



# AGsploration

The Science of Maryland Agriculture

UNIVERSITY OF  
MARYLAND  
EXTENSION  
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## Undressing the Mystery of Meat



### GOAL STATEMENT:

Students will learn about the types of beef, pork, and lamb meat cuts and products and the role that these important agricultural commodities play in one's diet and in Maryland's economy.

### OBJECTIVES:

- Students will learn the importance that livestock animals and meat products play in Maryland's economy.
- Students will name major products we get from beef, pork, and lamb carcasses and how they fit into people's diets.
- Students will learn about dressing percentages of different animals used for meat.

### REQUIRED MATERIALS:

- "Beef Cuts Made Easy" (Cattleman's Beef Board and National Cattlemen's Beef Association)
- "Retail Cuts of Pork" (National Livestock and Meat Board)
- "Retail Cuts of Lamb" (National Livestock and Meat Board)
- Fruit\* (1 piece per group)
- Paring knife, safety knife, or peeler (1 per group)
- Plate (1 per group)
- Scale (1 per group)
- Calculator (1 per group)
- Protractor (1 per student)
- "Undressing the Mystery of Meat" worksheet (1 per student)

\*Any type of fruit may be used; apples, pears, and oranges work well. If you are working with younger students, consider using a fruit like an orange that can be easily pulled apart without using a knife.

### AMOUNT OF TIME TO ALLOW:

Approximately 60-75 minutes. Extension activities will take additional time.

## Background Information



*Teacher's Note: Realize that not all people consume meat products in their diets for various health, religious, political, environmental, cultural, ethical, aesthetic, or economic reasons. However, livestock is still an important part of agriculture. Students who don't eat meat can still learn the importance they play in the economy and agriculture.*

Maryland ranks 34th in the Nation for the value of livestock, poultry, and animal products produced. That amount earns Maryland farmers \$1.2 billion annually. Each year Maryland farmers sell about 90,000 cattle, 123,000 hogs, and 12,000 sheep. Most of these cattle, hogs, and sheep are sold for meat. (To see the current number and economic value of livestock sold by Maryland farmers consult the Agriculture Census data for Maryland available from the National Agricultural Statistics Service of the USDA.)

Meat is the muscle and fat (and sometimes bone) from a livestock animal which has been raised and processed for food as part of our diets. The processing of an animal is referred to as **harvesting** the animal, just as we harvest corn or wheat. A **carcass** is the body of an animal after skinning and removing the internal organs. Meat is part of many people's diets because it provides important nutrients for our bodies and people like the taste. Meat is a protein source that contains B vitamins, vitamin E, iron, zinc, and magnesium. Protein is important in a diet for muscle growth and repair.

### Industry Overview and Facts

#### *Beef*

Meat that comes from cattle is called beef. Some of the common beef meat cuts or products are steaks, roasts, and hamburgers. Cattle that are grown for meat typically take about 14-18 months to grow to market weight. Market weight is the weight of a livestock animal when it is harvested for meat. The market weight of beef animals is 1,000 to 1,300 pounds. A 1,000-pound beef animal will yield about 600 pounds of meat.

- Beef is the number one selling protein in the United States. In 2010, consumer spending on beef totaled \$74.3 billion.
- According to industry research firm CattleFax, the average American consumes 59.6 pounds of beef a year and spends \$240 a year on beef.

#### *Pork*

Meat from pigs (also called hogs or swine) is called pork. Some of the common pork cuts that you may know are pork chops, ribs, bacon, sausage, and ham. Pigs grown for meat typically take about 5-6 months to reach market weight. The market weight of a market hog is 230-270 pounds. A 250-pound hog will yield about 175 pounds of meat.

- In 2015, the average American consumed 49.9 pounds of pork a year (Economic Research Service, USDA).
- Pork is known as "the other white meat" because even though many people don't realize it, many pork cuts are as lean as skinless chicken.

#### *Lamb*

Meat that comes from sheep under a year of age is called lamb. Meat from older sheep is called mutton. Some common lamb cuts you may know are rack of lamb, leg of lamb, lamb chops, or lamb kabobs. Sheep that are grown for meat typically take 5-6 months to reach market weight. Market weight for a lamb is 100 to 140 pounds. A 100-pound lamb will yield about



50 pounds of meat.

- A 3-ounce serving of lamb provides 43 percent of an adult's recommended daily allowance of protein.
- Lamb consumption in the United States is smaller than other meats. Americans consume just 0.8 pounds of lamb a year ([www.sheep101.info/lamb.html](http://www.sheep101.info/lamb.html), 2015).

## Engagement

25 minutes



Begin by writing Beef (Cattle), Pork (Swine), and Lamb (Sheep) on the board. Ask students to provide names of meat products that they eat or have tried and which animal they think it comes from. Record the students' ideas on the board to create a list under each heading (i.e. bacon comes from pork, hamburger is beef, hot dogs typically come from both pork and beef). You can use the attached meat charts to check different cuts. (You will most likely have to help them get a good list for lamb.)

Divide the students into groups (by tables or by counting off) of beef, pork, and lamb. Have students talk about the types of meat they have tried out of their animal. Provide the meat chart that corresponds to each of the groups and ask each to pick a cut from the list on the board. Then have them use the sheets to find where their cut comes from on the animal. Next ask each group to arrange themselves by their cut in order of the way they would come front to back in the animal. Each group can share with the class.

## Exploration

20 minutes



### Activity 1: Picture Sort

1. Divide students into groups of about four.
2. Hand out the Meat ID Pictures.
3. Ask the students to go through the pictures and say whether they think the cut comes from beef, pork, or lamb. Ask why they think that and where on the animal they think it comes from.
4. Go through and review the slides with the class.
5. You can also let students know that in most animals the best, most tender meat comes from the loin (steaks, pork chops, lamb chops, etc.) and usually costs the most.

### Activity 2: You Be the Butcher

**Butcher** – a person who harvests animals and processes them for meat products.

**Carcass** – the body of an animal after skinning and removing the internal organs.

**Live weight** – the original weight of the animal before it is harvested.

This activity will simulate what the butcher does to process the animal into meat that ends up in the store.



1. Divide the class into small groups or use the groups they are already in.
2. Provide each group with a type of fruit and a peeler and/or paring knife. (Apples, oranges, and pears work well. You may also consider using safety knives. If using oranges, no knives are needed.)
3. Have the students begin by weighing and recording the weight of their fruit.
4. Have students peel off the skin of the fruit and weigh just the skin on the scale.
5. Have students cut the fruit open and take out the core, seeds, and anything inedible. Weigh all the contents they take out.
6. Have students finish by weighing the remaining edible fruit they have.
7. Have students create a pie chart of the peel, inedible parts, and fruit they have left.
  - a. Record the values for each of the layers in the chart provided in the weight column.
  - b. Find the total weight of the fruit and record.
  - c. Find the percentage for each portion of the fruit by dividing its weight by the weight of the whole fruit. (The answer should be a decimal like .45 which is equal to 45%.)
  - d. Find the angle for each pie section. Multiply the percentage for each section by 360. (Following with our example above,  $45 \times 360 = 162$  degrees.) If you have done it correctly, all the numbers should add up to 360.
  - e. Draw a line to make the radius of the circle. To do this, start in the exact center of the circle and draw a straight line to the outside of the circle.
  - f. Draw each section division. To do this, lay the protractor against the radius of the circle and draw a line at the angle you calculated in the earlier step. Each time you add a section, adjust the protractor so it is against the new radius line you just drew. Color each segment a different color to match your key color.
8. Have students find the dressing percentage of their fruit. Dressing percentage in an animal is the amount of the live weight that will enter the cooler in the form of a carcass. Dressing percentage can be calculated as carcass weight (weight of the animal after it has been skinned and had the internal organs taken out) divided by the live weight and multiplied by 100. Dressing percentage for the fruit is the weight of the edible fruit divided by the weight of the whole fruit multiplied by 100.

## Explanation

20 minutes



Most animals are sold on a live weight basis so it is important for buyers to know that the actual amount of animal they end up with is less. The dressing percentage of the animal is what is left after the skin and internal organs are removed. Factors like if the animal had horns, if a sheep had wool, or if an animal is extremely fat will affect dressing percentage. The average dressing percentage for livestock animals is usually around:

- Pork - 70%
- Beef - 60%
- Sheep - 50%

After dressing, more processing is done to make cuts like steaks, roasts, chops and ground meat so the total edible product is even less than the dressing percentage.

Allow students time to fill out the worksheet questions within their groups. Use these questions to guide the class discussion. Talk about how much of the actual animal becomes edible product.

Talk about what the discarded parts like skin, fat, bone and other things can be used for.



Worksheet answers:

- Pig dressing percentage - 70%
- Steer carcass weight - 750 lbs.
- Lamb's live weight - 130 lbs.
- You can make 600 Big Macs

## Extension



An easy extension would be to use the “Food Fiber and More” lesson plan in the AGsploration curriculum to talk about and make animal byproducts.

Have an adult help students to pan-broil one pound of ground beef. Separate and weigh the cooked meat and the grease (fat and other fluids). Determine the percentage of each in the pound of uncooked ground beef. Repeat the activity with ground pork or sausage and one pound of ground lamb and compare the results.

Foods are often associated with special events or holidays. Ask students to discuss the association of meat with different events they enjoy and holidays they celebrate. For example, people eat hot dogs at ball games, have corned beef on St. Patrick's Day, or serve lamb on Easter.

Keep a record of the meat products from beef, pork, or lamb that your family eats in a one-week period. Visit a grocery store or local restaurant and find all the meat products your family ate in that week and determine the total cost for your family to have meat in your diet that week. Compare the cost of your favorite steak or other cut of meat at your local store to the restaurant cost.

## Evaluation



A pre/post test may be completed with this lesson plan. Student understanding of concepts can also be evaluated through class discussion as well as through evaluation of completed activity data sheets. Analysis/conclusion questions that are answered incorrectly by a large number of students should be addressed in a follow-up discussion.





There are many careers related to the science and business of providing wholesome, nutritious, quality, and convenient meats and meat products to consumers. Opportunities in the meat industry involve all the sciences and is one of the fastest changing of the food industries. Many fields of study can lead to careers in the meat industry including microbiology, chemistry, biochemistry, engineering, sales, management, and marketing. Today, the emphasis being placed on food safety is creating many new jobs in this industry. Careers can be found in several segments of the meat industry including production, fresh meats, manufacturing or processing, and industry support.

**Production** – Includes raising livestock animals to be used for meat and meat products. Example jobs include:

- **Production Manager** – This person oversees the daily operations of a livestock farm that raises animals for meat.
- **Marketing and Sales** – This person secures buyers for live animals at the best possible prices.
- **Quality Assurance** – This person makes sure that the safest possible livestock production practices are used to raise animals for meat.

**Fresh Meats** – Includes harvesting and processing fresh meat. Example jobs include:

- **Harvest and Fresh Meat Processor** – This person is responsible for cutting large carcasses into smaller cuts of meat like steaks, chops, roasts, and hamburger for grocers, restaurants, and consumers.
- **Carcass Grader** – This person performs an evaluation of the meat characteristics of beef, pork, and lamb that affect the meat products consumers like most and are willing to buy.
- **Food Safety Inspector** – This person is a federal inspector that makes sure only safe animals are used for meat and that they are processed in clean, safe facilities.

**Manufacture** – Includes manufacture of processed meat products like beef jerky, smoked hams, pepperoni, bacon, bologna, and much more. Example jobs include:

- **New Product Developer** – This person works to find safer ways to freeze, dehydrate, cook, and store meat products or applies new technologies to create new convenient ways for consumers to transport, serve, store, or prepare meat products.
- **Food Scientist** – This is a scientist who creates new recipes for lunch meats, hams, bratwursts, and much more or improves the nutritional value of meat products.

**Support Industry** – Includes equipment, ingredients, chemicals, packaging materials, and services. Example jobs include:

- **Food Service Worker or Retailer** – This person might be running a meat department at a grocery store or working as a chef or manager at your favorite restaurant.
- **Research and Consulting** – This person studies meat industry problems in processing, producing, storing, and preparing meat and meat products.
- **Engineer** – This person designs equipment that processes or packages meat and meat products and might also design meat processing or manufacturing plants.

# References



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# Undressing the Mystery of Meat



Name: \_\_\_\_\_

Date: \_\_\_\_\_ Period: \_\_\_\_\_

## Goal:

Simulate processing an animal into edible meat products.

## Materials:

- Fruit (apple, orange, pear, etc.)
- Plate
- Peeler, paring knife, or safety knife
- Scale
- Calculator

## Background:

Livestock are grown and harvested in many parts of the world to serve as a high-quality source of protein and essential vitamins and minerals in our diets. The three main livestock species harvested for meat in the United States include beef, sheep, and swine. The process of getting them from live form to what you get in the store is done by a butcher. The butcher is responsible for getting all of the edible products from that animal to our plates.

## Directions:

1. Get into your lab group.
2. Listen carefully as the teacher explains the activity.
3. Weigh your fruit on the scale and record the weight.
4. Carefully take your paring knife or peeler and remove all of the skin from your fruit, weigh it on the scale, and record the weight in the table.
5. Cut your fruit in half and remove the seeds, pits, and any inedible parts you find inside. Weigh this amount on the scale and record the weight in the table.
6. Take the remaining edible fruit, weigh it, and record the weight in the table.
7. Create a pie chart with three sections: skin, inedible parts, and edible fruit.
  - a. Find the percentage for each portion for peel, inedible parts, and edible parts by taking their amount and dividing by the whole then multiplying by 100.
  - b. Find the angle for the both sides of the pie section. Take the percentage and multiply it by 360.
  - c. If you have done it correctly, all the numbers should add back up to 360.
  - d. Draw a line to make the radius of the circle. Start in the exact center of the circle and draw a straight line to the outside of the circle.
  - e. Draw each section division. Draw the sections by marking the first division against the edge of the protractor at the correct angle, using the angle formulations you got in the earlier step. Each time you add a section, the radius changes to the line you just drew; rotate your protractor accordingly.
  - f. Color each segment a different color to match your key color.

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# Undressing the Mystery of Meat



Name: \_\_\_\_\_

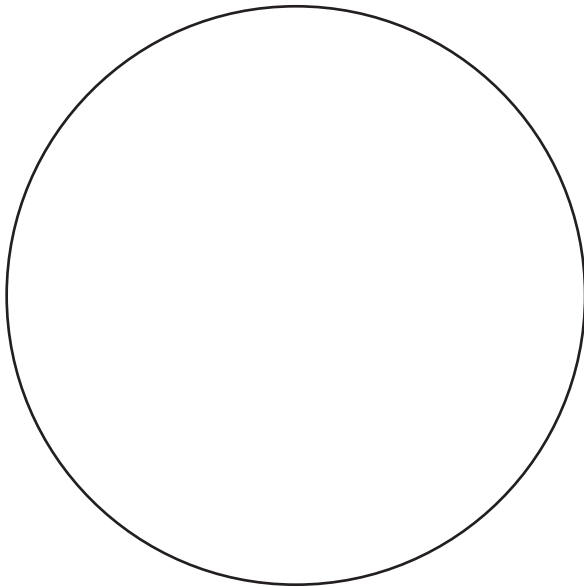
Date: \_\_\_\_\_ Period: \_\_\_\_\_

## Hypothesis:

What percentage of your fruit will you have left after you take off the skin and the inedible inside?

Part of Fruit	Weight
Whole Fruit	
Skin	
Inedible parts (seeds, core, etc.)	
Edible fruit	

## Fruit Dissection Pie Chart



### Pie Chart Color Key

- Skin
- Inedible
- Edible Fruit

1. Record the values for each of the layers in the chart provided in the weight column.
2. Find the total weight of the fruit and record.
3. Find the percentage for each portion of the fruit by dividing its weight by the weight of the whole fruit. (The answer should be a decimal like .45 which is equal to 45%.)
4. Find the angle for each pie section. Multiply the percentage for each section by 360. (For example,  $0.45 \times 360 = 162$  degrees.) If you have done it correctly, all the numbers should add up to 360.
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# Undressing the Mystery of Meat



Name: \_\_\_\_\_

Date: \_\_\_\_\_ Period: \_\_\_\_\_

**Dressing percentage** is the amount of the live weight of the animal that will enter the cooler in the form of a carcass (the processed animal that has been skinned and had the internal organs removed). Find the dressing percentage of your fruit.

$$(\text{weight of edible fruit} / \text{weight of the whole fruit}) \times 100 = \text{dressing percentage}$$

To find the dressing percentage of an animal:

$$(\text{carcass weight} / \text{live weight}) \times 100 = \text{dressing percentage}$$

You sold a pig that weighed 250 pounds and his carcass weight is 175 pounds. What is his dressing percentage?

The dressing percentage of your steer is 60% and his live weight is 1250 lbs. What is his carcass weight?

Your market lamb's carcass weighed 65 pounds and has a dressing percentage of 50%. What was the lamb's live weight?

Once an animal is dressed, more processing takes place to get meat into the final form that consumers buy it in.

An average 1200 pound steer has about 490 pounds of trim beef. Of that about 150 pounds ends up as ground beef. If we were to make this ground beef into hamburgers, how many McDonald's Big Macs could we make? (Hint: a Big Mac is two 1/8th pound patties.)

