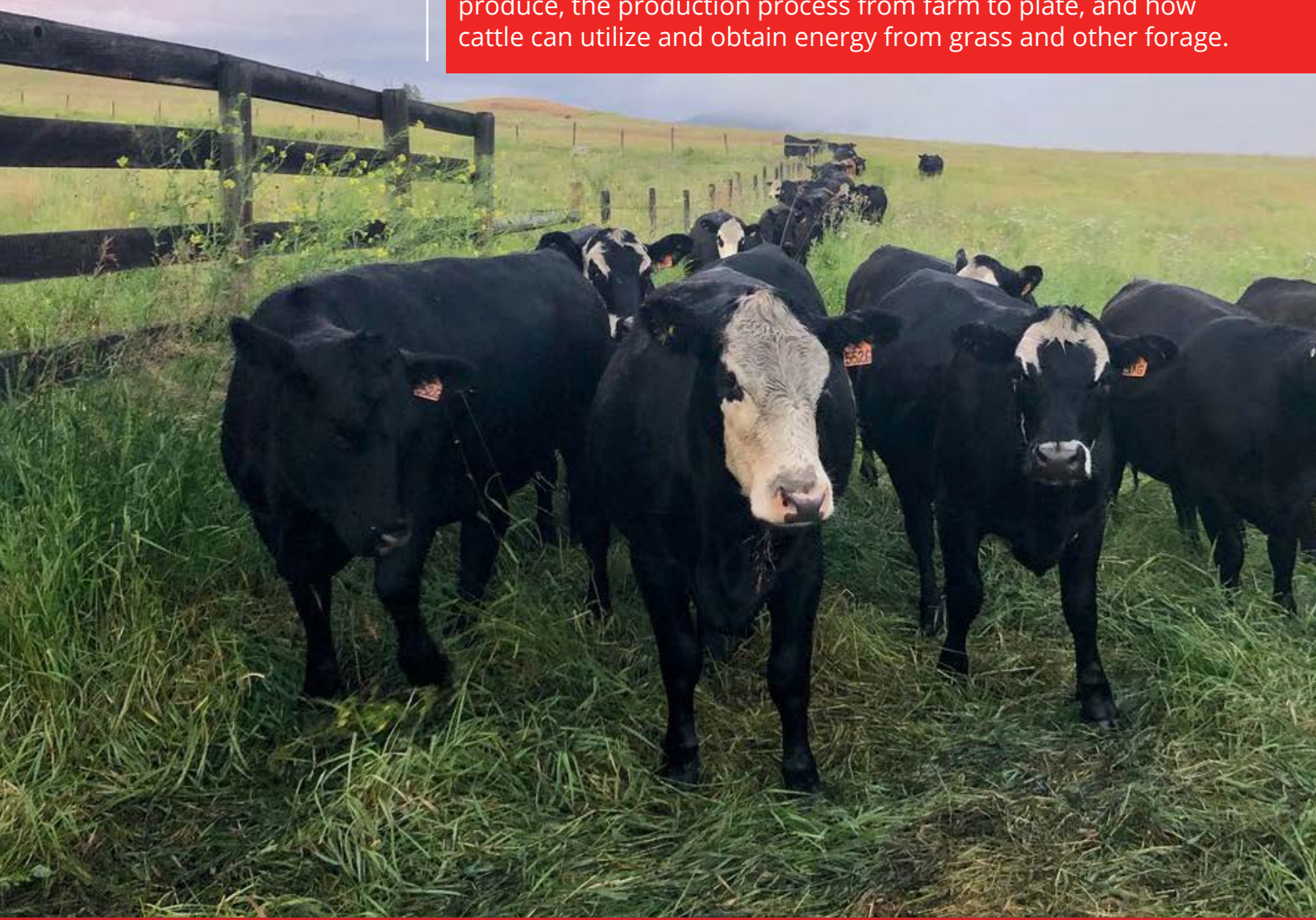
BC Agriculture in the Classroom Foundation
bcaitc.ca

SUSTAINABILITY IN THE BEEF INDUSTRY IN BRITISH COLUMBIA

Students will begin to understand the importance of the beef cattle industry in British Columbia, 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.



SECONDARY KIT

Subject Levels/ Suggested Grades:

Science 10-12 | Social Studies 11-12 | Food Studies 9-12 | Culinary Arts 11-12 | Career Ed 9-12

Written by: Sabrina Bhojani

Cover Photo Credit: Fossen Bar 7 Ranch

TEACHER BACKGROUND

BC Ranchers make efforts to manage land in an environmentally sustainable manner through good pasture and range management practices. This improves the rangeland and ensures the compatibility of cattle grazing alongside other uses. The BC ranching industry is active and works to co-operate with other resource users for present and future needs. This series of lesson plans make the 'farm to fork' connection, supporting an understanding of the beef cattle ranching industry and its importance to British Columbians.

This kit includes 10 lessons based on the following structure:

Lesson 1: An Introduction to BC Beef
Lesson 2: Beef Cattle Life Cycle
Lesson 3: Where's the Beef?
Lesson 4: Cereal Feed Sort Activity
Lesson 5: Beef By-Products
Lesson 6: Beef Cookery
Lesson 7: Meat or Meatless?
Lesson 8: Meat or Meatless? – Points of View
Lesson 9: Delicious Beef Recipes: BC Beef Chili Soup
Lesson 10: Mythbusting: The Use of Hormones and Antibiotics in Cattle Production

PHOTO CREDIT: Fossen Bar 7 Ranch

CURRICULUM LINKS

Grade/Subject	Big Ideas	Content Connections
SCIENCES 10-12	• Life is a result of interactions at the molecular and cellular levels • Complex roles and relationships contribute to diversity of ecosystems • Changing ecosystems are maintained by natural processes • Human practices affect the sustainability of ecosystems and cause changes in the global climate system • Humans can play a role in stewardship and restoration of ecosystems • Sustainable land use is essential to meet the needs of a growing population	• Applied Genetics and ethical considerations • Human actions and their impact on ecosystem integrity • Resource stewardship • Levels of biotic diversity • Land use, degradation and management • Conservation of water
SOCIAL STUDIES 11-12	• Decision making in urban and regional planning requires balancing political, economic, social, and environmental factors • Physical features and natural resources influence demographic patterns and population distribution	• Human responses to geographic challenges and opportunities, including climate, landforms and natural resources • Natural resource use and local, regional, national, or global development • Global issues in urbanization
FOOD STUDIES 9-12 & CULINARY ARTS 11-12	• Consumer needs and preferences inform food production and preparation • Social, ethical, and sustainability considerations impact design • Services and products can be designed through consultation and collaboration • Cuisine design interests require the evaluation and refinement of culinary principles and practices	• Ethical issues related to food systems • Simple and complex global food systems • Issues with food security • Factors involved in the creation of food guides and labelling • BC agriculture practices
CAREER EDUCATION 9- 12	• The value of work in our lives, communities, and society can be viewed from diverse perspectives • Adapting to economic and labour market changes requires flexibility	• Local and global needs and opportunities • Factors affecting types of jobs in the community

LESSON 1: An Introduction to BC Beef

Teacher Background

GIS (Geographic Information Systems) technology is commonly used in industries such as engineering, planning, management, transport/logistics, insurance, telecommunications, and business. Beyond a traditional paper map, the tool allows for multiple layers and data points to be examined within a single map.

The Grow BC resource was first created as a book, documenting not only the commodities produced through BC agriculture but also statistical information detailing the different regions of the province and their agricultural abilities. Teachers were directly involved in developing Grow BC into an interactive online GIS map to ensure its effective use in most curriculum areas. The provided scavenger hunt activity contains questions for both broad and specific aspects of the Grow BC Map resource, including provincial and regional specific questions. Regional specific questions may vary depending on the commodities chosen, and we encourage teachers to customize this resource to suit their needs.

Materials:

- Grow BC GIS Map https://www.bcaitc.ca/resources/grow-bc-guide-bcs-agriculture-resources
- Internet access
- Computers/tablets
- Student handouts:
  - -Know-Wonder-Learn (KWL) Chart
  - -Grow BC Interactive Map Scavenger Hunt Worksheet

PROCEDURE

Part 1 - Hook/Guided Learning, Know-Wonder-Learn (KWL) Chart

1. Hand each student a KWL chart, and explain that this will be the tool they use to record their learning throughout the unit.
2. Starting in the "Know" column, have students fill out two facts they know or think they know, about Sustainability in the Beef Industry.
3. Ask for volunteers to read out some of their points, or have the class participate in a gallery walk activity to view their peer's responses. Students can add new facts learned to the "Learn" column and questions they still have to the "Wonder" column.
4. At the end of each subsequent lesson, have students add more information to their charts.

Part 2 - Introduction to BC Beef

**Note – if it is not possible for students to view this program on their own devices, then the activity can be led by the instructor from the front of the class. However, it is highly recommended students have their own computer or tablet available for this activity.*

1. Model theses steps to your students:
   a. Go to www.bcaitc.ca and access the Grow BC GIS Map using the Resources tab at the top of the website: https://www.bcaitc.ca/resources/grow- bc-guide-bcs-agriculture-resources and show students Section 1 and the PDF links. Highlight Section 2, and show them the links to the different BC Commodities. Then, click on Section 3 to show students the different regions and careers.
   b. Finally, scroll to the bottom of the webpage to the interactive Grow BC map, and use

your cursor to move the map around, and the zoom buttons in the top left corner to demonstrate how to shift the resource.

2. Allow students to open the Grow BC GIS Map on their own computer or tablet.
3. Once all students are at the home page of the map, explain that this map shows all of the commercially produced agriculture commodities in BC, and challenge them to count how many different commodities exist (answer = 63).
4. Once they have had the chance to count the commodities and practice moving the map around, have everyone click into the Beef Cattle Ranching story. Students can click one of the beef cows they see on the map and then click on the "View Story" hyperlink.
5. Once in the Beef Story Map, provide students (can work individually or in partners) with the Grow BC Interactive Map Scavenger Hunt Worksheet. Explain to students that all the answers are in the contents of the story, and that they will need to read closely, click on hyperlinks and watch the videos to find all of the information.
6. When the majority of students have finished the scavenger hunt, mark the answer sheet as a class, elaborating on answers as needed if any questions arise.
7. Have students log off of the Grow BC map, and return to their KWL charts. As an Exit Ticket, have students fill in three new things they learned on their charts.

EXTENSION

- For a more comprehensive view of the beef production story, have students also explore the Forage, Forage Rangeland, and Agriculture Land Reserve Stories.

TOPIC: Sustainability in the Beef Industry

Name: _____ Date:_____

KNOW	WANT TO KNOW	LEARNED
K	W	L

Name: _____ Date:_____

Grow BC Interactive Map Scavenger Hunt

PART A: General Grow BC Interactive Map questions

1. Where can you access the Grow BC GIS Map? _____
2. Approximately how many commodities are included on the map? _____
3. What happens when you click on the map icons? _____
4. What are some of the top agricultural commodities in BC? _____

   _____
5. What are two factors that make some of the land in BC not entirely suitable for farming?

   _____

   _____

PART B: Click the link to the BC Commodities, then click on 'Beef Cattle Ranching'. Use the information to answer the following questions

6. What does the term "ruminants" mean?_____

   _____
7. What are four other animals that are also considered ruminants?

   _____
8. Match the following words with the appropriate definition by placing the correct letter in the blank provided.

a. Heifers	_____ castrated males
b. Cows	_____ adult females that have never produced offspring
c. Steers	_____ fertile males that can produce calves
d. Bulls	_____ newborn cattle
e. Calves	_____ adult females that have produced offspring

9. Where is Canada's largest ranch and how large is it?

   _____

10. Why does most ranching in BC take place in the Interior?

_____

11. How much Crown rangeland do BC cattle ranchers use?_____

_____

12. What is the typical count of cattle and calves on BC ranches?_____

_____

13. Match the following words with the appropriate definition by placing the correct letter in the blank provided.

a. Cow-calf operator	_____ raises weaned calves on mainly forage diets
b. Feedlot operator	_____ occurs when calves are 6-8 months old
c. Weaning	_____ raises the calves from birth to weaning
d. Rangeland	_____ provides forage for cattle in summer months
e. Backgrounder	_____ feeds calves a high-energy grain diet until they reach market weight

14. How can a cattle buyer, make a purchase of cattle, even if the auction site is far away?

_____

_____

15. What are some of the major challenge faced by BC ranchers? List at least 5 issues.

_____

_____

_____

_____

16. What are 5 careers that are involved in beef production?

_____

_____

_____

_____

17. If you could choose a career involved in beef production, what would you choose and why?

_____

_____

18. How does this career you chose relate to the beef industry?

_____

_____

PART B: Click the link to the BC Commodities, then click on 'Beef Cattle Ranching'. Use the information to answer the following questions

19. What is the ALR? _____

    a. Is there ALR land in your region? _____

20. What are some challenges of the ALR? Do you know of any specific challenges faced in a community like yours?

_____

_____

_____

_____

_____

_____

KEY

Grow BC Interactive Map Scavenger Hunt

PART A: General Grow BC Interactive Map questions

1. Where can you access the Grow BC GIS Map? **BCAITC Website under the Resources Tab**

2. Approximately how many commodities are included on the map? **63**

3. What happens when you click on the map icons? **A short description of the commodity appears, with an image and link taking you to the commodity story map.**

4. What are some of the top agricultural commodities in BC? **Examples include: dairy products, chickens, greenhouse vegetables, floriculture, beef, mushrooms, nursery products, eggs, blueberries, and sweet cherries.**

5. What are two factors that make some of the land in BC not entirely suitable for farming?

   Not all of BC's land is suitable for farming due to topography and soil capability.

PART B: Click the link to the BC Commodities, then click on 'Beef Cattle Ranching'. Use the information to answer the following questions

6. What does the term "ruminants" mean? **Ruminants are herbivores that have 4 compartments in their stomachs (for specialized digestion) that allows them to digest grass and hay**

7. What are four other animals that are also considered ruminants?

   Examples of ruminants include: dairy cattle, sheep, goats, buffalo, deer and bison

8. Match the following words with the appropriate definition by placing the correct letter in the blank provided.

a. Heifers	**C** castrated males
b. Cows	**A** adult females that have never produced offspring
c. Steers	**D** fertile males that can produce calves
d. Bulls	**E** newborn cattle
e. Calves	**B** adult females that have produced offspring

9. Where is Canada's largest ranch and how large is it?
   BC is home to Canada's largest ranch – Douglas Lake Ranch - located in the Nicola Valley, between Kamloops and Merritt, which covers over 1.2 million acres of deeded and Crown land.

KEY

10. Why does most ranching in BC take place in the Interior?
    Most of the ranching in the province takes place in the interior regions of BC, where there are large areas of rangeland for grazing available.

11. How much Crown rangeland do BC cattle ranchers use? **In BC, cattle producers are dependent on approximately 8.5 million hectares of Crown rangeland.**

12. What is the typical count of cattle and calves on BC ranches?

    There are 450,000 head of beef cattle in the province at any given time.

13. Match the following words with the appropriate definition by placing the correct letter in the blank provided.

a. Cow-calf operator	___E___ raises weaned calves on mainly forage diets
b. Feedlot operator	___C___ occurs when calves are 6-8 months old
c. Weaning	___A___ raises the calves from birth to weaning
d. Rangeland	___D___ provides forage for cattle in summer months
e. Backgrounder	___B___ feeds calves a high-energy grain diet until they reach market weight

14. How can a cattle buyer, make a purchase of cattle, even if the auction site is far away?
    New technology has introduced new marketing and purchasing methods, including online/satellite auctions, where the cattle buyer can bid on cattle hundreds or thousands of miles away.

15. What are some of the major challenge faced by BC ranchers? List at least 5 issues.
    Some of the major issues faced by BC ranchers include: the use of Crown-owned rangeland, water resources, mineral extraction, land claims, outdoor recreation, parks, subdivisions, timber production, wilderness areas, natural disasters, wildlife management are challenges in ranching operations.

16. What are 5 careers that are involved in beef production?
    Examples of careers involved in beef production include:
    - **Ranchers and cow-calf operators**
    - **Backgrounding operators**
    - **Feedlot operators**
    - **Veterinarians**
    - **Researchers**
    - **Machinery dealers**
    - **Agricultural (feed, fertilizer, genetics, etc.) sales representatives**
    - **Auctioneers**
    - **Truckers**
    - **Packing plant workers**
    - **Meat graders, inspectors and butchers**

KEY

17. If you could choose a career involved in beef production, what would you choose and why?

    Answers will vary.

18. How does this career you chose relate to the beef industry?

    Answers will vary depending on answer for #17.

PART B: Click the link to the BC Commodities, then click on 'Beef Cattle Ranching'. Use the information to answer the following questions

19. What is the ALR? **The Agriculture Land Reserve (ALR) is a policy put in place by the BC provincial government to protect prime agricultural farmland from being used up for other purposes.**

    a. Is there ALR land in your region? **Answers will vary. Use website link on story to view map.**

20. What are some challenges of the ALR? Do you know of any specific challenges faced in a community like yours?

    Answers will vary. Use website link on story to view map.

LESSON 2: Beef Cattle Life Cycle

Teacher Background

Students will have a chance to learn about the growth and development of beef. By learning about their life cycle, students will have a clear idea of the different animal needs including their social, environmental, nutritional, and parental needs. In addition, through an understanding of the beef cycle students will begin to understand how animals interact with their environments.

Materials:

- Grow BC GIS Map (https://www.bcaitc.ca/resources/grow-bc-guide-bcs-agriculture-resources)
- Internet access
- Computers/tablets
- Construction paper
- Student handouts:
  -Beef Life Cycle Activity Sheet

PROCEDURE

1. Have students use a computer/tablet to open the Grow BC GIS Map. Remind them where to find the list of commodities and have them read the Beef Cattle Ranching story.
2. Provide students with a copy of the Beef Life Cycle Activity Sheet.
3. Have students cut out rectangles and correctly order the stages of the Beef Life Cycle. Then have them glue the ordered rectangles to a piece of blank construction paper.
4. When the majority of students have finished the cut and paste activity, mark the sheet as a class, elaborating on answers as needed if any questions arise.
5. Have students return to their KWL charts from the previous lesson. As an Exit Ticket, have students fill in three new things they learned on their charts.

EXTENSION

- For a more comprehensive view of the beef production story, have students also explore the Forage, Forage Rangeland, and Agriculture Land Reserve Stories.

KEY

Beef Life Cycle Activity Sheet

KEY – Below is the correct order of steps for Beef Life Cycle

1. **Where Does Beef Come From?** Canada has a well-suited environment and landscape for raising beef. Most of the ranching in the province of BC takes place in the interior regions, where there are large areas of rangeland for grazing available.
2. **Cow & Calf:** Raising beef begins with ranchers who maintain a herd of mother cows (adult females that have had a baby) that give birth to calves (newborn male or female) once a year, typically in the earlier months. When a calf is born, it weighs between 30-50 kg (60-100 pounds). In many parts of the province, once the grass begins to grow in the spring, the cows and their calves are turned out onto pastures to graze. The calves will also continue to feed off its mothers milk until weaned.
3. **Weaning:** Once calves have grown and are ready to only eat grass and hay, they're ready for weaning. Calves are weaned from their mother's milk at about 6-8 months of age. By this point, calves can weigh upwards of 226-360 kg (500-800 lbs)! Smaller calves will move to a backgrounding operation, whereas heavier calves may go directly to a feedlot.
4. **Stockers & Backgrounders:** After weaning, cattle continue to grow and thrive by grazing on grass and pastures. Backgrounders harvest hay and make silage for winter feeding. Rangeland and pastures provide forage for the other months. Backgrounded cattle go to the feedlot when their desired weight is achieved. With stockers and backgrounders, the cattle gain weight and convert forage to protein.
5. **Feedlots:** Feedlots focus on efficient weight gain, nutrition and animal care. Cattle are provided a safe, low stress and healthy environment, and have plenty of room to move around in open air or indoor pens with access to feed and water. Cattle will typically spend somewhere between 60 and 200 days at a feedlot eating a high-energy diet.
6. **Auction & Breeding:** Once calves are ready to leave the ranch or farm, they are sold at livestock auction markets. This includes live, as well as online and satellite auctions, where the cattle buyer bidding on the cattle may be hundreds or thousands of miles away from the auction site. Many of the female calves and some of the male calves are kept on the farm to become mother cows or breeding bulls respectively.
7. **Ready For Market:** Most cattle in Canada are "grass fed, grain finished", meaning they spent most of their life being raised on grass-based forage, then finished on grain (mostly barley or corn). Once cattle reach an optimal market weight (often upwards of 680 kg/1,500 lbs), they are ready for market. Beef cattle are transported by truck and processed in regulated facilities for grading, cut production and food safety.
8. **On Your Table:** Canadian beef is known for its world-class excellence, high industry standards and emphasis on quality and safety. In Canada and around the world, our beef is sought out by consumers, butchers and chefs. Once Canadian beef reaches your table, you know you will be fuelling your body with protein, iron, vitamin B12, zinc and other essential nutrients to live a healthy lifestyle.

Beef Life Cycle Activity Sheet

DIRECTIONS: Cut out the rectangles below and correctly order the stages of the beef life cycle.

Weaning

Once calves have grown and are ready to only eat grass and hay, they're ready for weaning. Calves are weaned from their mother's milk at about 6-8 months of age. By this point, calves can weigh upwards of 226-360 kg (500-800 lbs)! Smaller calves will move to a backgrounding operation, whereas heavier calves may go directly to a feedlot.

Ready for Market

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Stockers & Backgrounders

After weaning, cattle continue to grow and thrive by grazing on grass and pastures. Backgrounders harvest hay and make silage for winter feeding. Rangeland and pastures provide forage for the other months. Backgrounded cattle go to the feedlot when their desired weight is achieved. With stockers and backgrounders, the cattle gain weight and convert forage to protein.

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Cow & Calf

Raising beef begins with ranchers who maintain a herd of mother cows (adult females that have had a baby) that give birth to calves (newborn male or female) once a year, typically in the earlier months. When a calf is born, it weighs between 30-50 kg (60-100 lbs). In many parts of the province, once the grass begins to grow in the spring, the cows and their calves are turned out onto pastures to graze. The calves will also continue to feed off its mothers milk until weaned.

Auction & Breeding

Once calves are ready to leave the ranch or farm, they are sold at livestock auction markets. This includes live, as well as online and satellite auctions, where the cattle buyer bidding on the cattle may be hundreds or thousands of miles away from the auction site. Many of the female calves and some of the male calves are kept on the farm to become mother cows or breeding bulls respectively.

Beef Life Cycle Activity Sheet

DIRECTIONS: Cut out the rectangles below and correctly order the stages of the beef life cycle.

Where Does BC Beef Come From?

Canada has a well-suited environment and landscape for raising beef. Most of the ranching in the province of BC takes place in the interior regions, where there are large areas of rangeland for grazing available.

Feedlots

Feedlots focus on efficient weight gain, nutrition and animal care. Cattle are provided a safe, low stress and healthy environment, and have plenty of room to move around in open air or indoor pens with access to feed and water. Cattle will typically spend somewhere between 60 and 200 days at a feedlot eating a high-energy diet.

LESSON 3: Where's the Beef?

Teacher Background

This lesson makes the 'farm to fork' connection for students so that they are able to identify various beef cuts. The activities are designed to teach students about the different primal and sub-primal cuts of meat and determine where on the animal the meat is coming from.

Materials:

- Interactive Beef Carcass at https://canadabeef.ca/cuts-by-colour/
- Internet access
- Computers/tablets
- Student handouts:
    - Beef Cuts: Cut & Paste
    - Beef Cuts: Matching Activity

PROCEDURE

1. Have students use a laptop or computer to access the Interactive Beef Carcass at https://canadabeef.ca/cuts-by-colour/
2. Provide students with a copy of the Beef Cuts: Cut & Paste worksheet
3. Have students cut out the individual cuts of meat and paste them on the silhouette of the cow provided.
4. Once most students have completed this, provide students with the Beef Cuts: Matching Activity handout
5. Have students match the definitions of the cuts of beef with the corresponding terms.
6. When the majority of students have finished the two handouts, mark the sheets as a class, elaborating on answers as needed if any questions arise.
7. Have students return to their KWL charts from Lesson 1. As an Exit Ticket, have students fill in three new things they learned on their charts.

EXTENSION

- For a more comprehensive view of the beef production story, have students also explore www.canadabeef.ca

KEY

Beef Cuts - Matching Activity

Directions: Match the definitions with the various cuts of beef as listed below by writing the correct letter on the space next to the terms below. Use the terms to label the picture of the cattle below.

B 1. Shank

E 2. Plate

I 3. Hip/Round

F 4. Flank

C 5. Brisket

H 6. Sirloin

A 7. Chuck

D 8. Rib

G 9. Loin

A. The largest of the primal cuts, this part is from the cow's shoulder muscle; ideal for braising and slow cooking.

B. This cut comes from the cow's hardworking and lean front and back legs just above the knee or hock; commonly found in slow cooker and soup recipes.

C. Located below the chuck primal and next to the short plate, this beef cut corresponds to the cow's breast.

D. A cow has 13 of these; very tender and flavorful cuts of meat come from this part.

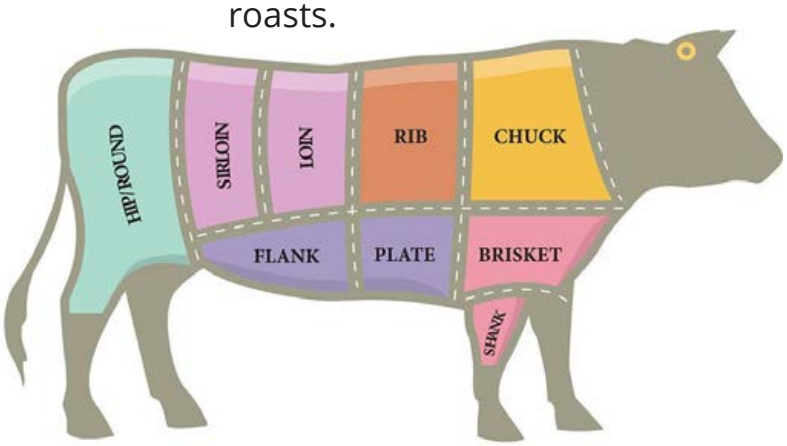
E. This cut is from the belly of the cow below the rib primal; skirt and hanger steaks come from this cut

F. From the abdominal muscles of the cow, this cut is located directly under the loin; the meat tends to be very lean and its coarse texture is good for soaking up marinades.

G. Cut from the back of the cow above the ribs this is one of the most tender cuts of beef; butchers usually make large steaks from this.

H. This cut from the lower back of the cow; it is slightly less tender than the loin, but more fatty and flavorful.

I. Cut from the back of the cow above the back legs, this meat is lean and inexpensive and often used for large roasts.



Name: _____ Date:_____

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_____ 9. Loin

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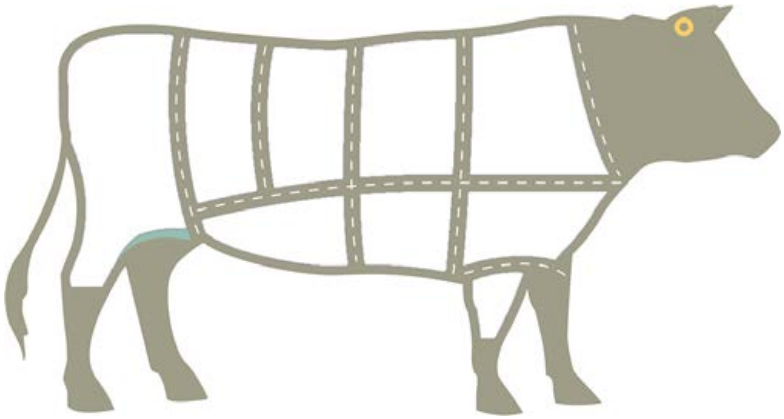
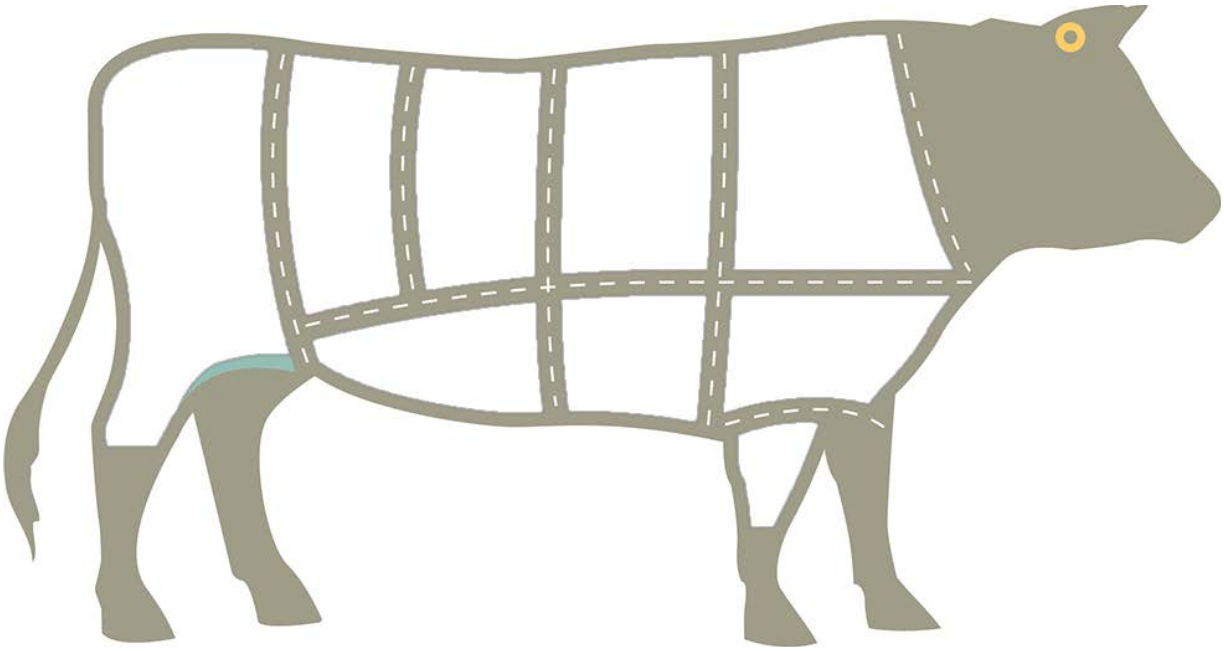
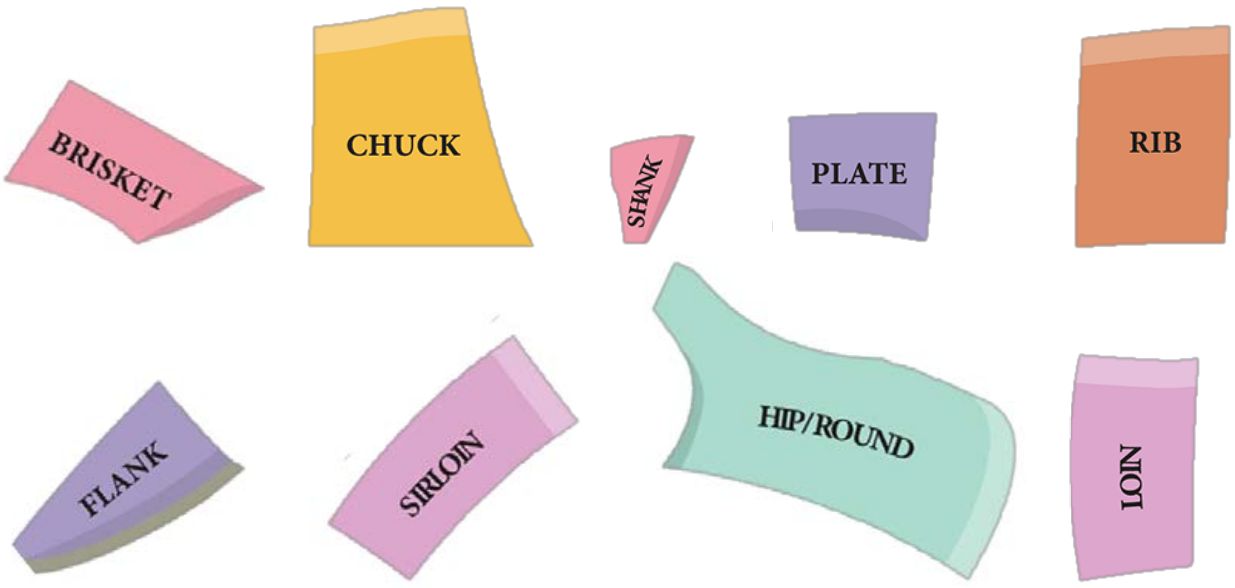


Name: _____ Date:_____

Beef Cuts - Cut & Paste

Directions: Cut out the individual cuts of meat and paste them on the appropriate spot are on the silhouette of the cow below.





LESSON 4: Cereal Feed Sort Activity

Teacher Background

This lesson explores beef cereal feed and the importance of certain ingredients in livestock diets, also known as rations. In addition, students will learn and discuss why it's important to feed animals a balanced and nutritious diet.

Materials:

- Feed Grains for Beef Cattle website https://www.beefresearch.ca/research-topic.cfm/feed-grains-for-beef-cattle-105
- 3 paper plates
- Samples of the following (which can be sourced from a local feed supply store)
  - rolled oats
  - corn
  - grass
- Internet access
- Computers/tablets
- Student handouts:
  - Student Cereal Sort Activity Worksheet

PROCEDURE

1. Place three plates at the front of the class, and put rolled oats on one, grass on one and corn on the other. Instruct students to line up behind their choice if they were to have a snack. Ask students to share their choice with a partner and to tell why they selected this choice. Then bring students back as a whole group and discuss the reasons why farmers may select certain types of feed for their cattle.
2. Explain to students that cereal grains (the seeds of grasses) are often chosen to feed livestock.
3. Have students use a tablet or computer to access Feed Grains for Beef Cattle website.
4. Provide students with a copy of the Student Cereal Sort Activity Worksheet. Using the phrases from the sheet and the website, have students complete the activity reminding them that each phrase may be used only once.
5. When the majority of students have finished, mark the sheets as a class, elaborating on answers as needed if any questions arise.
6. Have students return to their KWL charts from lesson 1. As an Exit Ticket, have students fill in two new things they learned through today's activity on their charts.

EXTENSION

- Have students look at why certain marketing campaigns promote certain types of feed (e.g. grain fed vs. grass-fed) and whether these differences in feed affect the nutritional value of beef.

KEY

Cereal Feed Sort Activity KEY

BARLEY

- This feed type can be classified as either two or six row, with this classification relating to differences in the physical structure of the cereal head.
- The two row varieties of this feed type typically produce larger, plumper seeds than the six row type.
- Hulless varieties (which have a loose attached hull that falls off during harvesting) are used primarily for human food, although when priced appropriately, they can be used as livestock feed.

WHEAT

- The vast majority of this feed type is destined for human consumption, and typically enters the feed market when there are issues with quality, such as mildew contamination or issues with sprouting.
- Kernels of this feed type lack a protective hull; however, they possess a seed coat that provides protection from the environment.
- Of the four varieties of feed, this has the lowest percentage of fat content.

CORN

- This feed type as classified as dent or flint.
- The interior of the kernel of this feed type is characterized by an endosperm that is soft and floury on the inside and harder and more dense on the outside
- Of the four varieties of feed, this has the lowest crude protein and rumen degradable protein content.

OAT

- Of the four varieties of feed, this has the highest crude protein and rumen degradable protein content.
- This grain can be successfully fed unprocessed to growing cattle.
- The relatively low energy content of this grain is due in part to the presence of an outer hull with high fibre compared to the other four feed types.

Name: _____ Date:_____

Cereal Feed Sort Activity

Cereal grains are actually the seeds of grasses (i.e. barley, oat, wheat and corn) which develop as the plant matures over the growing season. During this development, the seed fills with starch and associated protein. Barley, wheat, corn and oat are the principle feed grains used by the Canadian beef industry. These cereal grains are excellent sources of energy and intermediate sources of protein for cattle.

Directions: Go to: https://www.beefresearch.ca/research-topic.cfm/feed-grains-for-beef-cattle-105 and read the section on: Feed Grains for Beef Cattle. Use the phrases below to appropriately fill out the chart. Each phrase may only be used once.

The relatively low energy content of this grain is due in part to the presence of an outer hull with high fibre compared to the other four feed types.	The two row varieties of this feed type typically produce larger, plumper seeds than the six row type.	The interior of the kernel of this feed type is characterized by an endosperm that is soft and floury on the inside and harder and more dense on the outside.
Kernels of this feed type lack a protective hull; however, they possess a seed coat that provides protection from the environment.	The vast majority of this feed type is destined for human consumption, and typically enters the feed market when there are issues with quality, such as mildew contamination or issues with sprouting.	Hulless varieties (which have a loose attached hull that falls off during harvesting) are used primarily for human food, although when priced appropriately, they can be used as livestock feed.
Of the four varieties of feed, this has the lowest crude protein and rumen degradable protein content.	This feed type can be classified as either two or six row, with this classification relating to differences in the physical structure of the cereal head.	Of the four varieties of feed, this has the lowest percentage of fat content.
Of the four varieties of feed, this has the highest crude protein and rumen degradable protein content.	This feed type as classified as dent or flint.	This grain can be successfully fed unprocessed to growing cattle.

Cereal Feed Sort Activity

A.

B.

C.

A.

B.

C.

A.

B.

C.

A.

B.

C.

LESSON 5: Beef By-Products

Teacher Background

Steaks, hamburgers, and pot roast...when most students start thinking about what comes from a cow, these probably come to mind fairly easily. It's probably fairly safe to say that most would also tell you that milk, and maybe even leather comes from cows. Most students, however, would be surprised to find out that candles, cosmetics, crayons, and cement also are derived from beef by-products.

This activity shows some of the products made from cattle and where they come from. Students learn about how much agriculture impacts their daily lives through more than just the food on their plates and illustrates how we use these many by-products from beef.

Materials:

- Website: https://beef2live.com/story-fun-facts-products-beef-cattle-89-104636
- Video: https://www.youtube.com/watch?v=lGwoOihpBOY
- Internet access
- Computers/tablets
- Student handout:
  - Beef By-Products Activity Worksheet

PROCEDURE

1. Have students use a tablet or computer to access the following website: https://beef2live.com/story-fun-facts-products-beef-cattle-89- 104636
2. Individually or in pairs, read the article and then ask students if they were surprised by any of the by-products they saw.
3. Provide students with a copy of the Beef By-Products Activity Worksheet.
4. Watch video together as a class: https://www.youtube.com/watch?v=lGwoOihpBOY
5. Have students fill in the blanks by placing the appropriate by-product name in the blanks on the worksheet. Let them know that each by-product term from the word bank may be used only once and that the lists are all in alphabetical order.
6. When the majority of students have completed this handout, mark the sheets as a class, elaborating on answers as needed if any questions arise.
7. Have students return to their KWL charts from Lesson 1. As an Exit Ticket, have students fill in one or two new things they learned on their charts.

TEACHER INFORMATION

Canadian Statistics:

- Animals fats are also being used to make biojet fuel in Canada.
- There are 60,000 beef farms and feedlots in Canada.
- Canada produces approximately 1.55 million tonnes of beef per year.

KEY

Name: _____ Date:_____

Beef By-Products

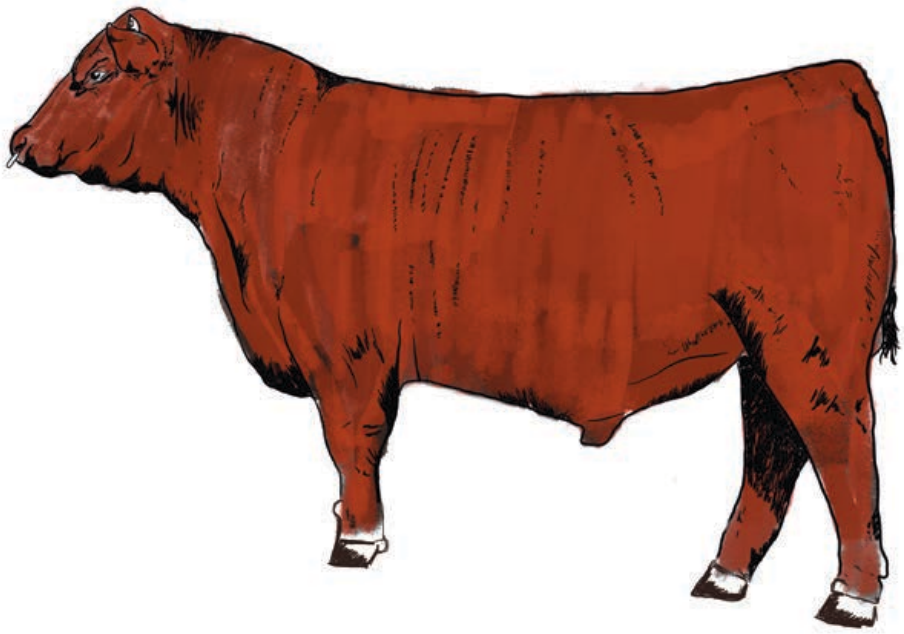
Directions: Fill in the blanks by placing the appropriate by-product name in the blanks below.

Internal Organs
- Anti-rejection drugs
- Insulin
- Natural Gut Tennis strings

Manure
- Fertilizer
- Methane Gas
- Nitrogen
- Phosphorus

Hide (Skin & Hair)
- Baseball Mitts
- Brushes
- Collagen
- Felt
- Gummy Candy
- Marshmellows
- Leather
- Volleyballs

Fat
- Antifreeze
- Biodiesel
- Candles
- Cake Mixes
- Crayons
- Dish Soap
- Hydrolic Brake Fluid
- Lipstick
- Tires
- Toothpaste



Bones, Hooves & Horns
- Bandaids
- Buttons
- China
- Glue
- Pet Food
- Plastics
- Wallpaper

WORD BANK
- BRUSHES
- CAKE MIXES
- CHINA
- DISH SOAP
- GUMMY CANDY
- INSULIN
- LIPSTICK
- METHANE GAS
- TOOTHPASTE
- VOLLEYBALLS
- WALLPAPER

Name: _____ Date:_____

Beef By-Products

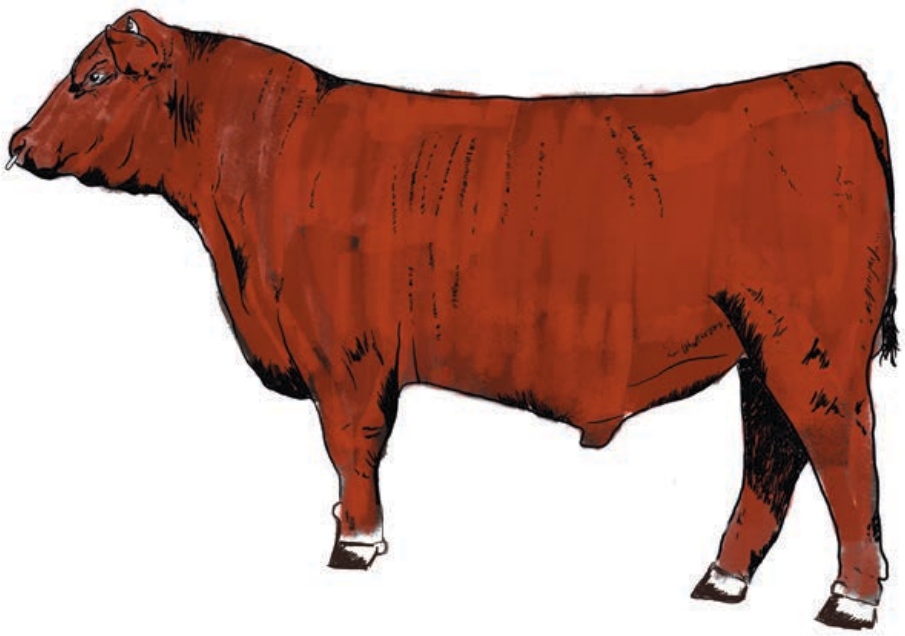
Directions: Fill in the blanks by placing the appropriate by-product name in the blanks below.

Internal Organs
- Anti-rejection drugs
- _____
- Natural Gut Tennis strings

Manure
- Fertilizer
- _____
- Nitrogen
- Phosphorus

Hide (Skin & Hair)
- Baseball Mitts
- _____
- Collagen
- Felt
- _____
- Marshmallows
- Leather
- _____

Fat
- Antifreeze
- Biodiesel
- Candles
- _____
- Crayons
- _____
- Hydraulic Brake Fluid
- _____
- Tires
- _____



Bones, Hooves & Horns
- Band-aids
- Buttons
- _____
- Glue
- Pet Food
- Plastics
- _____

WORD BANK
- BRUSHES
- CAKE MIXES
- CHINA
- DISH SOAP
- GUMMY CANDY
- INSULIN
- LIPSTICK
- METHANE GAS
- TOOTHPASTE
- VOLLEYBALLS
- WALLPAPER

LESSON 6: Beef Cookery

Teacher Background
This lesson will provide students a basic understanding of food safe handling practices in storing and preparing meat and using the proper cooking method depending on the cut of beef and its respective tenderness. Additionally, students will be able to identify dry heat and moist heat methods of cooking, and preparing meats using a variety of cooking methods.

Materials:
- Internet access
- Computers/tablets
- Video: Catch the Sizzle https://www.youtube.com/watch?v=LOox02dxlew
- Canada Beef Websites:
    - https://canadabeef.ca/cooking-know-how/
    - https://canadabeef.ca/cooking-methods/
- Student handouts:
    - Beef Cooking Methods Activity Worksheet
    - Beef Cookery Crossword

PROCEDURE

1. Have students watch the video: Catch the Sizzle: https://www.youtube.com/watch?v=LOox02dxlew
2. After viewing the video, ask students if they could identify any cuts of beef being prepared or any of the methods used to prepare them.
3. Next, have students go to the website: https://canadabeef.ca/cooking-know-how/ and show them how each method of cookery links to its own page. Then have them click on “Grilling” and watch the corresponding video. Provide students with the Beef Cooking Methods Activity Worksheet.
4. Once most students have had some time to complete the worksheet, provide students with the Beef Cookery Crossword. Students may use the Beef Cooking Methods page to assist them with the crossword puzzle https://canadabeef.ca/cooking-methods/
5. When the majority of students have finished the two handouts, mark the sheets as a class, elaborating on answers as needed if any questions arise.
6. Have students return to their KWL charts from Lesson 1. As an Exit Ticket, have students fill in 2-3 new things they learned on their charts.

EXTENSION

- For a more comprehensive view of the beef cooking methods, have students explore other parts of the website: www.canadabeef.ca

Name: _____ Date:_____

BEEF COOKING METHODS

Directions: Go to the https://canadabeef.ca/cooking-know-how/ website and investigate the different methods for cooking beef. Summarize the steps for cooking meat in the spaces provided below.

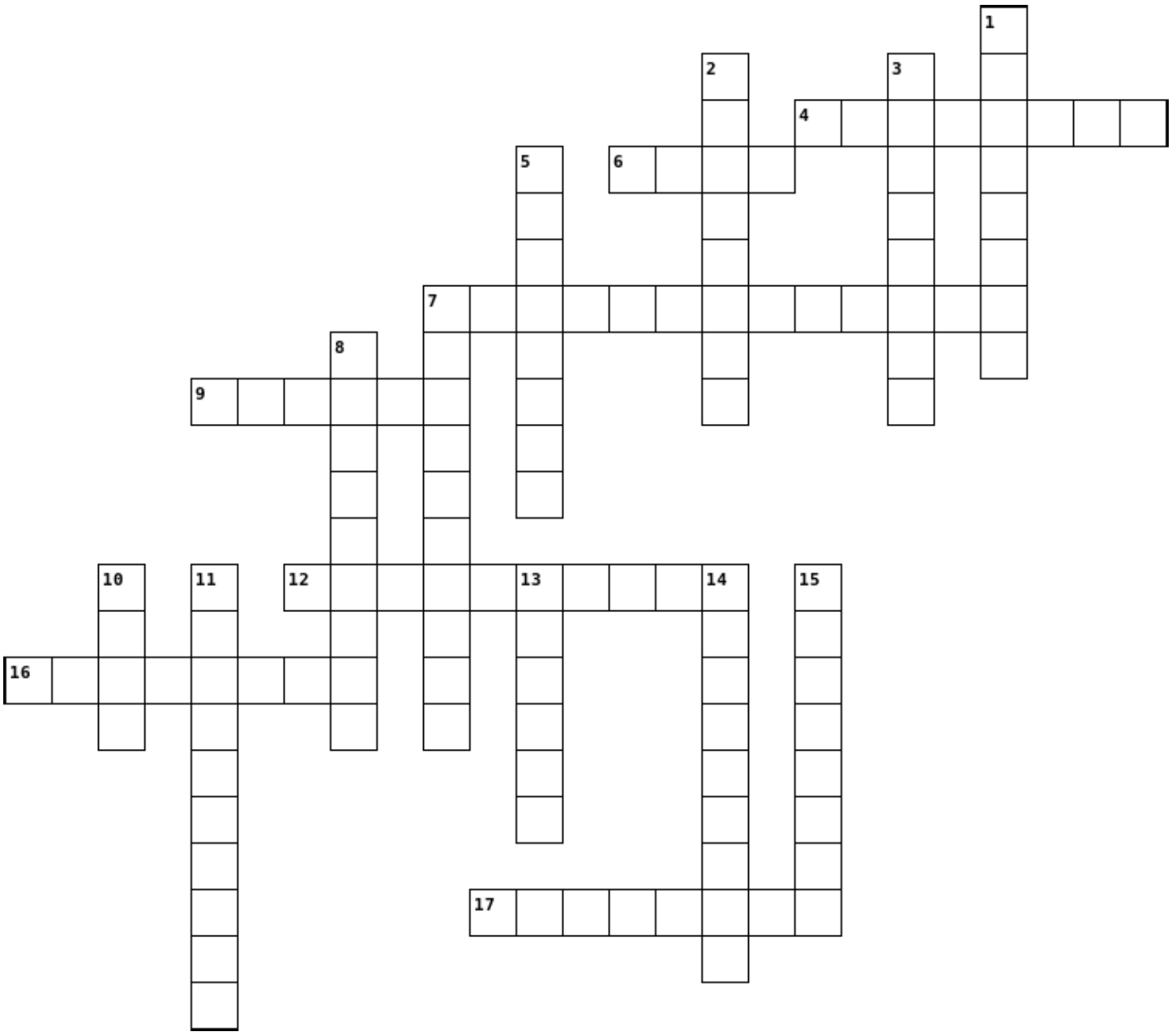
GRILLING	1. 2. 3.
GROUND BEEF	1. 2. 3.
BURGERS	1. 2. 3.
FAST-FRY STEAKS/ STIR-FRY STRIPS	1. 2. 3.
BEEF GRILLING KABOBS/ SATAY	1. 2. 3.
STEWING BEEF	1. 2. 3.

MARINATING STEAK	1. 2. 3. 4.
SIMMERING STEAK	1. 2. 3.
BROILING	1. 2. 3.
POT ROAST	1. 2. 3.
ROTISSERIE ROAST	1. 2. 3. 4.
OVEN ROAST	1. 2. 3. 4.

Name: _____ Date:_____

BEEF COOKERY CROSSWORD

Directions: Go to https://canadabeef.ca/cookingmethods/ and read the information on methods of cooking beef. Use the clues on the following page to complete the crossword puzzle below.



BEEF COOKERY CROSSWORD

Across

4. This refers to the visible white flecks and streaks of fat within the lean sections of meat.
6. This is the lowest degree of steak doneness.
7. The act of making beef tender through chemical or physical methods such as pounding or the use of marinades.
9. A natural tenderizer extract found in papaya fruit.
12. These type of dark patterns on meat can be created by cooking on the barbecue. They are visually appealing, seal in juices and help release the steak from your grill.
16. A sauce, typically made of oil, vinegar, spices, and herbs, in which meat is soaked before cooking in order to break down connective tissue and flavor it.
17. A cooking method in which beef is placed in an oven, allowing the heat to surround the cut and slowly increase its internal temperature until the desired doneness is reached.

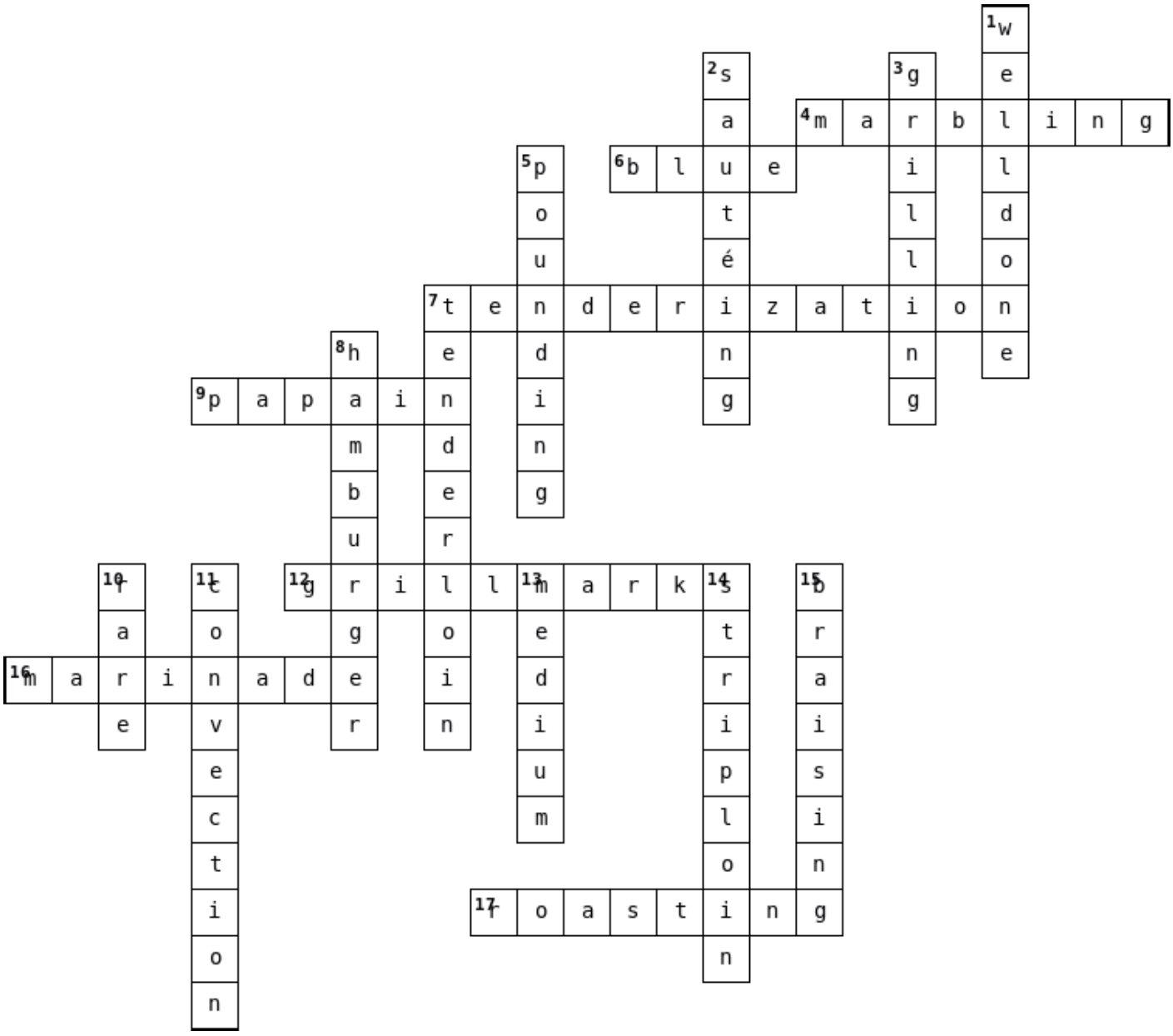
Photo by Edson Saldaña on Unsplash

Down

1. A level of steak doneness in which the meat is charbroiled and completely cooked through
2. This method of cooking utilizes a small amount of hot oil in a pan or wok to quickly cook the beef and maintain moisture and tenderness.
3. This method of cooking meat uses high heat to sear the outsides of a cut, in order to maintain moisture on the inside; it is most often associated with cooking steaks and smaller cuts like kabobs.
5. Using a meat hammer to flatten and break down connective tissue in meat.
7. One of the most tender beef cuts available; it is a long, narrow, lean muscle below the cattle's backbone.
8. A round patty of ground beef, fried or grilled and typically served on a bun or roll and garnished with various condiments.
10. This is the level of doneness in which steak is seared and is still 75% red through the centre.
11. A type of oven that has a fan in the back to help circulate the air around.
13. A level of steak doneness in which the meat is charbroiled with a pink centre.
14. One of the more tender and marbled cuts of beef often cooked via dry methods.
15. In this method of cooking, beef cuts are browned, vegetables added, and a liquid is added to cover one-third of the meat. A lid is then placed on the pot and the dish is cooked slowly in either an oven or on the stove top.

KEY

BEEF COOKERY CROSSWORD



LESSON 7: Meat or Meatless?

(This lesson has been adapted from a lesson called, A Tale of Two Burgers" by Bekka Israelsen, National Agriculture in the Classroom Organization, NAITCO)

Teacher Background

Plant-based protein is on the rise and alternative burgers such as Beyond Meat are showing up on fast-food menus throughout Canada and the world. As more and more meatless alternatives become available, consumers may be faced with various questions and concerns such as: What is a plant-based burger? Are meatless burgers a healthier alternative to real meat? Does meatless burger production result in a smaller carbon footprint than beef?

This lesson will provide students with a deeper understanding as they investigate beef and plant-based burgers. Students will have the opportunity to compare and contrast 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.

Materials:

- Internet access
- Computers/tablets
- PowerPoint:
  - Meat or Meatless
    https://www.bcaitc.ca/resources/sustainability-beef-industry-british-columbia-powerpoint
- Student Handouts:
  - Burger Types Activity Worksheet (4 different sheets, 1 sheet per group)

PROCEDURE

1. Begin the lesson by projecting slide 1 of the Meat or Meatless PowerPoint and ask students to predict which of the pictures of the burgers correspond to the types listed. Have students reveal their predictions and provide them with an opportunity to share the reason for their choices.
2. Ask students the following questions to promote discussion:
   - What qualities of the burger did you consider when studying each burger?
   - Was there one burger that was easy or obvious to identify?
   - Which burger would you be willing to try?
3. Next, show students Slide 2 to reveal the correct burger types and allow students to check their predictions. Tell them that the next activity will allow them to explore meat and meat alternatives in order to determine similarities and differences.
4. Divide students into groups of 2-4 students. Provide each group with one of the four Burger Types handouts. Instruct the groups that they will be responsible for researching their assigned meat/meat alternative product and to fill in the appropriate boxes on the sheet provided. Students may use print or online resources for their research, however, remind students to use credible sources and to cite them.
5. Once students have completed their research and filled in the sections on their handouts, have them share their information with the whole class.
6. After everyone has completed their sharing, use slides 3-6 on the Meat or Meatless PowerPoint, and review the burger types with the class allowing them to complete any sections on their handout that they may have missed.

EXTENSION

- For an extension activity, ask students to research other plant-based protein products and compare them to those studied.
- Ask a local grocery store owner to visit your class to discuss the changes in the number and types of plant-based products on their shelves. Also, see if plant-based products are in their own section or in the meat section.
- Conduct a blind taste test with students to see if they can identify which burger contains a beef patty and which contains an alternative meat patty.

BEEF BURGER

HISTORY

How long has this type of burger been available?

STEPS FROM FARM TO FORK

How is it produced? Provide a detailed step-by-step explanation!

INGREDIENTS

What are the ingredients used to make this burger?

BENEFITS

What are the benefits of this burger?

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

CHALLENGES

What are the challenges or drawbacks to this burger?

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

MORNINGSTAR FARMS VEGGIE BURGER

HISTORY

How long has this type of burger been available?

STEPS FROM FARM TO FORK

How is it produced? Provide a detailed step-by-step explanation!

INGREDIENTS

What are the ingredients used to make this burger?

BENEFITS

What are the benefits of this burger?

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

CHALLENGES

What are the challenges or drawbacks to this burger?

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

BEYOND MEAT BURGER

HISTORY

How long has this type of burger been available?

STEPS FROM FARM TO FORK

How is it produced? Provide a detailed step-by-step explanation!

INGREDIENTS

What are the ingredients used to make this burger?

BENEFITS

What are the benefits of this burger?

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

CHALLENGES

What are the challenges or drawbacks to this burger?

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

IMPOSSIBLE FOODS BURGER

HISTORY

How long has this type of burger been available?

STEPS FROM FARM TO FORK

How is it produced? Provide a detailed step-by-step explanation!

INGREDIENTS

What are the ingredients used to make this burger?

BENEFITS

What are the benefits of this burger?

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

CHALLENGES

What are the challenges or drawbacks to this burger?

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

KEY

BEEF BURGER

HISTORY

How long has this type of burger been available?

- humans began eating cattle in 6,500 B.C.E.

STEPS FROM FARM TO FORK

How is it produced? Provide a detailed step-by-step explanation!

- Calves are raised with their mothers
- Calves are weaned and fed to a finished weight
- Meat is harvested and sold to consumers

INGREDIENTS

What are the ingredients used to make this burger?

- Beef!

BENEFITS

What are the benefits of this burger?

- low in sodium
- high in protein
- 99% of a beef animal is used in Canada creating little waste. Many items we use daily contain beef by-products
- Canada is the leader in sustainable beef production (only 2.4% of Canada's overall Greenhouse Gas Footprint).[1]

1. https://www.albertabeef.org/education-resources/infographics/Worried_About_Emissions.pdf

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

CHALLENGES

What are the challenges or drawbacks to this burger?

- many misconceptions and conflicting data surrounding beef and its environmental impact.

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

KEY

MORNINGSTAR FARMS VEGGIE BURGER

HISTORY

How long has this type of burger been available?

- company started producing plant-based meats in 1974.

STEPS FROM FARM TO FORK

How is it produced? Provide a detailed step-by-step explanation!

- ingredients are combined and pressed together.
- processed and frozen for sales.

INGREDIENTS

What are the ingredients used to make this burger?

Water, carrots, onions, soy flour, egg whites, mushrooms, whole grain oats, wheat gluten, water chestnuts, vegetable oil (corn, canola, and/or sunflower oil), green bell peppers, calcium caseinate (from milk), cooked brown rice (water, brown rice), red bell peppers.Contains 2% or less of onion powder, cornstarch, soy sauce powder (soy sauce [soybeans, salt, wheat]), sugar, black olives, salt, spices, garlic powder, jalapeno peppers, xanthan gum.

BENEFITS

What are the benefits of this burger?

- low calories
- still high in protein

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

CHALLENGES

What are the challenges or drawbacks to this burger?

- very high in sodium
- lots of ingredients
- contains many common allergens

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

KEY

BEYOND MEAT BURGER

HISTORY

How long has this type of burger been available?

- debuted in 2016

STEPS FROM FARM TO FORK

How is it produced? Provide a detailed step-by-step explanation!

- source the five building blocks of meat from plants
- use heating, cooling, and pressure to create fibrous meat texture
- mix in fats, minerals, veggie and fruit colours, natural flavours and carbohydrates to replicate meat.

INGREDIENTS

What are the ingredients used to make this burger?

- coconut oil
- canola oil
- salt
- apple extract
- potato starch
- water
- vinegar
- beets
- cocoa butter

BENEFITS

What are the benefits of this burger?

- appropriate for consumption if vegan
- does not contain heme or soy
- high in protein

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

CHALLENGES

What are the challenges or drawbacks to this burger?

- very processed
- high in sodium

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

KEY

IMPOSSIBLE FOODS

HISTORY

How long has this type of burger been available?

- Since 2019

STEPS FROM FARM TO FORK

How is it produced? Provide a detailed step-by-step explanation!

- make heme (the molecule that gives meat the flavour craved), via fermentation of genetically engineered yeast
- combine that with primary ingredients
- add other ingredients
- mix it all together and package

INGREDIENTS

What are the ingredients used to make this burger?

Water, Soy Protein Concentrate, Coconut Oil, Sunflower Oil, Potato Protein, Methylcellulose, Soy Leghemoglobin, Glutamates, Natural Flavours, Sugars (Cultured Dextrose), Salt, Modified Plant Starch, Yeast Extract, Mixed Tocopherols (Antioxidant), Soy Protein Isolate, Thiamine Hydrochloride (Flavour), L-Tryptophan, Zinc Gluconate, Niacin (Vitamin B3), Ferric Phosphate, Pyridoxine Hydrochloride (Vitamin B6), Calcium Pantothenate (Vitamin B5), Riboflavin (Vitamin B2), and Vitamin B12.

BENEFITS

What are the benefits of this burger?

- less cholesterol
- high in protein
- contains many vitamins and minerals
- suitable for vegans

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

CHALLENGES

What are the challenges or drawbacks to this burger?

- high in sodium
- is a genetically modified food
- highly processed
- contains soy (a common allergen)

Think of both the farm (environment and resources needed) and the consumer (nutrition)!

LESSON 8: Meat or Meatless? Points of View

(This lesson has been adapted from a lesson called, A Tale of Two Burgers" by Bekka Israelsen, National Agriculture in the Classroom Organization, NAITCO)

Teacher Background

Plant-based protein is on the rise and alternative burgers such as Beyond Meat are showing up on fast-food menus throughout Canada and the world. As more and more meatless alternatives become available, consumers may be faced with various questions and concerns such as: What is a plant-based burger? Are meatless burgers a healthier alternative to real meat? Does meatless burger production result in a smaller carbon footprint than beef?

This lesson will provide students with a deeper understanding as they investigate beef and plant-based burgers. Students will have the opportunity to compare and contrast 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.

Materials:

- Internet access
- Computers/tablets
- Beach ball
- Student Handouts:
  - Student Point of View Plant-based Burger Cards (6 different sheets, 1 sheet per group)

PROCEDURE

1. Write the numbers 1-6 on a beach ball and in the middle of the room hold the ball up for your students to see. Without rotating the ball, ask students at various points of the room which number(s) they can see. For example, ask a student in front of the classroom what number they see, followed by the same question to a student in the back of the room and so on. Each student will see all or part of different numbers.
   - Ask students: "If you are all looking at the same object, why are you seeing different numbers?" Explain that it is because each has a different "point of view." Each student sees different numbers from their point of view. They may see an entire number or part of a number. There will be some numbers that they do not see at all.
2. Use this object lesson to spring into a discussion about plant-based burgers and beef burgers and different points of view, including:
   - What different points of view should be considered when discussing plant-based burgers and beef burgers?
   - How could this be a controversial topic?
3. While holding the ball in the middle of the room, divide students into six groups based on where they are sitting. Ask each group which number they see best from their position in the classroom. The number that they see will be their assigned point of view. (For example, if a group sees the number two best from their position in the classroom, they will have card #2 and their point of view will be a beef producer).
4. Assign each group a point of view to consider using the Student Point of View Plant-based Burger Cards.

5. Instruct groups to study the information on their card and discuss their point of view as a group. What other facts and information could be added to support their point of view? Groups should research their point of view and find various artifacts (e.g. video clips, news articles, opinion articles, etc.) that would help defend their point of view in a presentation or class discussion.
6. Allow students to present their material based on their assigned point of view reminding all the following important points:
   - Resolving issues and evaluating situations requires that we look at multiple viewpoints.
   - It's okay to agree to disagree.
   - When looking at or discussing issues, people may use facts, opinions, or personal biases to defend and persuade others to see her or his point of view.
   - It is important to try to look at multiple points of view before making our own evidence-based decisions.

EXTENSION

- Listen to the AgFuture podcast, Alternative "Meat" vs. Traditional Beef by Amanda Radke (https://www.alltech.com/podcast-blog/amanda-radke-beef-producers-perspective-future-protein-security), and discuss. Consider the following questions to engage your students:
  - Why is consumer choice important? How does it relate to beef vs. plant- based proteins?
  - Plant-based proteins are advertised as environmentally and ethically superior to beef. Is this true?
  - Why can't the land used to graze cattle simply be converted into farmland to grow food?
  - What by-products would be lost if the cattle industry vanished?
  - Should alternative meat companies be able to call their products "meat" or "beef?" Why or why not?

PLANT-BASED BURGERS
FROM MY POINT OF VIEW...

#1 – CFIA
(Canadian Food Inspection Agency)

- GFDA has approved the sale of Beyond Burgers and Impossible Burgers to consumers. In terms of food safety, they have been approved for consumption.

- CFIA and Health Canada have deemed the use of soy leghemoglobin (also known as LegH, harvested from genetically engineered yeast) as safe. Concerns arose because this plant alternative to hemoglobin found in meat has never been used in food prior to the Impossible Burger.

Background Information: *The Canadian Food Inspection Agency regulates the safety of food for humans and animals to ensure the well-being of Canada's people and economy while Health Canada ensures healthy foods are accessible. The CFIA regulates the safety of food for humans and animals, including foods produced from genetically engineered (GE) plants.*

PLANT-BASED BURGERS
FROM MY POINT OF VIEW...

#2 – Beef Producer

- Some beef producers are indifferent to plant-based burgers and believe many consumers will continue to eat beef products
- Some beef producers are opposed to plant-based burgers because plant-based meats are advertised as superior alternatives to eating red meat

Background Information: *Not all claims against beef production are accurate and in context. In Canada, to produce 1 kg of beef, 11.4 kg of carbon dioxide equivalents (kg CO2e) are produced[1]. This is less than half of the global average. In 2018, cattle accounted for 2.4% of total Canadian GHG emissions while transport and energy combustion accounts for 81.6% (Environment and Climate Change Canada)[2]. Although these numbers are important, just looking at GHG emissions disregards the whole picture. Cattle may be our greatest weapon against climate change through positive environmental benefits such as carbon sequestration, grassland preservation, soil health and biodiversity2. When it comes to health, recent studies claim the health benefits from eating less beef and pork are small. Red meat is nutrient-dense and a high-quality protein source which can meet nutritional requirements with relatively low calories, contributing to a healthy lifestyle[3].*

[1] *Canadian Roundtable for Sustainable Beef. (2016). National Beef Sustainability Assessment - Environmental and Social Life Cycle Assessments. Calgary, AB: Deloitte*

[2] *Binnie, M.A., Barlow, K., Johnson, V., and Harrison, C. 2014. Red meats: Time for a paradigm shift in dietary advice. Meat Science 98:445-451*

[3] *https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/sources-sinks-executive-summary-2020.html*

PLANT-BASED BURGERS
FROM MY POINT OF VIEW...

#3 – Food Marketer

- Some consumers fear GMO foods and prefer to purchase foods labeled as “non-GMO” The Beyond Burger can be advertised as “non-GMO” while the Impossible Burger cannot make the same claim.

- Some consumers and beef producers believe plant-based burgers should not be marketed and advertised as “beef” or “meat” since they do not contain any beef or animal products.

- Some consumers prefer buying grass fed and organic beef for the same reasons they choose non-GMO as it is perceived to be healthier. While there is no evidence to suggest it is healthier, consumers are still drawn to the labels and if there is a market, farmers and ranchers will provide it.

Background Information: *The dictionary definition of meat is “the flesh of an animal (especially a mammal) as food.” In 2018, the National Cattlemen’s Association petitioned the United States Department of Agriculture (USDA) and Food Safety and Inspection Services (FSIS) to exclude products not derived directly from animals raised and slaughtered from the definition of “beef” and “meat.”*[1]

[1] *https://www.uscattlemen.org/Templates/pdfs_USCA/2018-PDFs/2-9-18USCA-AMS-Petition-re-definition-of- beef-and-meat.pdf*

PLANT-BASED BURGERS
FROM MY POINT OF VIEW...

#4 – Nutritionist

- Plant-based burgers can provide an alternative protein source for consumers wishing not to consume animal products.

  "As a nutritionist, I would say this: If you enjoy the taste of these faux meat burgers, and part of your food philosophy includes vegetarianism or eating to sustain the environment, then by all means, you should feel free to enjoy an Impossible Burger or Beyond Burger. But if you are choosing to eat these burgers solely for their health value, you may want to reconsider." –**Lisa Drayer**, *CNN Health*[1]

- Plant-based burgers and beef burgers are very comparable in terms of nutrition (fat and calories). Plant-based burgers have significantly more sodium.

  "For example, the Impossible Burger has 240 calories, and 8 grams of saturated fat, thanks to coconut oil. By comparison, an 80% lean beef burger has 280 calories and 9 grams of saturated fat. That's not a whole lot of difference. Plant-based] meat burgers also rank higher in sodium than the beef and turkey burgers, with the Impossible Burger containing 370 milligrams of sodium, and the Beyond Burger containing 390 milligrams. The beef patty contains only 65 to 75 milligrams of sodium, depending on the brand."–**Lisa Drayer**, *CNN Health*

- Nutrients from meat are often better absorbed by our bodies than plant-based proteins. That is because although the content of protein is similar, the quality of the protein is not always the same. Eating meat and plant-based food together improves the iron absorption from plant-based foods by 150%

  "For example, the Impossible Burger has 240 calories, and 8 grams of saturated fat, thanks to coconut oil. By comparison, an 80% lean beef burger has 280 calories and 9 grams of saturated fat. That's not a whole lot of difference, however the beef has all amino acids in ratios that closely resemble the amino acids ratios required by humans."[2]

[1] https://www.cnn.com/2019/08/09/health/plant-fake-meat-burgers-good-for-you-or-not/index.html

[2] http://thinkbeef.ca

PLANT-BASED BURGERS
FROM MY POINT OF VIEW...

#5 – Consumer in Favour

- Some consumers are indifferent about plant-based burgers and beef burgers
- Some consumers are in favour of plant-based burgers because they contain no animal products and are vegetarian or vegan.
- Some consumers are in favour of plant based burgers because they perceive an environmental benefit.
- Some consumers are in favour of plant based burgers because they perceive health benefits. Some studies have shown that eating too much red meat can lead to higher rates of cancer or heart disease, and so they feel that they can mitigate these diseases if they do not consume any red meat.[1]

[1] https://www.medicalnewstoday.com/articles/326156#red-meat-and-health

PLANT-BASED BURGERS
FROM MY POINT OF VIEW...

#6 – Consumer Opposed

- Some consumers are opposed to plant-based burgers because they are highly processed.
- Some consumers are opposed to the Impossible Burger because it contains ingredients harvested from genetically engineered yeast.
- Some consumers do not eat plant-based burgers because they often contain many common allergens and are not considered a "whole food".
- Some consumers want to support sustainable beef agriculture, and Canadian endangered grassland preservation.

LESSON 9: Delicious Beef Recipes: BC Beef Chili Soup

(This lesson has been adapted from a recipe by Miriam Borys, Head Chef at Burnaby Central Secondary, as found on BC Agriculture in the Classroom Foundation Website)

Teacher Background

This lesson will provide students an opportunity to gain experience in preparing a dish that has beef as the key ingredient.

Materials:

- BC Beef Chili Soup Recipe: https://www.bcaitc.ca/recipes/bc-beef-chili-soup
- Demo and group sets of the necessary tools and the following ingredients:
  - Lean Ground Beef, browned & fat removed
  - Canola or Olive Oil
  - Onions, medium dice
  - Garlic, chopped
  - Carrots, medium diced
  - Celery, medium diced
  - Yams, peeled & diced
  - 1 Can Diced Tomatoes
  - Tomato Sauce
  - 1 Red Kidney Beans, 2.84 g Can, drained & rinsed
  - Onion Soup Mix
  - Chili Powder
  - Pepper, to taste
  - Beef Stock

PROCEDURE

1. Demonstrate how to prepare BC Beef Chili Soup by having all ingredients measured and prepared prior to the class.
2. Have students prepare BC Beef Chili Soup in their cooking groups using appropriate kitchen safety and food handling techniques.
3. During the 45 minute simmer time, have students clean up their stations and return to their KWL charts from Lesson 1. Have them complete the chart and submit it for assessment.

EXTENSION

- Have students try a beef recipe of their own choosing to try and share with the class.
- Encourage students to try other beef recipes from www.canadabeef.ca and https://www.bcaitc.ca/index.php/recipes
- Create a beef recipe exchange with class members by providing an online forum where students can share their favourite recipe and a picture of it prepared.
- Have students participate in Zesty Beef Lettuce Wraps Cook- Along with Chef Randle: https://www.bcaitc.ca/blog/cook-along-chef-randle-june-21

BEEF CHILI SOUP

Yields:
approximately 20 L or 80 x 250 mL portions

INGREDIENTS

Lean Ground Beef, browned & fat removed	2 kg
Canola or Olive Oil	50 g
Onions, medium dice	2 kg
Garlic, chopped	50 g
Carrots, medium dice	2 kg
Celery, medium dice	1 kg
Yams, peeled & diced	750 g
Can Diced Tomatoes, 2.84 L	1
Tomato Sauce	1.15 kg
Red Kidney Beans, 2.84 g Can, drained & rinsed	1
Onion Soup Mix	100 g
Chili Powder	50 g
Pepper	to taste
Beef Stock	15 L

DIRECTIONS

1. Sauté the ground beef and remove excess fat. Set aside.
2. In a clean stockpot sauté onions, garlic, carrots and celery in oil until transparent.
3. Add yams. Sauté for 5 minutes more.
4. Add tomatoes, tomato sauce, kidney beans, onion soup mix, chili powder and pepper to the onion mixture. Add beef and beef stock.
5. Bring to a boil. Reduce heat and simmer for 45 minutes.
6. Serve.

LESSON 10: Mythbusting: The Use of Hormones and Antibiotics in Cattle Production

Teacher Background

In this lesson, students will think about their own perspectives and learnings about beef cattle production and determine where they stand on common statements and myths. They will also learn more about the controversial and often misunderstood use of hormones and antibiotics in beef cattle production.

Materials:

- 5 Opinion Signs to post in the Classroom:
  - Strongly Agree, Agree, Neutral/Unsure, Disagree, and Strongly Disagree
- Student Handouts:
  - SnapAg Sheet: Hormones
  - SnapAg Sheet: Antibiotics
- Lined paper
- Chart paper

PROCEDURE

Part 1: Where do You Stand?

1. Set up the classroom by moving desks and chairs to one side of the room to maximize space. Label one wall with five signs in a row – Strongly Agree, Agree, Neutral/Unsure, Disagree, and Strongly Disagree. Explain to the students that they will be arranging themselves in a human bar graph line by the category that best fits their response to the following questions. Explain to the students that they will be arranging themselves into a human bar graph by lining up by the category that best fits their response to the following questions.
2. If desired, warm up for this activity with a less controversial statement, such as "vanilla is the best ice cream flavour," to help students establish the instructions for moving and defending their position.
3. Read each statement below one at a time. Allow 1-2 minutes per question so that students can move to the sign that most aligns with what they believe.
   - Beef is one of the best tasting agricultural food products on the market.
   - The thought of eating beef hormones frightens me.
   - Eating beef that has been treated with antibiotics during its lifetime will make me sick
   - Veterinary drugs used on animals raised for human consumption do not require any of the same rigour of testing as those used for people.
   - Canada has strict regulations around which medicines can be used on cattle raised for beef production.
   - Hormone implants in cattle can make beef tastier, but can be extremely costly and raise the amount you pay as a consumer at the grocery store.
   - Hormone-free beef is better for your health.
4. When students are standing beside the sign that fits their answer, have one or two volunteers explain their choice.
   - Important Note: students are expressing their own views on the subject and should not put down the opinions of their peers. They are allowed to defend their position but should not attack other's arguments as this is a learning exercise to explore the topic.

Part 2: Mythbusting Hormones and Antibiotics in Beef Production

1. Write "Hormones" on board or large piece of paper and post at the front of the room. Write "Antibiotics" on another board or large piece of paper and post at the front of the room. Have students write down anything on the board or the paper, that comes to mind about the related topics. Questions are encouraged, and they are not to repeat other's ideas.
2. Explain to students that in today's class they will be tackling another complicated and controversial topic in the beef industry, the use of antibiotics and the use of hormones, and what exactly those two words mean.
3. Show the class a clip of an A&W commercial advertising their beef burgers being raised without hormones or steroids: https://www.youtube.com/watch?v=Xia7qLKP-Ls&feature=emb_logo
   - Ask students if they believe beef raised without hormones or steroids is better and why? Ask students if they think eating beef given antibiotics is bad and why?
4. Following this discussion, have students read the CBC article response here: https://www.cbc.ca/news/canada/edmonton/ranchers-have-a-beef-with-new-a-w- hamburger-campaign-1.2426659.
   - Ask students to identify what the main counter argument presented as is.
5. Have students prepare a notes sheet by dividing a lined paper in two sections with the headers, "Hormones" and "Antibiotics". Provide half the class with the snapAG resource sheet on Hormones and the other half with the snapAg sheet on Antibiotics.
6. Have the students read their sheets over individually and highlight three key ideas they would use to teach the topic to someone else. Have them add these to the top of their notes sheet under the appropriate column.
7. Once students have finished their reading and recording, have them stand in two lines facing each other. Have the students with the hormone snapAg sheet stand on one side and the students with the antibiotics snapAg sheet on the other.
8. The students with the hormone sheet will have two minutes to explain their three points to the person they are facing, and one minute for questions. The student with the antibiotic sheet will then have two minutes of speaking time for their three points with one minute of question time. Have both students write down the other's points on their notes sheet.
9. Repeat this process, with one of the lines moving down one person, two more times. Have the students fill in their notes sheet when a new idea is presented.
10. At the end of the activity, have students make a group of 3-4 (they must have had the same original snap Ag sheet), and on a large piece of chart paper make a poster highlighting the top 5 most mentioned/key points they learned about the other topic.
11. Hang the posters on opposite sides of the classroom, and have students compare and contrast the teachings. What is similar about the two topics? What is dramatically different?
12. Revisit: Where do you Stand? Activity from Part 1 of this lesson. Ask questions again, and have students move to the sign they feel best aligns with their opinion. Have students reflect if any of their opinions changed. Were there any changes from strongly agree to a strongly disagree?
13. As an Exit Ticket, have students write down one new thing they learned from this activity and what they will do with this new information.

EXTENSION

- If possible, take your students on a field trip to a local cattle ranch. Use the Tips for Tours Ranch Guides (www.bcaitc.ca/resources) for teachers and producers, to help you and the rancher prepare for the fieldtrip.

snapAG ANIMAL HEALTH

HORMONES

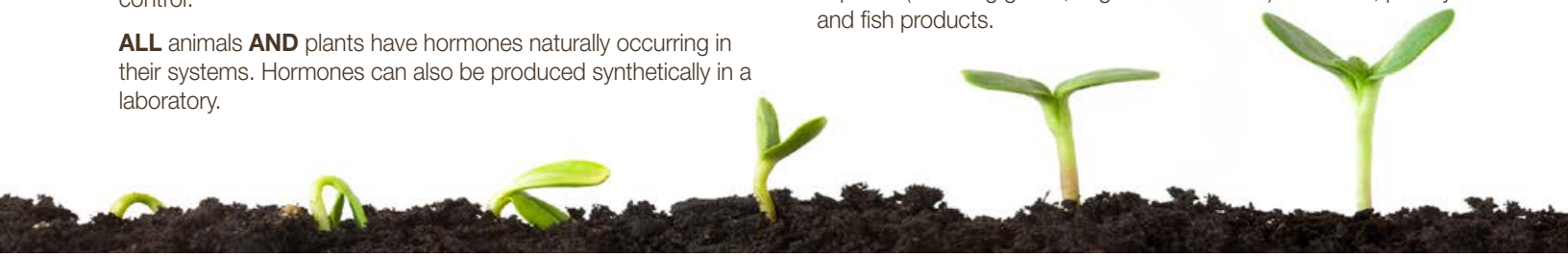
WHAT are hormones?

Hormones are chemical substances produced in the body to control the activity of certain cells or organs. They are essential for every activity of life: metabolism, growth, reproduction and mood control.

ALL animals **AND** plants have hormones naturally occurring in their systems. Hormones can also be produced synthetically in a laboratory.

NO FOOD IS HORMONE FREE!

The Canadian Food Inspection Agency (CFIA) that controls food labelling does not permit labelling food as "hormone-free" because such a label is untruthful.[1] Naturally occurring hormones are present in plants (including grains, vegetables and fruit) and meat, poultry and fish products.



ARE HORMONES USED FOR ALL FARM ANIMALS?

No. In Canada, growth hormones are approved for use **ONLY** with beef cattle (cattle raised for meat products).[2]

Hormones are not given to dairy cows (cows raised to produce milk). Dairy cows produce high quality milk when they are kept stress free and comfortable.

Pigs, chickens and turkeys also do not need hormones. No chickens anywhere in the world are given hormones.

FARMERS USE HORMONES FOR A REASON

For beef cattle, added hormones assist their natural hormones by promoting growth of muscle rather than fat.

As a result, beef cattle who are given hormones grow more quickly, make more efficient use of their feed and produce leaner meat, all of which translate into lower costs for farmers, and less impact on the environment AND your grocery bill.

Between 1977 and 2007, use of hormones in cattle resulted in producing 11% more beef from 20% fewer cattle![3]

HORMONES

Hormone use in beef cattle is safe

The *Food and Drugs Act* in Canada[4] states that hormones given to beef cattle must fulfill the following requirements:

- Be effective (do what they are supposed to do)
- Result in food products that are safe for people to eat on a regular basis
- Be safe for animals

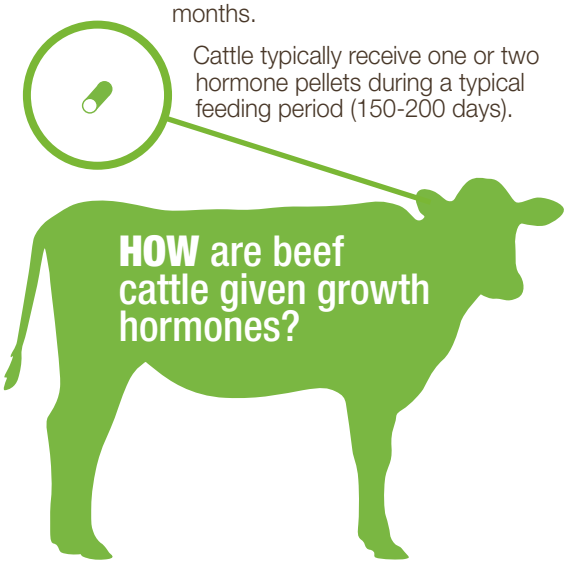
The Canadian Food Inspection Agency (CFIA) randomly samples beef products in order to ensure that hormone levels are at or below the amount that is determined to be safe.

THERE ARE **NO** SCIENTIFIC STUDIES

that indicate eating beef produced with hormones has any negative effects on human health.[5]

A small pellet containing the hormone is placed under the skin in an animal's ear. This pellet dissolves slowly over several months.

Cattle typically receive one or two hormone pellets during a typical feeding period (150-200 days).



The amount of estrogen contained in one serving of cabbage =

the same amount of estrogen contained in over 1,000 servings of beef produced using hormone implants![6]

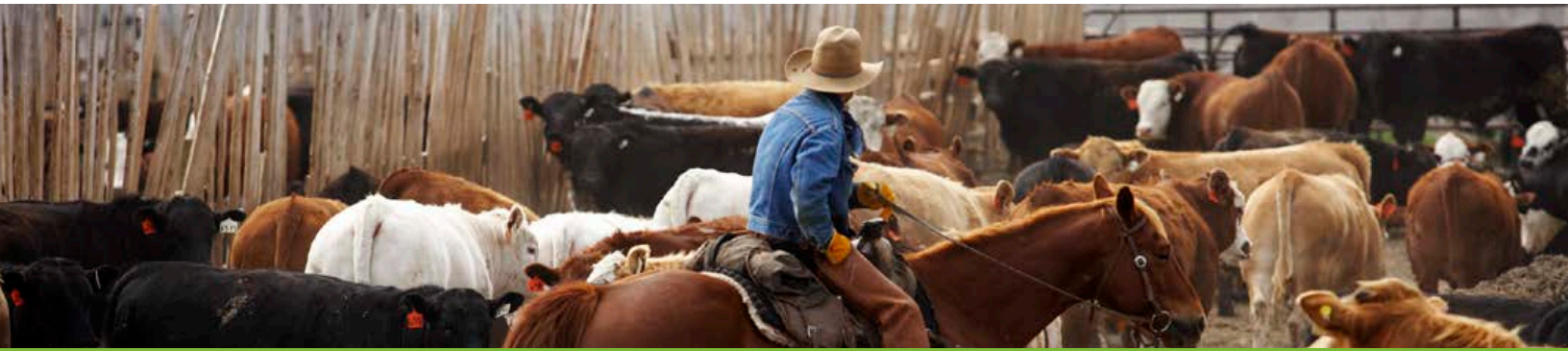
	FOOD	ESTROGEN*	SERVINGS OF BEEF** (75g)
	75g Beef without hormone implants	1.1 ng	0.65
	75g Beef withhormone implants	1.9 ng	1
	75g Chicken	2.1 ng	1.1
	355ml Milk	51 ng	26.8
	75g Cabbage	2025 ng	1,065.8

*AMOUNT OF ESTROGEN (1ng = 1 billionth of a gram)
**EQUIVALENT # OF SERVINGS OF BEEF produced with the use of hormone implants

"RAISED WITHOUT THE USE OF ADDED HORMONES"

When you see this statement on a package of meat in the grocery store, it means exactly what it says: no growth hormones were used while raising that animal.

In Canada, **ALL CHICKENS** are raised without added hormones. Chicken products labelled "raised without the use of added hormones" are no different from chicken products that do not carry this label.



References available @ www.aitc-canada.ca

snapAG ANIMAL HEALTH

ANTIBIOTICS

#1 IN A SERIES OF 3

WHAT are antibiotics used for?

Antibiotics are drugs used for treating or preventing infections caused by bacteria in both humans and animals. Antibiotics can also help limit the spread of disease.

WHY do farmers & ranchers use antibiotics?

DISEASE TREATMENT

Caring for animals when they are sick is an important aspect of animal welfare that farmers, ranchers and veterinarians take very seriously. Sometimes, using antibiotics is necessary to treat animal disease and illness and prevent animal suffering.

DISEASE PREVENTION

In some situations, antibiotics are given to prevent infections from getting established in the first place. Using preventative antibiotics can reduce the need for more powerful antibiotics if the disease becomes more serious.

Prevention is always preferred over treatment in both human and veterinary medicine.

NUTRITIONAL EFFICIENCY

Ionophores are a type of antibiotic that boost growth in meat-producing animals, such as beef cattle. Ionophores increase their ability to use nutrients more effectively with less waste, meaning they mature more quickly and efficiently.

Between 1977 and 2007, Canada produced 10% more cattle that provided 39% more beef, largely because of ionophore use.[1]

For some animals, such as chickens and young beef cattle, ionophores help control parasites that can cause illness and even death.

DISEASE CONTROL

Antibiotics can reduce the spread of specific diseases within a herd to other animals after an animal has been infected.

Farmers work with veterinarians to determine appropriate and safe plans for giving antibiotics to animals based on a particular situation. As of December 2018, all antibiotics require a veterinary prescription (except for ionophores).

BIOSECURITY

Most poultry, pork and dairy farms are required to follow biosecurity measures to protect humans and animals against disease. These measures include limiting visitor access to barns and developing strict hygiene procedures that farm workers must follow. Even though they may not look sick, people and animals can carry diseases and pass them on to healthy herds and flocks. Biosecurity can help prevent introduction of disease, thus reducing the need for antibiotics.

ANTIBIOTICS

Are antibiotics safe?

Yes, as long as they are used according to manufacturers' guidelines. All antibiotics must meet Health Canada's strict standards for human and animal safety.[2] Before being approved for use, antibiotics are thoroughly tested to make sure they are both safe and effective.

Antibiotics help maintain animal health, which ensures the existence of a safe food supply for consumers and the prevention of potential food safety problems.

Antibiotics and the environment

Using ionophores creates environmental benefits. A farmer's ability to produce more meat in less time requires less feed, water and land. Cattle also produce less methane gas if treated with ionophores.

! In Canada, producing 1 kg of beef in 2011 created **15%** lower greenhouse gas emissions than in 1981.[3]

LOOK DOWN AT THE GROUND....

About 80% of antibiotics we use today originated from soil bacteria.[4] Some antibiotics are synthetic. That is, they are "made up" rather than naturally occurring.

Do humans and animals use the same types of antibiotics?

Certain types of antibiotics may be used by both humans and animals. Antibiotics of very high importance in human medicine, such as drugs prescribed for tuberculosis (TB), are seldom used to treat animals.

Ionophores are not used in human medicine. They work only on bacteria and certain parasites found in the stomachs of animals, and have no effect on disease-causing bacteria affecting humans.

snapAG ANIMAL HEALTH

ANTIBIOTICS IN FOOD

#3 IN A SERIES OF 3

SHOULD I be concerned about antibiotics in my food?

No. In Canada, food is tested for antibiotics to ensure that it is safe for you to eat.

Canada has **strict regulations** regarding how much time passes between when an animal is last treated with antibiotics and when it is sent to be prepared to be sold to consumers. This is known as a **WITHDRAWAL PERIOD,** and it ensures that antibiotics have left the animal's system before any product from the animal is sold as food.

For example, if a dairy cow receives medication, then the farmer cannot sell that cow's milk until the animal is healthy. Even after a farmer stops giving medicine to a cow, its milk must be discarded until the withdrawal period has passed.

Similarly, when laying hens are given antibiotics, their eggs are thrown away until the withdrawal period is finished.

Regular Testing

The Canadian Food Inspection Agency (CFIA) regularly tests food products to make sure they do not contain more antibiotics than the maximum limit allowed. Tests are in parts per billion, which would be like finding one drop in an entire swimming pool![1]

In 2013, **over 99.9%** of Canadian beef and imported beef products that were tested were found to be free from antibiotics.[2] If antibiotics are detected in a meat product, then that product cannot be sold.

There are 2.2 million milk pickups at farms in Canada every year. **Less than 0.009% test positive for antibiotics.** On the rare occasion that the milk does test positive for antibiotics, the whole truck load of milk is discarded and never reaches consumers.[3]

WHY WOULD THE PRESENCE OF ANTIBIOTICS IN FOOD BE A PROBLEM?

Over-exposure to antibiotics can lead to **antibiotic resistance**, which means that people and animals who are infected with a disease may not respond to antibiotic treatment.

A limited number of antibiotics are presently available. If these antibiotics become ineffective, then the ability to fight infectious diseases is significantly hindered.

Milking parlour

ANTIBIOTICS IN FOOD

Farmers and ranchers first priority is keeping their animals healthy!

Farmers and veterinarians work together to preventatively manage disease, which sometimes includes treatment with antibiotics.

Health Canada approves and controls antibiotics for both human and veterinary use in Canada. Before they are approved, antibiotics are thoroughly tested to make sure they are both safe and effective.

CODES OF PRACTICE

Codes of practice provide farmers and ranchers with information about how they are expected to raise their animals in order to maintain the high standards for animal care that we have in Canada.

Programs developed by various Canadian producer associations outline practices that farmers are expected to follow in order to ensure production of safe food. Examples include:

- **On-Farm Food Safety Assurance Program** – Chicken Farmers of Canada
- **Verified Beef Production Program** – Canadian Beef Producers
- **Canadian Quality Assurance Program** – Canadian Pork Producers
- **Food Safety module of proAction®** – Canadian Dairy Farmers

Farm groups are investing heavily in research to understand the animals they raise and investigate antibiotic alternatives. For example, Chicken Farmers of Canada and others in the poultry industry have invested over **$1.4 million** in antibiotic alternatives research over the past few years.[4]

"Raised without antibiotics"

If you buy a chicken labelled "raised without the use of antibiotics," then this means that no antibiotics were given to the chicken during its lifetime. Organic food is produced without using antibiotics.

REMEMBER: ALL Canadian chicken, meat, fish and dairy products are regularly tested for antibiotics and are safe to eat!

References available @ www.aitc-canada.ca