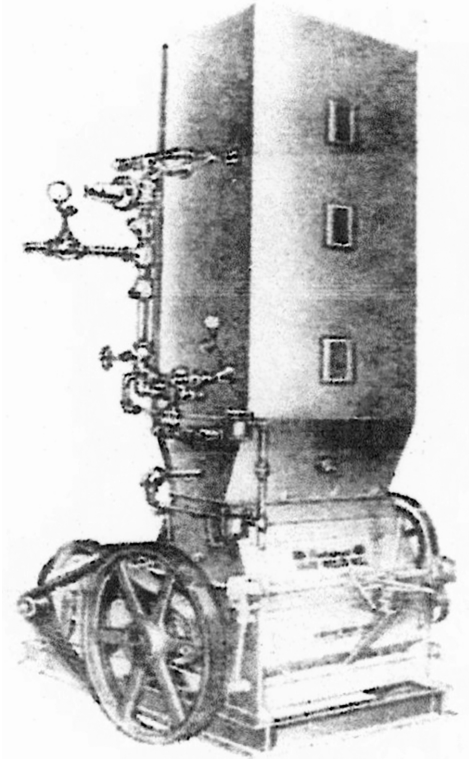
During a period of nearly 140 years many different methods of grain processing were adopted. These methods are shown in the table.

As the cattle feeding industry expanded rapidly during the early 1950's the demand for new developments arrived. One of these was the development of a grain processing technique. This processing method was called "steam flaking"

developed by Dr. John Matsushima and his graduate students at Colorado State University in early 1960's. The process involves a steam chamber, original model show in the illustration, which cooks the whole corn as it gravitates downward into a roller mill. The rollers must be set very close so that the flakes are very thin. The starch gelatinization takes place in the steam chamber and also with the pressure generated between the rollers. Thus, the chemical and physical changes brought about the steam flaking process increases the feed value of the corn by nearly 10% and thereby cheapens the cost of beef to the consumer. Steam flaking of grains, both corn and milo, saves the cattle feeding industry over 250 million dollars a year. Ever since the innovation of the flaked corn the process has been adopted throughout the world.

Grain processing methods.

Dry process		Wet process	
Method	Year started	Method	Year started
Grinding	1840	Soaking	????
Crimping	1930	Cooking, boiling	????
Pelleting	1957	Steam rolling (barley)	1930
Extruding	1966	Steam flaking (corn)	1950
Popping	1966	High moisture-ensile	1958
Micronizing	1970	Pressure cooker-roll	1966
Roasting	1975	Reconstitute (milo)	1968
		Exploding (milo)	1972



Steam flaking machine

Whole corn gravitates into the steam chamber. When the corn reaches the bottom of the chamber, the starch has gelatinized. The whole corn drops through two rollers and is flattened. The "corn flakes" drop to a storage bin after drying or moved while hot and moist into a feed mixer for feeding cattle.



Whole kernel dent or field corn



Steam-flaked corn

High quality steam-flaked should be processed to be as THIN as possible for optimum starch gelatinization. When steam flaked corn is fed to feedlot cattle, it takes nearly ten percent less feed to get cattle to market.

Read more about Dr. John Matsushima and his inventions that revolutionized the cattle feeding industry in the magazine Grounded included in the 2025 Literacy Project kit.

Japanese Americans in Colorado During WWII

History Colorado Virtual Field Trip



It is through a partnership between Colorado Agriculture in the Classroom and History Colorado that we are proud to provide a video on Japanese Americans in Colorado during WWII. Thank you Rachael Storm, Ph.D., Curator of Business + Industry of History Colorado for creating this video. The video can be accessed on the [CoAITC YouTube Channel \(@coagclassroom\)](#), using this link <https://bit.ly/3CjNbwT>, or scanning this code.



Watch the History Colorado Virtual Field Trip Video. Read each question and on a separate piece of paper answer in complete sentences using details from the video. Review your answers and be ready to discuss with the class.

Think: Why is it important to remember this history?

1. Why did some Japanese Americans have to leave their homes during World War II?
2. What was life like for Japanese Americans living in Amache, the concentration camp in Colorado?
3. How did Japanese Americans try to make life better while living in Amache?
4. What did Governor Ralph Carr do to help Japanese Americans in Colorado? Why was this important?
5. Why is it important to remember places like Amache and the experiences of Japanese Americans during WWII?

JAPANESE RAILROAD WORKERS

c. 1900

Sueji Matsushima (standing on the far right in the photo) -
Dr. John Matsushima's grandfather

Sueji Matsushima was born in Kumamoto Prefecture in southern Japan. He left for America by boat from Yokohama around 1900 at the age of 29, and landed in Vancouver, British Columbia, Canada after being at sea for over a month. From Vancouver, he made his way to settle and western Nebraska to work on the Union Pacific railroad and in the sugar beet fields. During the winter months after the sugar beet harvest, he and his friends traveled to Denver to earn pin money (small amounts of extra money earned through temporary or side jobs) by washing dishes at restaurants and doing laundry work at hotels. He missed the train to return to Nebraska on his second or third trek, and that led him to walk northward from Denver along the Platte River. He met a fur trapper named Albert Leyner who was a farmer that had a homestead. This meeting led to a share crop partnership between Sueji and the farmer, mainly raising sugar beets in Lafayette, CO. Sueji saved enough money to send for his son Kihei (Dr. John Matsushima's father) to join him, and eventually his son Kihei moved to south of Platteville to start a farm and purchased it in 1931.

Courtesy of Matsushima Family



As you watch the History Colorado video on Japanese Americans Living in Colorado during WWII, keep your eyes out for this photo!

“Good Food + Good Water = A Good Life”

Background on Dr. John Matsushima:

Dr. John Matsushima is a renowned animal scientist whose groundbreaking research in cattle nutrition revolutionized the beef industry. Born in 1920, he dedicated his career to improving feed efficiency and beef quality, benefiting both farmers and consumers. His lifelong commitment to agriculture, education, and innovation has earned him numerous honors. On December 24, 2024, Dr. Matsushima celebrated his 104th birthday, a testament to a life devoted to learning and progress. As you complete this assignment, consider how his philosophy—“Good food plus good water equals a good life”—reflects his impact on agriculture and society. Read more about his contributions in the article in the magazine *Grounded* before writing your response.

Objective 1:

Explore the importance of food and water in supporting a healthy life, connecting to agriculture, science, and society.

Instructions:

- 1. Choose Your Approach:** Write an informative essay, a persuasive argument, or a personal reflection on Dr. John Matsushima’s philosophy: “Good food plus good water equals a good life.”
- 2. Research & Support:** Use credible sources to explain how quality food and clean water contribute to health, agriculture, and communities.
- 3. Make It Relevant:** Connect your ideas to Colorado agriculture, water use, or nutrition.
- 4. Write & Organize:**
 - Introduction: Introduce the quote and explain its meaning.
 - Body Paragraphs: Provide evidence, examples, and reasoning to support your ideas
 - Conclusion: Summarize key points and reflect on why this philosophy matters today.
- 5. Revise & Edit:** Check for clarity, grammar, and strong arguments.

Length: 500–750 words

Submission: Typed, double-spaced, 12-pt font.

Objective 2:

You will explore how good food and clean water impact health, agriculture, and sustainability. This activity will help you connect Dr. John Matsushima’s philosophy—“Good food plus good water equals a good life.”—to real-world issues.

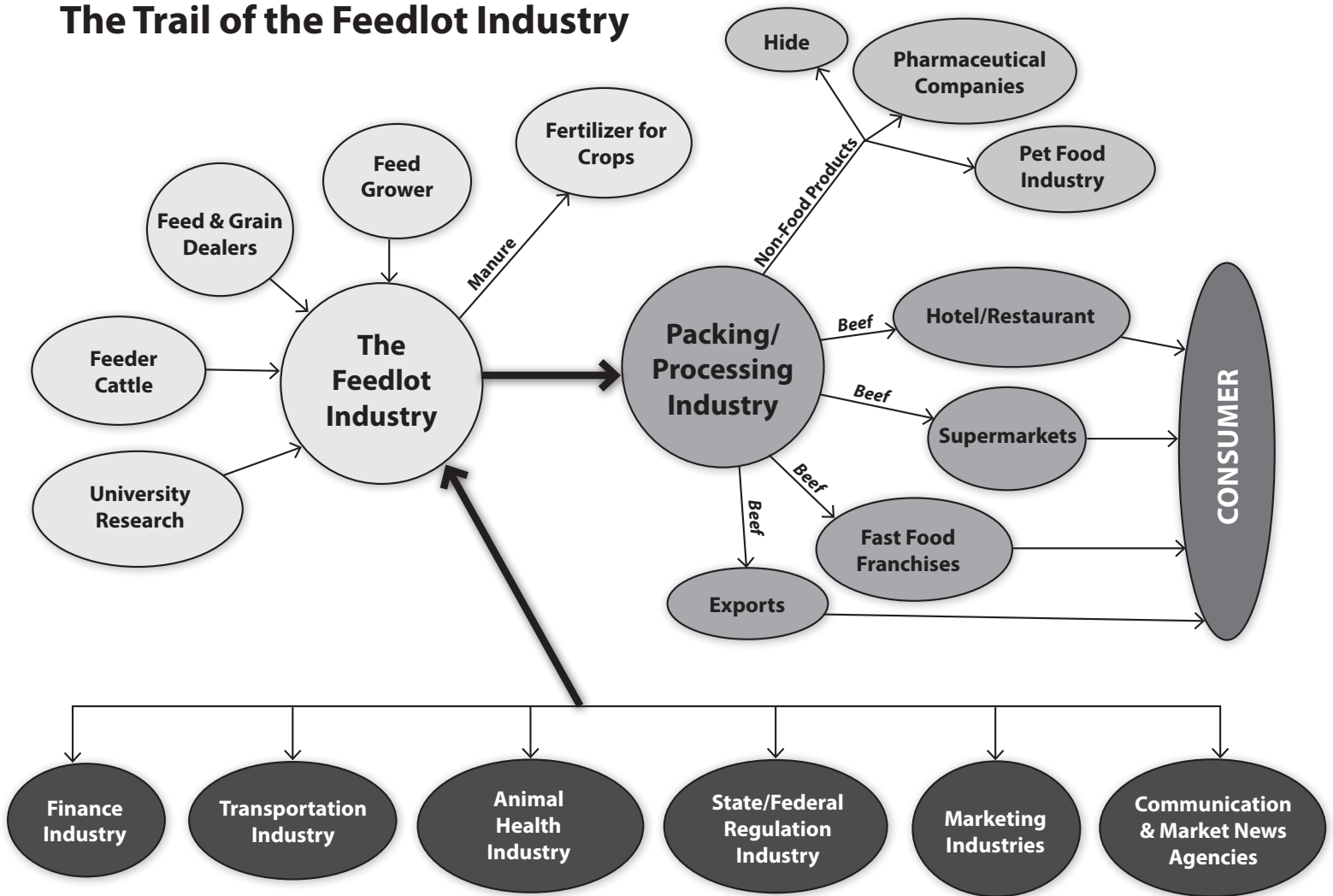
Instructions:

- 1. Think & Discuss:**
 - What do “good food” and “good water” mean to you?
 - How do they affect people’s health, agriculture, and the environment?
 - What happens when people don’t have access to one or both?
- 2. Research & Compare:**
 - Choose one of the following topics to explore: 1) Water scarcity and how it affects food production; 2) Sustainable agriculture and ways farmers improve food and water quality; 3) Nutrition and health, focusing on why a balanced diet is important
 - Find two locations to compare: One with good access to food and clean water and One facing challenges with food or water shortages
- 3. Create a Visual Representation:**
 - Make an infographic, poster, or digital slideshow to show what you learned.
 - Include facts, statistics, and possible solutions to food and water issues.
- 4. Share & Reflect:**
 - Display your work in a class gallery walk or give a short presentation.
 - Discuss: How does Dr. Matsushima’s philosophy apply to what you learned?

Assessment & Submission:

- Your visual should be clear, informative, and creative.
- Be prepared to explain your findings and how they connect to the big idea.

The Trail of the Feedlot Industry



This "The Trail of the Feedlot Industry" infographic was recreated from page 3 of the book, *Beef Cattle Feedlot Industry*, written by Dr. John Matsushima and published in 2022

Part 1: Identifying Industries in the Beef Supply Chain

The beef supply chain involves multiple industries that work together to bring beef from cattle ranches to consumers. These industries are categorized into three economic sectors:

- **Primary Sector:** Industries that involve raw material production (e.g., farming, ranching, feed production).
- **Secondary Sector:** Industries that process and manufacture products (e.g., packing plants, processing facilities).
- **Tertiary Sector:** Industries that sell, market, and distribute goods to consumers (e.g., supermarkets, fast food, exports).

Instructions: Look at The Trail of the Feedlot Industry graphic, on a separate sheet of paper create a table that categorizes each industry into the correct sector.

Part 2: The Impact of Policy Changes

Government policies can impact every sector of the beef supply chain. These policies may include:

- **Environmental Regulations:** Examples include restrictions on manure management, greenhouse gas emissions rules.
- **Trade Agreements:** Examples include tariffs on beef exports, international food safety standards.
- **Transportation Laws:** Examples include fuel cost increases, trucking regulations, livestock transport laws.

Instructions: Choose one policy change from the list above and answer the questions below on a separate piece of paper.

1. Which policy change did you choose?
2. Which industries in the beef supply chain would be most affected by this policy? Why?
3. What are some potential positive and negative effects of this policy?

Name: _____ Date: _____

Cattle Feeding Math: Land, Space, and Feeding Calculations

Introduction: Cattle ranchers must understand land measurements and feeding requirements to manage their herds efficiently. Use math to solve real-world ranching problems!

Part 1: Land Measurement and Carrying Capacity

1. How many square feet are in one acre?

- 1 acre = 4,840 square yards
- 1 square yard = 9 square feet
- Calculate the total square feet in one acre: _____

2. How many acres are in a quarter section of land?

- A full section = 640 acres
- Calculate the number of acres in one quarter section of land? = _____ acres

3. Carrying Capacity Discussion: Carrying capacity is the maximum number of animals that a given area of land can support without degrading natural resources. It depends on factors like soil quality, forage availability, climate, and management practices.

- Using the example of a carrying capacity of 1 cow-calf pair per 40 acres of non-irrigated land in Colorado, Calculate the number of cow-calf pairs that can be supported on 160 acres? _____

Part 2: Cattle Feeding and Space Requirements

5. Feeding Space for a Cow Herd (Average weight of 1200-1500 lbs.)

- Mature beef cows require 15 inches of bunk space per head.
- Convert inches to feet: 15 inches \div 12 = _____ feet per cow
- Calculate the total bunk space required for 200 mature beef cows: _____ feet

6. Feeding Space for Backgrounding Calves (Average weight of 400-900 lbs.)

- 100 backgrounding calves at an average weight of 650 lbs. require 18 inches of bunk space per head.
- Calculate the total bunk space required for these 100 backgrounding calves: _____ feet

7. Feeding Space for Finishing Cattle (Average weight of 900-1500 lbs.)

- 200 finishing cattle at an average weight of 1,350 lbs. require 12 inches per head when fed a grain-based diet once a day.
- Calculate the total bunk space required for these 200 finishing cattle: _____ feet

Reflection and Application

Why is it important to calculate land and feeding space correctly?

How might these calculations change based on weather, feed type, or animal size?

If you were designing a cattle operation, what factors would you consider when planning land and feed space?

Name: _____ Date: _____

Agriculture Careers Exploration Worksheet

Instructions:

1. Read the article Growing Opportunities: Careers in Agriculture (on the other side of this page) to learn about career options in agriculture.
2. Explore the magazine Grounded included in your 2025 Literacy Project Kit. This magazine contains profiles of people working in various agriculture-related careers.
3. Choose an agricultural career to research and complete the worksheet below.

Career Exploration Questions

What is the name/title of the agricultural career you are exploring?

Why did you choose to research this career?

List the resources you used for your career research (people, publications, online sources, businesses, etc.):

a. _____

b. _____

c. _____

d. _____

List the main job duties and responsibilities for this career:

What is the average pay or salary for this career?

What education, training, or background knowledge is required for this career?

Name five personal strengths or qualities you have that would make this a good career choice for you:

Student Reflection

Think about the career you researched. Would you consider pursuing this career in the future? Why or why not?

Growing Opportunities: Careers in Agriculture

When you think about agriculture, what comes to mind? You might picture farmers and ranchers working in fields and pastures, raising crops and livestock. But agriculture is much more than that—it's a diverse and exciting industry filled with opportunities in science, technology, business, education, and engineering. In fact, agriculture and related industries employ more than **22 million people in the United States**, making up about **11% of all U.S. jobs**.

Each year, approximately **59,400 job openings** in agriculture and food systems are available in the U.S., but there are not enough graduates to fill them all. That means careers in agriculture are in high demand, and the opportunities are growing! Advances in technology, a changing climate, and the need to feed a growing world population mean that new jobs are constantly being created. From drone operators who use technology to monitor crop health to food scientists developing sustainable ingredients, the industry is full of innovation.

A Variety of Careers

Agriculture is not just about working on a farm. It includes careers in:

- **Animal Science & Veterinary Medicine** – Caring for livestock and developing nutrition plans.
- **Environmental Science & Conservation** – Protecting natural resources and developing sustainable farming practices.
- **Food Science & Safety** – Ensuring the food we eat is safe and nutritious.
- **Technology & Engineering** – Developing agricultural machinery, precision technology, and even agricultural robotics.
- **Agribusiness & Marketing** – Managing farms, selling agricultural products, and working in agricultural finance.
- **Education & Communications** – Teaching the next generation of agricultural leaders and sharing the story of agriculture with the public.

Agriculture Careers in Colorado

Colorado's diverse landscape means there are many different agricultural careers available across the state. With **over 36,000 farms and ranches** covering **nearly half of Colorado's land**, agriculture is a major part of the state's economy. Colorado is a leader in beef production, dairy farming, and specialty crops like Pueblo chiles, Palisade peaches, and Olathe sweet corn. The state is also home to growing industries in agriculture technology, soil conservation, and food innovation.

The agriculture industry in Colorado employs more

than **195,000 people**, contributing approximately **\$47 billion annually** to the state's economy.

Some exciting careers in Colorado agriculture include:

- **Precision Agriculture Technicians** – Using drones and GPS technology to make farming more efficient.
- **Wildlife & Rangeland Specialists** – Managing land and water resources to balance agriculture with environmental conservation.
- **Meat Scientists & Food Safety Inspectors** – Ensuring safe and high-quality meat products.
- **Hydrologists & Irrigation Engineers** – Helping farmers manage water resources in Colorado's dry climate.
- **Greenhouse & Vertical Farming Experts** – Growing fresh produce in new, sustainable ways.

Why Choose a Career in Agriculture?

The agriculture industry is not only growing—it is evolving to meet the needs of the future. With advancements in technology and sustainability, agriculture is one of the most exciting and innovative career fields today. Plus, agriculture offers **job security**, **competitive salaries**, and the chance to make a real impact on the world by helping to feed people, protect the environment, and advance new technology.

Whether you love science, technology, business, or working with animals, there is a place for you in agriculture. Colorado's agricultural industry needs the **next generation of innovators, problem solvers, and leaders** to keep growing. Could that be you?

What agricultural career interests you the most?

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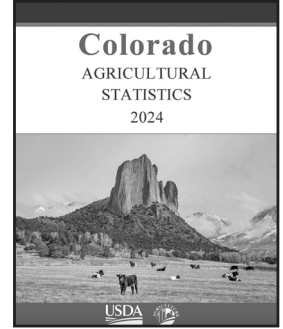
Name: _____ Date: _____

Exploring Colorado Agriculture through Data

Colorado agriculture is diverse, covering everything from cattle ranching and dairy production to growing crops like wheat, corn, and Pueblo chiles. Understanding agricultural data helps farmers, business owners, and policymakers make informed decisions.

You will use the 2024 Colorado Agricultural Statistics Bulletin to answer the following questions. To find the 2024 Colorado Agriculture Statistics Bulletin, search the internet for the Colorado Annual Agricultural Statistics Bulletin on the United States Department of Agriculture (USDA) National Agricultural Statistics Service (NASS) website.

This activity will help you analyze Colorado agriculture, compare trends, and think like an agricultural expert.



Part 1: Agriculture in Your Region

Find your region on the Colorado Agricultural Statistics map in the bulletin.

1. What is your Agricultural Statistics District (ASD)?

List three major crops or livestock products produced in your district:

A. _____

B. _____

C. _____

Compare your district to another region in Colorado.

2. Choose a different ASD and compare its top products to your district. What are the biggest differences?

3. Why do you think agriculture varies so much across different regions of Colorado? Think about climate, elevation, soil, and water availability.

Part 2: Colorado's Agricultural Impact

How much land is used for agriculture in Colorado?

4. Find the number of total farm and ranch land acres.

5. What percentage of Colorado's total land area is used for agriculture?

6. How many farms and ranches are there in Colorado?

7. What is the average size in acres of a farm/ranch in Colorado?

Colorado's #1 crop or livestock product:

8. What is Colorado ranked #1 in producing nationally?

9. Why do you think Colorado excels at producing this?

Agriculture's Economic Impact

What was the total farm cash receipts for Colorado in 2022?

What percentage of the total farm cash receipts were from livestock and livestock products?

What percentage were from crops?

What does this tell you about whether Colorado is more focused on crops or livestock?

Part 3: Understanding Trends in Colorado Agriculture

Changes Over Time

Look at the data from 2018 and 2022 for cattle and corn production.

What was the total cattle inventory in Colorado in

2018: _____

2022: _____

What was the total corn production (bushels per acre) in

2018: _____

2022: _____

Why do you think these numbers changed? Consider drought, economy, consumer demand, or new technologies.

Irrigated vs. Non-Irrigated Land

What was the average cash rent per acre in your county

Irrigated land: \$ _____

Non-irrigated land: \$ _____

Pastureland: \$ _____

Why is irrigated land more expensive to rent than non-irrigated land?

Part 4: Thinking Like an Agricultural Leader

Decision Making: You are a Colorado farmer!

Imagine you are running a farm in your region. Based on what you learned from the statistics bulletin, decide:

What crops or livestock would you focus on producing?

What challenges might you face?

What new technology or practices could help your farm be successful?

Using Data to Predict the Future

Based on what you've learned, how do you think agriculture in Colorado will change in the next 10 years?

Final Reflection

Now that you've explored real agricultural data, what is one new thing you learned that surprised you?

Would you consider a career in agriculture after seeing this data? Why or why not?

Video Contest

Cattle, Corn, and Courage - The Story of Dr. John Matsushima

Thank you for participating in Colorado Agriculture in the Classroom's 2025 Literacy Project! We have created a Video Contest as an opportunity to showcase your class's or school's involvement in the Literacy Project, "Cattle, Corn, and Courage - The Story of Dr. John Matsushima," and to share the learning and creativity of your students. Below are the official rules and guidelines for participation.

Eligibility:

- Open to all classes or schools participating in the 2025 Literacy Project.
- Videos must be submitted by a teacher, school representative, or designated project leader.
- **Two Contest Divisions:**
 - 1) Elementary Entries (PreK-5 grades)
 - 2) Middle/High School Entries (6-12 grades)

Contest Theme:

- Videos should showcase your class or school's engagement with the Literacy Project. This could include footage of students participating in project activities, creative presentations of what they learned, or storytelling around the theme "Cattle, Corn, and Courage."

Video Requirements:

- **Length:** Videos should be 1 to 3 minutes long.
- **Format:** Accepted file formats include MP4 or MOV.
- **Content:** Videos must contain original content or content with proper licensing. Do not include copyrighted music, images, or materials unless you have permission to use them.
- **Permissions:** Ensure all students appearing in the video have signed media release forms from parents or guardians.

Submission Process:

- **Submit your video through Jotform at the following link:** <https://bit.ly/3WqBWhu> or scan the code.
- **Deadline:** All submissions must be received by 11:59 PM MST on May 15, 2025.
- **Contact Information:** Please include an email address and phone number that can be used to contact you during the summer.
- **Media Waiver:** Submissions must include acceptance of the media release terms (see below).



Scan to Submit
Video Contest
Entries

Prizes:

- **Participation Incentive:** Each teacher or school submitting a valid entry will receive a \$25 gift certificate to the Ag Classroom Store.
- **Winning Prizes:** Larger gift certificates will be awarded for each division:
 - > Best Overall Video: \$250
 - > Most Creative Video: \$150
 - > Best Student Learning Showcase: \$150
- Winners will be notified via email by June 15, 2025. Be sure to include a summer email address on the entry form.

Judging Criteria:

- Creativity and originality.
- Relevance to the Literacy Project theme.
- Student engagement and learning outcomes demonstrated.
- Production quality (e.g., clear audio and visuals).

Media Release and Disclaimer:

By submitting a video, you grant Colorado Agriculture in the Classroom (CoAITC) the right to use the video for promotional purposes. Videos may be shared on CoAITC's website, social media channels, newsletters, and with project donors. You affirm that all necessary permissions, including parental consent for student appearances, have been obtained.

Video Tips and Tricks:

Here are some tips and tricks to help you produce high-quality, engaging footage!

Stabilize Your Camera

- **Use Both Hands:** Hold your phone or camera with both hands to prevent shaky footage.
- **Use a Tripod or Gimbal:** For ultra-smooth video, invest in a tripod or a gimbal (a handheld stabilizer).
- **Lean Against Something:** If you don't have a tripod, lean your body or arms against a stable surface to minimize shaking.

Set the Right Resolution and Frame Rate

- **Resolution:** For most uses, filming in 1080p (Full HD) will suffice, but for higher quality, shoot in 4K (found in settings). Keep in mind that 4K files take up more storage space.
- **Frame Rate:**
 - > Smooth motion (e.g., fast-moving subjects): 60 fps
 - > Cinematic or film-like footage: 24 fps
 - > Aspect Ratio: Videos can be recorded horizontally-holding the phone sideways (16:9 aspect ratio) or vertically-holding the phone upright (9:16)

Lighting

- **Lighting is everything!** Ensure that the light is behind your videographer so that it shines on the subject.
- **Natural Light:** Film near windows or outside for bright, even lighting.
- **Artificial Light:** Use lamps or ring lights to brighten your subject. Ensure the light source is in front of your subject.

Audio Quality

- **Quiet Environment:** Choose a location with minimal background noise.
- **External Microphone:** If available, use an external microphone for clearer sound.
- **Test Audio Levels:** Record a short clip and playback to ensure voices are audible.

Composition

- **Clean Your Camera Lens.** We take out phones everywhere and you'd be surprised how dirty your camera is.
- **Rule of Thirds:** Place subjects off-center for a balanced, visually appealing shot. Enable the grid option on your phone to help align shots.
- **Eye Level:** Position the camera at eye level for a natural perspective.
- **Clean Background:** Choose a clutter-free background to keep the focus on the subject.

Preparation

- **Storyboard:** Plan the shots and key points you want to capture before filming.
- **Rehearse:** Run through the activity or interview to ensure everyone knows what to do or say.
- **Multiple Takes:** Film extra footage to ensure you have options during editing.

Filming Techniques

- **Zooming:** Avoid digital zooming, which reduces quality. Instead, move closer to your subject.
- **Panning and Movement:** Move the camera slowly and steadily to avoid jerky footage.
- **Switch to Video Mode:** Open the camera app, swipe to "Video," and start filming.

Editing Basics

- **Simple Tools:** Use free editing apps like iMovie (iPhone), Adobe Premiere Rush, or CapCut to trim clips and add transitions.
- **Titles and Captions:** Add titles to introduce the video and captions for accessibility.
- **Music:** Include royalty-free music, ensuring it doesn't overpower the dialogue.

File Management

- **Storage Space:** Check your phone's storage before filming to ensure enough space.
- **Backup Footage:** Save your video files to cloud storage or an external drive after filming.

These tips will help you create a polished, engaging video that showcases your class's work and creativity. Have fun filming!

Additional Lessons from the Agriculture Literacy Curriculum Matrix

The Agricultural Literacy Curriculum Matrix is an online, searchable, and standards-based database for K-12 teachers. The Matrix contextualizes national education standards in science, social studies, and nutritional education with relevant instructional resources linked to Common Core Standards. Below are a few lesson plans that could be used in conjunction with the Literacy Project. Find these lessons and more by searching the **lesson name** on the Curriculum Matrix at CoAgClassroom.org.

Grades K-2

Animals on the Farm: Students discover that farm animals produce different types of products.

Milk or Meat? Beef or Dairy?: Students identify the differences between beef and dairy cattle and determine the commodities produced by each type of cattle.

Agriculture Pays: Students discover that agricultural careers are interconnected and that agriculture influences many parts of their daily lives.

Grades 3-5

Beef Basics: Students explain the value of the beef cattle industry, including the products cattle produce, the production process from farm to plate, and how cattle can utilize and obtain energy from grass and other forage.

Corn an A-maizing Plant: Food, Fuel, and Plastic: Students examine the growth, composition, history, and uses of corn through a close reading activity, discussion of renewable and non-renewable resources, and hands-on exploration of bioplastics made from corn.

Find Your Future Career: Students discover the variety of agricultural careers available and consider their career paths in terms of economics, interests, and suitability to their personal talents and characteristics.

Grades 6-8

The Remarkable Ruminant: In this lesson, students will follow the farm to fork process of producing beef, learn how cattle and other ruminants convert grass into nutrient-rich foods such as milk and meat, discover ways cattle recycle food waste, and identify careers in the beef cattle industry.

Energy and Biofuels: Students explore the process of fermentation in the creation of ethanol and observe the role enzymes play in the fermentation of starch.

Growing America: Students determine corn anatomy and function of plant parts, identify stages of plant development in corn, and research how temperature plays a role in corn growth as they calculate growing degree units (GDUs) for a region.

Career Trek: From Farm-to-Fork: Explore the farm-to-fork process of food through the lens of careers. Students will make a career web to see the variety of careers and skill sets necessary to our food system. They will check their understanding by playing Career Trek—a board game that requires students to identify careers in agriculture and natural resources.

Grades 9-12

A Tale of Two Burgers: Beef and Plant-based Protein: Students compare the components of beef and plant-based burgers by determining the production and processing methods of each product; evaluate the ingredients and nutritional differences between beef and plant-based products; and discuss different points of view in the agricultural industry concerning plant-based proteins and traditional beef. This lesson covers a socioscientific issue and aims to provide students with tools to evaluate science within the context of social and economic points of view.

Carbon Hoofprints: Cows and Climate Change: Students explore the carbon cycle and evaluate the carbon footprint of cattle. Using critical thinking skills, students will use the Claim, Evidence, and Reasoning model to determine the effect of cows' methane production on the environment and investigate the extent cattle contribute to climate change.

Energy and Biofuels: Through a series of activities, students explore fermentation and ethanol production, observe the role of enzymes in fermentation, analyze nutrient values of dent corn, and discover how biofuels are made from plant oils.

Grades 6-12 Kit

Discover Agriculture Careers Bundle: Explore the wide world of agricultural careers with this comprehensive kit designed for grades 6-12. From farming and ranching to cutting-edge research in biotechnology and sustainability, this kit highlights a range of exciting career paths in agronomy, animal science, agricultural engineering, food science, agribusiness management, environmental conservation, and more. The kit includes a folded poster, 48 career cards, and 100 Discover Agriculture stickers. Bulk pricing is available, and individual resources can also be purchased. These materials complement the Discover Agriculture Careers website and are perfect for enhancing classroom lessons, which can be found on the Agricultural Literacy Curriculum Matrix.