How "Lean is your Dollar"

Grade Level
7-12

Lesson Length
1-55 minute class for preparation and instruction
2-55 minute class periods for experiments

STEM Careers
- Animal Scientist, Nutritionist, Culinary and Meat Scientist

Nebraska Science Standards

IAFNR Standards
Standard #9

These lessons aim to bring the science, skills of inquiry, critical thinking, and problem solving to life through an agricultural context

Learning Objectives

By the end of the unit, students should be able to:
- *Describe the factors which influence the palatability of ground beef products related to tenderness, juiciness and flavor.*
- *Explain how the fat content of ground beef influences color, taste and cost.*
- *Determine the amount of purchased weight that is lost during cooking.*
- *Students will prepare an extra lean ground beef patty with a modification for tenderness and flavor.*
- *Students will participate in a test panel.*

Materials List (per student team)

Experiment #1 Ground beef patty taste test:

  1 pound each of 80%, 85%, 90%-lean ground beef (for smaller class, use 80% and 93%)
  2 pounds of 93-96% lean ground beef
  one egg white
  ¼ cup soft bread crumbs
  1 tsp. seasoned salt
  5 skillets (at least 2 should be non-stick)
  5 knives
  5 spatulas
  5 – 1 cup glass measuring cups or small clear plastic cups
  Instant read thermometer
  Scale (check the chemistry department?)
  Waxed paper or plastic wrap to place on scale
  Small paper tasting plates, markers to identify products
  Ranch Burger Recipe – for the 96% lean ground beef patty
  Compare the Difference sheet for each student

Preparation:

1. Divide students into 5 groups for this experiment.
2. Each student will mark a paper plate into 5 sections and label – A, B, C, D and E.
3. Identify each of the 5 types of ground beef with – A, B, C, D and E and determine which lab group will be preparing which type of ground beef.
4. Discuss appearance of the raw meat as to color and amount of fat present (the leaner the ground beef, the more red the color.)

Materials List
Experiment #2 Ground beef crumble test:

1 pound each of 80%, 85%, 90% and 93-96% lean ground beef
Option – extra pound of 80% to brown, crumble and rinse
1 skillet and spoon for each pound of ground beef
Scale (check the chemistry department?)
Paper plates to weigh ground beef crumbles
1 glass (1-cup) measuring cup or clear plastic cup per pound of ground beef
Compare the Difference Worksheet for each student.

Preparation:

1. Divide students into 5 groups for this experiment.
2. Each student will mark a paper plate into 5 sections and label – A, B, C, D and E.
3. Identify each of the 5 types of ground beef with – A, B, C, D and E and determine which lab group will be preparing which type of ground beef.
4. Discuss appearance of the raw meat as to color and amount of fat present (the leaner the ground beef, the redder the color.)
5. Divide students into groups for this experiment. Use the leftover ground beef crumbles for a lab for recipes made with ground beef crumbles.

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✋ *Do*

Introduction (Interest Approach)

To introduce students to how ground beef is made, show the following 4 minute and 18 second video clip to the class. The video clip shows how ground beef is made and what part of the animal is used to create ground beef. Use the video to gain curiosity in the content and to abolish any misconceptions that students may have about ground beef.

https://www.youtube.com/watch?v=dLcY4BEs5CY

Essential Questions

1. Which is the best ground beef for a hamburger patty?
2. For ground beef crumbles?
3. For low cost?
4. For health and reducing fat content in the diet?

Learning Activity 1: Lab #1 Patties

Provide students with the preparation knowledge and instruct them that they will be comparing the differences in % Lean Ground Beef which can be purchased at grocery stores. The differences the students will be comparing are color, taste, tenderness, juiciness and contrasting raw weight and cooked weight. Students may also compare the price difference associated with purchased price and edible product

Learning Activity 2: Lab # 2 Crumbles

In this lab, students will try to determine the proper recipes each type of lean should be used for. Based upon the texture of the precooked ground beef and cooked ground beef, students can find or create recipes which would support the different % lean products.

Learning Activity 3: Pre knowledge or follow up notes:

To give students information prior to the labs, you may want to offer the attached PowerPoint (Ground Beef Notes and Pearson square) presentations prior to or following the completion of the labs.

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🧠 *Reflection for either or both labs;*

Using the prompts below to facilitate reflection, allow each student to respond in writing to the prompts and then facilitate a whole class discussion.

1. Ground beef is economical, versatile and can be used in hundreds of ways. Ground beef should be selected for the specific use. Burgers, casseroles and other dishes yield the best product depending on the choice of lean meat. What is the best choice for people wishing to reduce the fat content in their diet?

2. Which is the best ground beef for a hamburger patty? For ground beef crumbles? For low cost? For health and reducing fat content in the diet? Ground Beef may be purchased in bulk and crumbles can be prepared and frozen for future use. This can be an economical way for the consumer to save money and time with food preparation.

🔄 *Apply*

Use the prompts below to facilitate small group and whole class discussion.

1. What factors which influence the palatability of ground beef products related to tenderness, juiciness and flavor?
2. *How does the fat content of ground beef influences color, taste and cost.*
3. *What amount of purchased weight was lost during cooking? Do you feel that this is deceptive to consumers? Why or why not?*
4. *What type of ground beef will you be purchasing for different meals and why?*

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References:

- **Reducing Fat in Cooked Ground Beef** -
http://www.beefnutrition.org/cmdocs/beefnutrition/reducingfatincookedgroundbeef.pdf
- **Ground Beef Nutrient Comparisons** – see back page
http://www.beefnutrition.org/cmdocs/beefnutrition/naturallynutrientrichleangroundbeef.pdf-

- **Burger Battle: Ground Beef vs. Ground Turkey** -
http://www.beefnutrition.org/cmdocs/beefnutrition/gbvsgt_factsheet.pdf
- **Recommended Temperatures for Cooking Meat and Poultry** – USDA
http://www.foodsafety.gov/blog/meat_temperatures.html
- **Thermometer Placement & Temperatures** – USDA
http://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/teach-others/fsis-educationalcampaigns/is-it-done-yet/thermometer-placement-and-temperatures/CT_Index
- **Start your Engines with Ground Beef** – PowerPoint presentation on ground beef developed for middle school by Kristie Kuhse, Waverly-Shell Rock Middle School**.**
http://www.iabeef.org/CMDocs/IowaBC/Start%20Your%20Engines%20with%20Ground%20Beef.ppt
- **Ground beef lesson and Study Guide** to accompany Start Your Engines with Ground Beef PPT. http://www.iabeef.org/CMDocs/IowaBC/LessonPlan&StudyGuide.pdf

Safety

- **Color of Cooked Ground Beef as it Relates to Safety** – USDA
http://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-factsheets/meat-preparation/color-of-cooked-ground-beef-as-it-relates-to-doneness/ct_index
- **Ground Beef and Food Safety** – USDA
http://www.fsis.usda.gov/wps/portal/fsis/topics/foodsafety-education/get-answers/food-safety-fact-sheets/meat-preparation/ground-beef-and-foodsafety/CT_Index
- **The Facts on Lean Finely Textured Beef (Pink Slime)** www.beefisbeef.com

- **How Ground Beef is Made** - www.cargillgroundbeef.com

Recipes

- **100 Burger Ideas** - http://www.iabeef.org/CMDocs/IowaBC/100_BurgerIdeas.pdf

- **Easy Ground Beef Recipes** -
http://www.iabeef.org/CMDocs/IowaBC/EasyGroundBeefRecipes.pdf

Just for Fun

- **Hamburger Timeline** - http://www.iabeef.org/CMDocs/IowaBC/HamburgerTimeline.pdf

- **Hamburger Trivia** - http://www.iabeef.org/CMDocs/IowaBC/HamburgerTrivia.pdf

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How "Lean is your Dollar"

Purpose: The purpose of these experiments is to determine the type of % lean ground beef the students and their families may purchase at the store. They will also determine the best uses for each type of % lean for meal preparation and analyze the cost of edible product of each type of ground beef.

Objective:

- *Students will describe the factors which influence the palatability of ground beef products related to tenderness, juiciness and flavor.*
- *Students will be able to explain how the fat content of ground beef influences color, taste and cost.*
- *Students will determine the amount of purchased weight which lost during cooking.*
- *Students will prepare an extra lean ground beef patty with a modification for tenderness and flavor.*
- *Students will participate in a test panel.*

Preparation:

The following information should be provided to students for background information. This can be performed by using a PowerPoint presentation, notes, or QR scanner game.

1. Ground beef is pure, 100% beef with some fat present. No fillers, cereal products or additives may be used unless specified on the label.

2. Ground beef options vary according to %-lean content found on the label. 85% lean / 15% fat means 85% of the weight is lean muscle and 15% is fat.

3. By law, ground beef can contain no more than 30% fat.

4. Fat content of ground beef will affect the flavor, juiciness and tenderness of beef patties. Consumer research shows that the most preferred beef patties are 80 to 85% lean for flavor and juiciness. As fat content decreases, the beef will become drier.

5. Fat content will affect shrinkage; leaner ground beef will lose moisture while a higher fat content will lose fat through preparation.

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6. Ground beef may carry the label "ground round" or "ground chuck" indicating the section of the beef carcass it came from. However by law, ground beef must be labeled with % lean/% fat.

7. Different %-lean ground beef products may be used in different recipes.

    a. Ground beef less than 80%-lean is good for dishes in which you drain the fat from the cooked beef, such as Sloppy Joes, chili and spaghetti sauce.

    b. Ground beef 80-85% lean is good for meat loaf / meatballs / beef patties as they hold their shape better when a moderate level of leanness is used. Beef patties with this level of fat are juicier.

    c. Ground beef 90-96% lean is good for combination dishes where the beef is not cooked first and low calorie recipes. Extra lean ground beef may crumble, fall apart and be drier in a patty.

    d. Any type of ground beef may be used to make ground beef crumbles, although the less expensive types may offer a better value.

8. Extra lean ground beef patties can be made more tender and juicy by adding an egg white and bread crumbs. See directions in Ranch Burgers recipe.

9. Ground beef with a higher percent of fat may be placed in a colander (after cooking) and rinsed to reduce fat. See *Reducing Fat in Cooked Ground Beef.*

<u>Instructions</u> (per team; assuming 4 comparisons)
1. Participation in Lab Activity
  1. Each group will make 4 equal sized patties – ½ inch thick - out of each pound of ground beef.
  2. **One group will add 1 egg white, ¼ cup of soft bread crumbs and 1 teaspoon seasoning salt to their one pound of 93-96% lean ground beef and mix lightly. ** Refer to Ranch Burger Recipe
  3. Weigh each patty before and after cooking. Record data on *Compare the Difference* Worksheet.
  4. Place a small hole or indentation in each patty to speed cooking.
  5. Pre-heat skillets to medium; place patties in the skillet and cook about the same amount of time, turning with a spatula.
  6. DO NOT press down on patties while cooking. Leaner patties may cook more quickly. Patties should reach 160 degrees F, as measured with an instant-read thermometer inserted horizontally.
  7. Reweigh patties using scale. Record data on *Compare the Difference* Worksheet.
  8. Pour off drippings into measuring cups or small plastic containers for comparison.
  9. Place each group of patties on a plate identified with its letter and cut into bite-sized pieces.

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10. Each student will take a piece of each of the five Taste Test patty samples.

11. Each student will record data and observations on *Compare the Difference* Worksheet.

12. Clean up lab area.

2. Negotiation Phase 1 – Write personal meanings
- ✓ Students will use data collected on the five different types of ground beef considering the % lean, weight raw and cooked, cost per pound and flavor to make claims based on the observations and evidence gathered.
- ✓ Example: "I can claim that the fat content will affect the flavor, juiciness and tenderness of the beef patty. As the % lean increased, the beef became drier."
- ✓ What regulations are in place in the beef and meat industry to ensure food safety and quality?
- ✓ Suggested resources: www.beefisbeef.org and www.cargillgroundbeef.com and USDA – Ground Beef and Food Safety.

3. Negotiation Phase II – Share data with the other groups
- ✓ Students compare their findings with the other groups by writing their statements on the whiteboard or butcher paper. Groups share their claims and generalizations that can be made from the experiment.

4. Negotiation Phase III- Compare findings to scientific community and experts
- ✓ Students will compare claims to the online and text resources listed in the Resource section of the lesson plan. The Generalizations listed in the lesson plan would also be helpful information for
- ✓ *students*.

5. Negotiation Phase IV – Individual reflection
- ✓ Students reflect on their results and discuss how their ideas have changed from the lab experiment.
- ✓ Students expand on their finding about the meat industry and regulations to ensure safe and quality meats are sold. (suggested reflection: pink slime, how ground beef is made)
- ✓ Students write their opinions of the experience – positive and negative including the amount of drippings poured off of each type – if any, the best flavor, juiciest, and most tender. Students should consider shrinkage, cost per serving and which is the best %-lean for hamburger patties?

Preparation for lab #2 Beef Crumbles
Review the **following** instructions prior to beginning the lab.
- ✓ Discuss proper food safety handling of ground beef – wash hands with hot soapy water before and after handling the raw meat to prevent foodborne illness.
- ✓ Discuss a taste panel – used to collect data, compare products, cooking methods, etc.
- ✓ Students will prepare the ground beef crumbles in their lab group and deliver the product to a central location for others to sample.
- ✓ Students will place one bite of each sample on their plates, sit down and carefully taste each sample.

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✓ Students/groups should NOT compare findings with neighbors until the experiment is completed.
✓ Students will complete the *Compare the Difference* worksheet.

Instructions (per team; assuming 4 comparisons)

2. Participation in Lab Activity
1. Each group should weight their "pound" of ground beef so it is exactly 16 ounces. Record on *Compare the Difference* Worksheet.
2. Heat skillet to medium and brown ground beef, breaking up crumbles while stirring. Break crumbles to ¾-inch in size (some consistent level). Be careful with the 90-96% lean as it can get dry and burn.
3. Carefully pour off all drippings into measuring cup/container and mark with letter of ground beef.
4. Weigh ground beef crumbles and record.
5. Have each group determine the cost per cooked ounce of ground beef by dividing the weight of the cooked meat into the cost per pound of the raw ground beef. Record data on *Compare the Difference* Worksheet.
6. ***Option*** – use directions from *Reducing Fat in Ground Beef* to rinse 80%-lean crumbles and compare weight, calories, costs and taste.

3. Negotiation Phase 1 – Write personal meanings
✓ Describe personal observations during the lab. Record on *Compare the Difference* worksheet.
✓ Students will make claims based on evidence gathered in the lab.
✓ Students will use data collected on the five different types of ground beef considering the % lean, weight raw and cooked, cost per pound and flavor to make claims based on the observations and evidence gathered.
✓ Example: "I can claim that the fat content will affect the flavor, juiciness and tenderness of the beef patty. As the % lean increased, the beef became drier."
✓ What regulations are in place in the beef and meat industry to ensure food safety and quality?
✓ Suggested resources: www.beefisbeef.org and www.cargillgroundbeef.com

4. Negotiation Phase II – Share data with the other groups
✓ Students compare their findings with the other groups by writing their statements on the whiteboard or butcher paper. Groups share their claims and generalizations that can be made from the experiment.

5. Negotiation Phase III- compare findings to scientific community and experts
✓ Students will compare claims to the online and text resources listed in the Resource section of the lesson plan. The Generalizations listed in the lesson plan would also be helpful information for

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students.

6. Negotiation Phase IV – Individual reflection

- ✓ Students write their opinions of the experience – positive and negative including the amount of drippings poured off of each type – if any, the best flavor, juiciest, and most tender. Students should consider shrinkage and cost per serving.
- ✓ Students write the best explanation based on what they learned from this laboratory experience.
- ✓ Student may make suggestions on what each type of ground beef should be used for. (suggestion, lower %lean may be more usable for patties, while higher % lean may be better for crumbling recipes such as pasta or lasagna)
- ✓ Students expand on their finding about the meat industry and regulations to ensure safe and quality meats are sold. (suggested reflection: pink slime, how ground beef is made)

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Compare the Difference

Name:_____

Types of Ground Beef – Compare % Lean

Sample	% Lean Ground Beef	Raw Weight	Cooked Weight	Cost/Pound	Cost/Ounce	Flavor and Comments

1. Which ground beef lost the most weight during cooking?_____

2. Which ground beef cost the least per ounce?_____

3. Which ground beef Cost the most per pound?_____

4. Which ground beef has the best flavor?_____

5. Which is the best choice for health and reduced fat content?_____

How "Lean is your Dollar" Discussion Questions

1. Which is the best ground beef for a hamburger patty?

2. For ground beef crumbles?

3. For low cost?

4. For health and reducing fat content in the diet?

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Lab Report

Please complete the following report during the design and implementation of your experiment.

Research Problem
- ✓ Describe what you are investigating and justify why you are investigating the problem.

Hypothesis
- ✓ Formulate one or more hypotheses for your experiment.

Procedures
- ✓ Create the steps you will follow for your experiment.

Data Collection
- ✓ Describe the data that you will collect during your experiment.
- ✓ Provide graphs, tables, charts, and raw data as necessary.

Results
- Explain you're your results.

Conclusion
- Based on your data:
    - ○ What can you conclude?
    - ○ Were your hypotheses supported?
    - ○ Were their limitations to your experiment?
    - ○ What are new research questions that derived from this study?