

CONNECT: Beef Production & Family and Consumer Sciences



This lesson is made possible through the support and content contributions of the Kansas Beef Council and Kansas Corn Commission.

CONNECT: Beef Production & Family and Consumer Sciences

Grade Level: Middle School / High School

Overview

As cities grow, many people move away from an agricultural understanding, even though it is essential to our basic needs (food, clothing, shelter) and relates or interacts with a sustainable environment and our quality of life. Kansas is one of the largest beef and corn producing states, and agriculture is the largest industry in Kansas. This curriculum is designed to provide students a basic knowledge of beef production. Students will learn about the beef life cycle and beef's role in a sustainable and healthy diet. Many cross-curricular connections can be made using this curriculum and teachers are encouraged to adapt this activity to meet their lesson's objectives and learning outcomes. Starting a cooking lab with this curriculum will create general awareness that can lead to more in-depth investigations and activities that will keep the conversation going about the journey of food from pasture to plate. A great intro to beef cooking labs!

Next Generation Science Standards (NGSS)

Middle School Science

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 human impact on the environment.

High School Science

HS-ESS3-1. Earth and Human Activity. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

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.

National FCS Standards

8.0. Food Production & Services

- Integrate knowledge, skills, and practices required for careers in food production and services.

9.0. Food Science, Dietetics, and Nutrition

- Integrate knowledge, skills, and practices required for careers in food science, food technology, dietetics and nutrition.

14.0. Nutrition & Wellness

- Demonstrate nutrition and wellness practices that enhance individual and family wellness.

Common Core State Standards Connections

- ELA/Literacy: RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
- Mathematics: HSS-IC.B.6 Evaluate reports based on data.

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Suggested Lesson Time

- 3 total days:
 - ▶ 1-2 class periods for instruction; *flexible depending upon the length of class*
 - ▶ 1 class period for cooking lab (based on 45-minute classes)

Learning Objectives

- Students will understand sustainable beef production practices and their important relationship to nutrition quality by creating a nutrition plan for a student.
- Students will be able to communicate basic information about Kansas agriculture, specifically beef production operations, after exploring the real-life operations showcased in Station 2.
- Students will be able to identify the correlation and connections between the beef and corn industries

Background Information

Beef Nutrition

Right now in America and other developed countries, it is common to be both overweight and, at the same time, undernourished. Why? We are surpassing recommended levels of calories, but we're not balancing that with enough physical activity, and we're not getting the recommended amounts of many important nutrients.

Beef - including steak, roasts and ground beef - offers a solution to this dilemma. It's delicious and it provides more nutrients in fewer calories than many other food choices. For example, a 3 oz serving of beef contributes over 50% of the daily value of protein and is also an excellent source of zinc, vitamins B₆ and B₁₂, niacin, and phosphorus, and a good source of iron.

Beef in a Healthy, Sustainable Diet

The bottom line is that beef is nourishing and sustainable and most people already are eating beef within global dietary guidelines. So, what can we all do to help make our diets healthier and more sustainable? There are three big opportunities that can make the biggest difference: waste less food, eat a balanced diet and improve the productivity of agriculture globally.

On average, 40% of all the food brought home in America goes uneaten, enough to fill the 90,000 seat Rose Bowl stadium every day, and that means food waste costs the average American family \$2,500 annually. If we wasted less beef, and less food in general, we would improve the environmental impact of our diets because that waste wouldn't be emitting methane in a landfill. One great way to avoid food waste is using ingredients you already have to make a new meal or eating "plannedovers" to re-create leftovers.

We also can eat a balanced diet to contribute to a healthy and sustainable food supply. We know that, on average, 3 ounces of cooked beef provides 10 essential nutrients in about 170 calories, including 25 grams of high-quality protein, zinc, iron, and B vitamins. Beef packs a nutrient punch that can't afford to be lost. By eating a variety of whole grains, fruits, vegetables, and lean proteins - and not wasting it - we can create a sustainable food system that will support a growing global population, so all people can thrive.


When it comes to productivity, in the U.S., we produce the same amount of beef today with 33% fewer cattle compared to 1977, and 18% of the world's beef with only 8% of the world's cattle. This is a result of better animal health and welfare, better animal nutrition and better animal genetics, all of which are supported by the Beef Quality Assurance Program. Beef farmers and ranchers also rely on experts like nutritionists and veterinarians focused on supporting herd health and production.

As we work together to build a healthier, more sustainable food supply for ourselves and future generations, our focus should be on changes that are science-based, practical and highly impactful, like reducing food waste, consuming balanced meals and improving global agricultural productivity.

3OZ SERVING OF BEEF
PROVIDES 175 CALORIES AND:

51% 
OF THE DV OF PROTEIN.

39% 
OF THE DV OF ZINC.

24% 
OF THE DV OF B₆, B₁₂,
NIACIN, PHOSPHORUS.

14% 
OF THE DV OF IRON.

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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.

It takes a community of people to bring beef from pasture to plate. This includes farmers and ranchers, feedlot operators, livestock auction market owners, and packing plant workers as the primary people who care for and raise cattle across the U.S. The beef community also includes veterinarians, animal nutritionists, pen riders and welfare specialists who ensure cattle are cared for and have a proper diet, room to roam and medical care. Finally, restaurants, grocery stores, and families like yours are a very important part of the beef community and contribute to beef's sustainability and innovation.

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. Beef farmers and ranchers care about their animals, and the top priorities for everyone in the beef community are healthy animals and a safe, nutritious, high-quality and delicious protein you can feel good about serving your family and friends.

What Cattle Eat

Raising beef plays an important role in our ecosystem and cattle generate more protein for the human food supply than would exist without them because their unique digestive system allows them to upcycle human-inedible plants into high-quality protein. Did you know approximately half the weight of a corn plant remains after harvest in the stalk, leaf, cob and husk? Fortunately, cattle love the residue (leftovers) and are able to transform a human-inedible byproduct of farming into high-quality beef. This increases the sustainability of that land. Plus, cattle also leave behind a nitrogen-rich, organic fertilizer that provides nutrients for the following year.

Whether grass- or grain-finished, 90 percent of what cattle eat is forage and plant leftovers that people can't eat. Overall, the grain-finished beef system in the U.S. generates 19 percent more protein for the human food supply than it consumes. And, more than 40 percent of the land in the contiguous U.S. is pasture and rangeland, much of which is too rocky, steep, and/or arid to support cultivated agriculture - yet this land can support cattle and protein upcycling.

Vocabulary

Upcycle - ability to upgrade human-inedible material or food waste into human-edible high-quality protein and essential micronutrients

Sustainable Nutrition - meeting the needs of the present without compromising the ability of future generations to meet their needs. Sustainability is composed of three pillars: economic, environmental, and social

Finishing - period when beef cattle are fed an energy-dense diet so they will grow rapidly and add muscle/meat to their frame and optimize fat cover in preparation for slaughter

Food security - the state of having reliable access to a sufficient quantity of affordable, nutritious food

Cow - a mature female that has had at least one calf

Heifer - a young female that has not had a calf

Bull - a mature male capable of reproduction

Steer - a neutered male

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Overview for Teacher

DAYS 1 & 2 (depending on length of your class period):

Introduction/Anticipatory Set

Teacher writes the word “connection” on the board/displays it on a prominent screen, to prompt students to hypothesize what the lesson may be regarding and spark their curiosity.

Teacher asks students: What is the connection between corn farmers, cattle ranchers, and high school students?

Guide the discussion as needed, making connections between the components of what corn farmers plant and harvest that then feeds our cattle, which becomes healthy protein for us to consume in our daily diets.

Explain that through this lesson over the next few days, students will explore the benefits of beef in a nutritious diet, see real-life examples of Kansas beef production, and recognize and discuss the connections between corn farmers and beef producers.

Information Presentation

Students can rotate through stations or do Station 1 on Day 1 and Stations 2 & 3 on Day 2.

Station 1 is reading two articles, selecting a recipe for a student athlete, and creating nutrition facts for that recipe. (See worksheet and lab form.)

Station 2 introduces the interactive Beef Life Cycle platform and provides a virtual tour of two ranches, with their written feedback, blogs, and social media platforms and three 360° videos on the Beef. It's What's For Dinner. website. (See worksheet.)

Station 3 is a capstone application. At this station, students write an elevator speech and describe the important role that corn plays in the diet of cattle.

Reflection & Conclusion

Verbally recap with the students what they learned at each station, and go over the vocabulary terms *upcycle*, *sustainable nutrition*, *finishing*, and *food security*. Ask the students to share their elevator speeches created at Station 3 aloud with the class.

Student Assessment

Assess their understanding based on Station 1 & 2 worksheets and on the content they provide in the elevator speech in Station 3. (Inclusion examples: what cattle eat, beef life cycle notations, beef cattle as upcyclers, beef nutrition - high-quality protein & micronutrients)

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DAY 3: COOKING LAB

May use one of the student-developed recipes from Station 1 here or suggested recipes:

- English Muffin Cheeseburger Pizza
- Beef & Ramen Lettuce Wraps
- Beefy PB&J Wraps
- Tiny Taco Beef Tarts
- Mexican Beef Sausage Cornbread Muffins
- Beef Jerky Trail Mix
- Beefy Sweet Potato Mash-Up

May use pre-developed lesson plans from www.kansasbeef.org/more-information/beef-in-schools/resources-for-food-science-and-fcs-teachers.

Teacher Materials:

- Station 1 Worksheets – Pages S1-S4
- Station 2 Worksheets – Pages S5-S7
- Station 3 Worksheets – Pages S8-S9

Need beef for your cooking lab?

The Kansas Beef Council (KBC) will reimburse Kansas high school and middle school FCS foods classes for the purchase of beef used in classes and teaching labs. Your school is eligible for reimbursement based upon the number of students enrolled in FCS foods classes. Funds will be allocated on a first-come, first-served basis. Funds are only available to Kansas schools and applications are required each year. Visit www.kansasbeef.org/more-information/beef-in-schools/the-beef-certificate-program for more details.

Curriculum Designer

Kansas Beef Council, Kansas Corn Commission and Janet Holden, FCS teacher

Resources

Visit www.kansasbeef.org and www.kansascornstem.com for updated resources in the future.

Citations

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CONNECT: Beef Production and Family & Consumer Sciences - Station #1

Sample Nutrition Plan for a Student Athlete

Directions: Use the following two articles to gain information to fill in the blanks.

Part A: Read the following article: www.kansasbeef.org/health-wellness/5-nutrition-tips-for-student-athletes and use the text to fill in the following information:



5 Nutrition Tips for Student Athletes

The Dietary Guidelines for Americans, 2015-2020, recommends Americans focus on consuming _____-dense foods such as vegetables, fruits, whole-grains, fat-free or low-fat milk and milk products, seafood, _____ and poultry, eggs, beans, peas, nuts, seeds and soy products. Protein helps _____ and repair muscles and aids muscle recovery when consumed after _____. Many studies recommend young athletes spread protein _____ the day, having some at each meal and with most _____ for overall health and wellness.

Part B: Read the following infographic and use the text to fill in the following information:
www.beefitswhatsfordinner.com/raising-beef/beef-in-a-sustainable-diet



Beef in a Healthy, Sustainable Diet

Beef is both nutritious and provides _____ nutrients in _____ calories than many other food choices. For example, a _____ serving of beef contributes over _____% of the daily value of protein and is also an excellent source of _____, vitamins B6 and B12, niacin, and phosphorus and a good source of _____.

Beef Production and Family & Consumer Sciences - Station #1 ANSWER KEY

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The Dietary Guidelines for Americans, 2015-2020, recommends Americans focus on consuming nutrient-dense foods such as vegetables, fruits, whole-grains, fat-free or low-fat milk and milk products, seafood, lean meats and poultry, eggs, beans, peas, nuts, seeds and soy products.

Protein helps build and repair muscles and aids muscle recovery when consumed after exercise. Many studies recommend young athletes spread protein throughout the day, having some at each meal and with most snacks for overall health and wellness.

Part B: Read the following infographic and use the text to fill in the following information:
www.beefitswhatsfordinner.com/raising-beef/beef-in-a-sustainable-diet



Beef in a Healthy, Sustainable Diet

Beef is both nutritious and provides more nutrients in fewer calories than many other food choices. For example, a 3 ounce serving of beef contributes over 50% of the daily value of protein and is also an excellent source of zinc, vitamins B6 and B12, niacin, and phosphorus and a good source of iron.

Beef Production and Family & Consumer Sciences - Station #1

Name: _____

Part C: Circle one of the following recipes for a student athlete in a sport of your choice. In one paragraph, explain why incorporating this recipe into their daily diet/nutrition plan would be beneficial for their particular sport.



Personal Beef Pizzas



Beef & Ramen Lettuce Wraps



Saucy Beef Wrap



Tiny Taco Beef Tarts



Mex Beef Sausage Cornbread Muffins



Beef Jerky Trail Mix



Beefy Sweet Potato Mash-Up



Why is this menu item beneficial for your athlete's diet plan? (4-6 sentences)

Part D: Log into the website "Recipal" www.recipal.com to create a nutrition fact label for the recipe you selected. Fill in the Nutrition Facts label at the right with your recipe's information:

Nutrition Facts	
Serving Size	
Amount Per Serving	
Calories	Calories from fat
% Daily Value*	
Total Fat	
Saturated Fat	
Trans Fat	
Cholesterol	
Sodium	
Total Carbohydrate	
Dietary Fiber	
Sugars	
Protein	
Vitamin A	Vitamin C
Calcium	Iron

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

Beef Production and Family & Consumer Sciences - Station #1

Name: _____

Part E: Complete the lab plan for your group's chosen recipe.

FACS Lab Form

Lab Date: _____

Group Members: _____

Job Chart:

<i>Equipment:</i>	<i>Ingredients:</i>	<i>Pre-Heat:</i>	<i>Wash:</i>
<i>Dry:</i>	<i>Sweep:</i>	<i>Sanitize Counters/Sink:</i>	<i>Microwave/Appliances:</i>

Lab Recipe Name: _____

Ingredients:

Directions:

Equipment Needed:

--

Beef Production and Family & Consumer Sciences - Station #1

Group Members: _____

Teacher Lab Rubric:

Lab Planning:					
5 Lab plan filled out completely, correct and on time.	4 Lab plan filled out completely, one or two errors and on time.	3 Lab plan is mostly correct, a few errors and on time.	2 Lab plan is filled out, but has errors and might have been late.	1 Lab plan has several errors and was late.	Comments:
Work Station:					
5 Exceptionally clean and sanitary throughout activity. No cross-contamination or unsafe conditions.	4 Maintains clean workspace and avoids cross-contamination and unsafe conditions.	3 Moderately clean workspace; some threat of cross-contamination and/or safety issues during activity.	2 Workspace not well maintained during activity. Needs coaching to remedy the situation.	1 Poorly maintained workspace. Cross-contamination and/or unsafe conditions are present.	Comments:
Preparation & Process:					
5 Correctly following the recipe directions. This includes accurate measurement of ingredients, cooking times, temp, using correct tools and techniques.	4 Followed recipe directions, tools, and techniques with 90% accuracy.	3 Completed the recipe. Some errors in technique, tools, and following the recipe.	2 Recipe completed, but with major errors in technique, use of tools, and/or following the recipe.	1 Recipe was not able to be completed due to major errors in technique, use of tools, and/or following the recipe.	Comments:
Overall Time-Management:					
5 Exceptionally organized. Complete group cooperation. Completed activity ahead of time.	4 Completed activity with good teamwork and all cleanup tasks on time.	3 Average organization. Completed activity relatively on time. Some level of teamwork.	2 Did not complete in time allotted due to inefficient use of time. Lack of cooperation/teamwork.	1 Large amounts of wasted time and/or inactivity; activity was not completed.	Comments:
Cleanup:					
5 Exceptionally clean and sanitary throughout activity. No cross-contamination or unsafe conditions.	4 Clean equipment, utensils, surfaces. Everything put away and floor swept.	3 Adequate cleaning of equipment, utensils, surfaces. Some disorganization in storage.	2 Poor cleaning of equipment, utensils, surfaces. Must be rewashed before further use.	1 Several items left unwashed. Floor not swept. Disorganization of storage in lab.	Comments:
Final Product Evaluation:					
5 Followed recipe, correct final product, presentation of product. Food meets high standards of taste, appearance, texture, and temperature.	4 Recipe followed. Good final product, and presentation of product.	3 Most of the directions of the recipe were followed. Presentation was attempted.	2 Several directions were not followed. Very little presentation present.	1 Product inedible. Directions not followed. No presentation of product.	Comments:

What would you change if you did this lab again?

Any suggestions for an alternate recipe for this unit?

Did all members in the group participate? List each member's name (even yours!) and give them all a rating 1-10 (10 = best).

Beef Production and Family & Consumer Sciences - Station #2

Virtual Tour of Beef Production Ranches

Directions: Explore and learn about the people and the process involved in raising beef from the pasture to the plate with the interactive Beef Life cycle platform. Read about these two ranch families, explore their social media accounts, and read what they have to say about beef sustainability!



Isaac and Jill Carr • Insta @carr.family.ranch • www.ourbeefkitchen.com

We live in the Flint Hills of Kansas and beef is a part of our everyday life. Not only do we raise and produce beef, we also really enjoying eating it! Our goal with Our Beef Kitchen is to educate you on beef-how it's produced, how to prepare the different cuts of meat and how to make it part of a balanced and nutritious diet. You will also catch a glimpse of our way of life here on the ranch along the way!

Isaac owns and operates a backgrounding feedyard as well as runs a cow-calf operation with his dad. Isaac is the cowboy model, editor and taste-tester for Our Beef Kitchen. Jill is a work-from-home mom as a Virtual Assistant. Along with ranch wife-ing and mom life-ing, Jill is the recipe finder/creator, photographer and cook for Our Beef Kitchen. We have the sweetest daughter, Emily, who keeps us on our toes! We feel blessed to get to share this lifestyle together and we have a passion for sharing our love and knowledge of beef with others.

Every week on our Instagram Stories, you will find a segment called "Feedlot Friday". Feedlot Friday is a way we can show our audience what goes on at a feedlot on a day-to-day basis. Even though we are a smaller operation than most feedlots, a lot of the practices are still the same. We explain how antibiotics are used and why they are important to us, as well as the use of growth hormones and how we reduce the carbon footprint of animal agriculture. We also talk about the importance of reducing stress on the cattle and how that optimizes performance. Overall, our goal is to educate the consumer so that they feel confident and comfortable in their meat choices, knowing that the beef they buy at the grocery store and feed to their family, no matter the label, is safe, sustainable and raised with pride.



Beef Production and Family & Consumer Sciences - Station #2

Virtual Tour of Beef Production Ranches



Arturo & Wrenn Pacheco • Insta @cookingwiththecowboy • www.cookingwiththecowboy.com

Hi, ya'!! We are Arturo and Wrenn Pacheco...the husband and wife team behind "Cooking with the Cowboy"! Arturo does the cooking and I do the dishes! I also am in charge of the tasting, writing, and photography! We have two little cowboys that are rowdy and love to help us in the kitchen.

Arturo, a genuine cowboy, has his PhD in ruminant nutrition and, through his nutrition consultant business, he helps farmers and ranchers practice efficient feeding practices. He has clients all over the country and his goal is to help ranchers and cattlemen provide an excellent product for the consumer.

Together, we also ranch and manage our custom-grazing operation. This operation consists of caring for steers (neutered males) for ranchers in Iowa and Kansas and developing heifers (young females that have not had a calf) for ranchers in Kansas. We do all of this and more here in the Flint Hills of Kansas. We both grew up on ranches and are excited about raising our children in the country, surrounded by cattle, cow dogs, and horses.



Take a Virtual Reality Tour

Directions: Explore farms and ranches across the United States to see how America's beef farmers and ranchers raise cattle to produce high-quality beef. With 360° ranch videos, you can get a unique, behind-the-scenes look at how beef is raised.

- Brackett Ranches from the Idaho/Oregon border
- Easterday Ranches in Washington
- Triple U Ranch in Iowa



Beef Production and Family & Consumer Sciences - Station #2



The Beef Life Cycle and Ranch Tours

1. At what stage are cows bred and calves born and raised to graze on grass pastures within sight of their mothers?
2. During which stage do cattle graze on a variety of pastures where they gain weight and convert human-inedible forage and grass into human-edible protein?
3. Cattle ranchers and farmers are stewards of the land by:
 - a. Preserving water
 - b. Controlling plants
 - c. Protecting the habitats of endangered species
 - d. Maintaining fire breaks
 - e. All of the above
4. Cattle typically spend how long in a feedyard being fed a scientifically balanced diet and receiving daily care?
5. It takes a community of people to bring beef from pasture to plate. List 3 occupations within the beef community.

Beef Production and Family & Consumer Sciences - Station #2 **ANSWER KEY**

The Beef Life Cycle and Ranch Tours

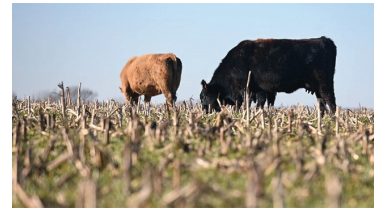
1. At what stage are cows bred and calves born and raised to graze on grass pastures within sight of their mothers? **Cow-Calf**
2. During which stage do cattle graze on a variety of pastures where they gain weight and convert human-inedible forage and grass into human-edible protein? **Stockers and Backgrounders**
3. Cattle ranchers and farmers are stewards of the land by:
 - a. Preserving water
 - b. Controlling plants
 - c. Protecting the habitats of endangered species
 - d. Maintaining fire breaks
 - e. **All of the above**
4. Cattle typically spend how long in a feedyard being fed a scientifically balanced diet and receiving daily care? **4-6 months**
5. It takes a community of people to bring beef from pasture to plate. List 3 occupations within the beef community. (**Examples: ranchers, farmers, feedlot operators, livestock auction market owners, packing plant workers, veterinarians, animal nutritionists, pen riders, animal welfare specialists**)

Beef Production and Family & Consumer Sciences - Station #3

“We Grow Corn” Elevator Speech



“What Do Cattle Eat in the Winter”



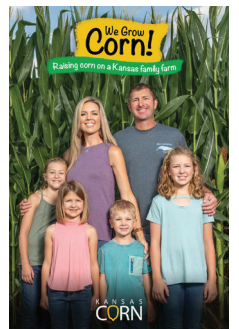
Directions: Read “What Do Cattle Eat in the Winter” article. Discuss and explore how climate and natural resources determine the types of crops and livestock that can be grown and raised for consumption.



“We Grow Corn”

Directions: Read Kansas Corn’s children’s book “We Grow Corn - Raising Corn on a Kansas Family Farm” through the QR code. Click “View-Download Now” button on the webpage.

Students will read this article and book, then create an “elevator speech”, pretending they’re a beef producer talking to a group of elementary students about the important role of corn in the diet of cattle. Students must incorporate components from each of their stations into their mini-speech. (Maximum 3 minutes in length)



Beef Production and Family & Consumer Sciences - Station #3

“We Grow Corn” Elevator Speech

As a group, write the outline of your speech here:

You must include a topic sentence, three main ideas, and a conclusion.

Topic Sentence:

Main Ideas:

1.

2.

3.

Conclusion: