

UNIT IV - PRODUCTS FROM AGRICULTURE

Lesson 1: Agriculture in the Food Chain

Competency/Objective: Describe the role of agriculture in the food chain.

Study Questions

1. **What is the food chain?**
2. **Why do people manipulate the food chain?**
3. **What is the role of agriculture in the food chain?**

References

1. *Exploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit IV.
2. Transparency Masters
TM 1.1 Simple Food Chain in the Natural Environment
TM 1.2 Simple Food Chain in the Aquatic Environment
TM 1.3 Agricultural Food Chain
3. Activity Sheets
AS 1.1 Student Chain (Instructor)
AS 1.2 Food Web (Instructor)

UNIT IV - PRODUCTS FROM AGRICULTURE

Lesson 1: Agriculture in the Food Chain

TEACHING PROCEDURES

A. **Introduction**

This lesson is about the food chain and how agricultural activities affect the process.

B. **Motivation**

Explain to students that during this lesson we will look at the food chain. Discuss what comes to mind when we say "chain." Answers such as "connected," "links," "chain letter," etc., will be given. Explain that we are going to make a student chain. Then conduct AS 1.1 as a motivational interest approach.

C. **Assignment**

D. **Supervised Study**

To be prepared for AS 6.2 in lesson 6 of this unit, order the following materials now.

Obtain biodegradable golf tees from the following address:

ECO GOLF
Box 17872
Indianapolis, IN 46217
<<http://www.ecogolf.com>>
888-326-3003
fax (317) 889-9921

Obtain cornstarch superabsorbent polymer from the following address:

Grain Processing Corporation
1600 Oregon Street
Muscatine, IA 52761-1494
<<http://www.grainprocessing.com>>
(319) 264-4265
sales@grainprocessing.com

To be prepared for AS 6.3, order the following materials now.

Minnesota Forest Industries
902 Medical Arts Building
324 West Superior Street
Duluth, MN 55802
(218) 722-5013
<<http://www.minnesotaforests.com>>

E. **Discussion**

Q1. **What is the food chain?**

A1. **The food chain is a sequence in which living organisms obtain food. There are four main parts to a food chain: sun, producer, consumer, and decomposer.**

Ask students to give an example of a food chain. Use TM 1.1 to illustrate the simple food chain in the natural environment. Use TM 1.2 to illustrate the food energy flow in the aquatic environment. In nature, lower animal forms are consumed by higher animal forms. Ultimately, consumption by humans, the highest animal form, is the end of the food chain. Garbage and waste products are then consumed by bacteria, etc., and the food chain process begins again. Conduct AS 1.2 to have students create a food chain with a more complex web of interconnections.

Q2. **Why do people manipulate the food chain?**

A2. Humans cannot survive by only using food produced by the natural food chain.

Ask students why people alter the food chain. Discuss why natural food chains can no longer provide the food that people need. Management of the food chains allows producers to raise more food in a shorter amount of time than would be possible naturally.

Q3. What is the role of agriculture in the food chain?

A3.

- a) **Controlled, large-scale production of food crops**
- b) **Domestication of animals and plants for food**
- c) **Protection of the environment and natural food chain for wildlife**

Discuss the role of agriculture in the food chain. As the human population increases, the need for food increases as well. Agricultural practices enable people to produce larger amounts of food than would be produced naturally in the food chain. Use TM 1.3 to illustrate the various food sources and their path to human consumption. Agriculture strives to maximize positive environmental factors (e.g., fertilizers, confinement housing, and vaccinations) while minimizing adverse factors (e.g., competition from weeds, weather conditions, and diseases).

F. *Other Activity*

Have students list as many food products as they can, categorizing them into plant or animal products. Also, list as many producers and consumers of these products as possible.

G. *Conclusion*

Natural food chains occur throughout the world in every environment. Agriculture and agricultural practices have enabled people to produce larger amounts of food than would be produced naturally in the food chain. Domestication of animals and plants has helped to produce food and clothing for humankind. Agricultural practices must protect the environment and the natural food chain for wildlife.

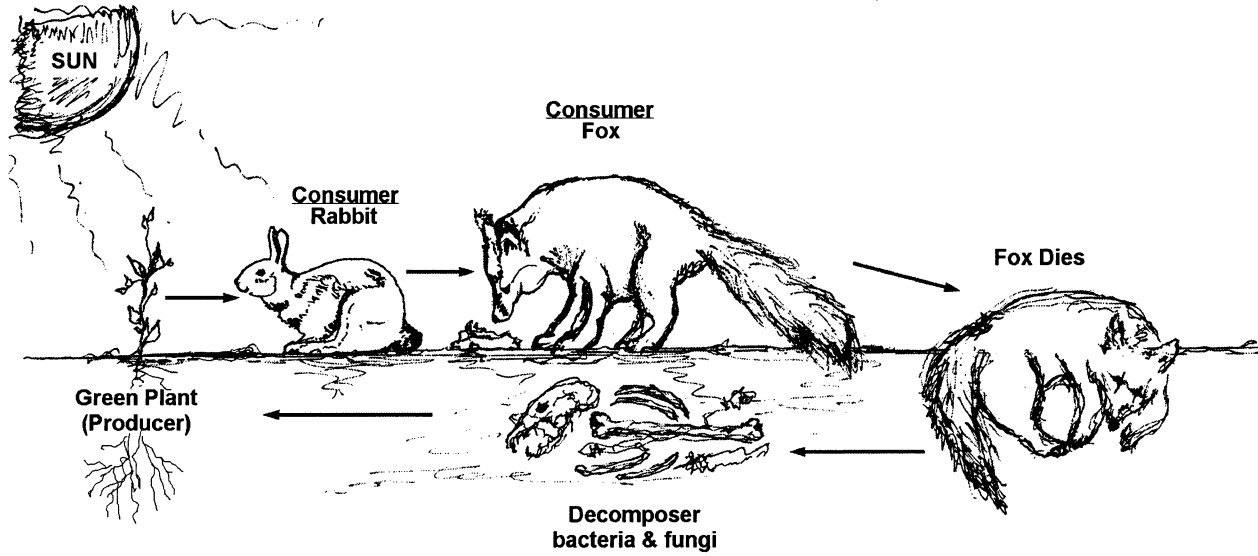
H. *Answers to Activity Sheets*

Answers will vary.

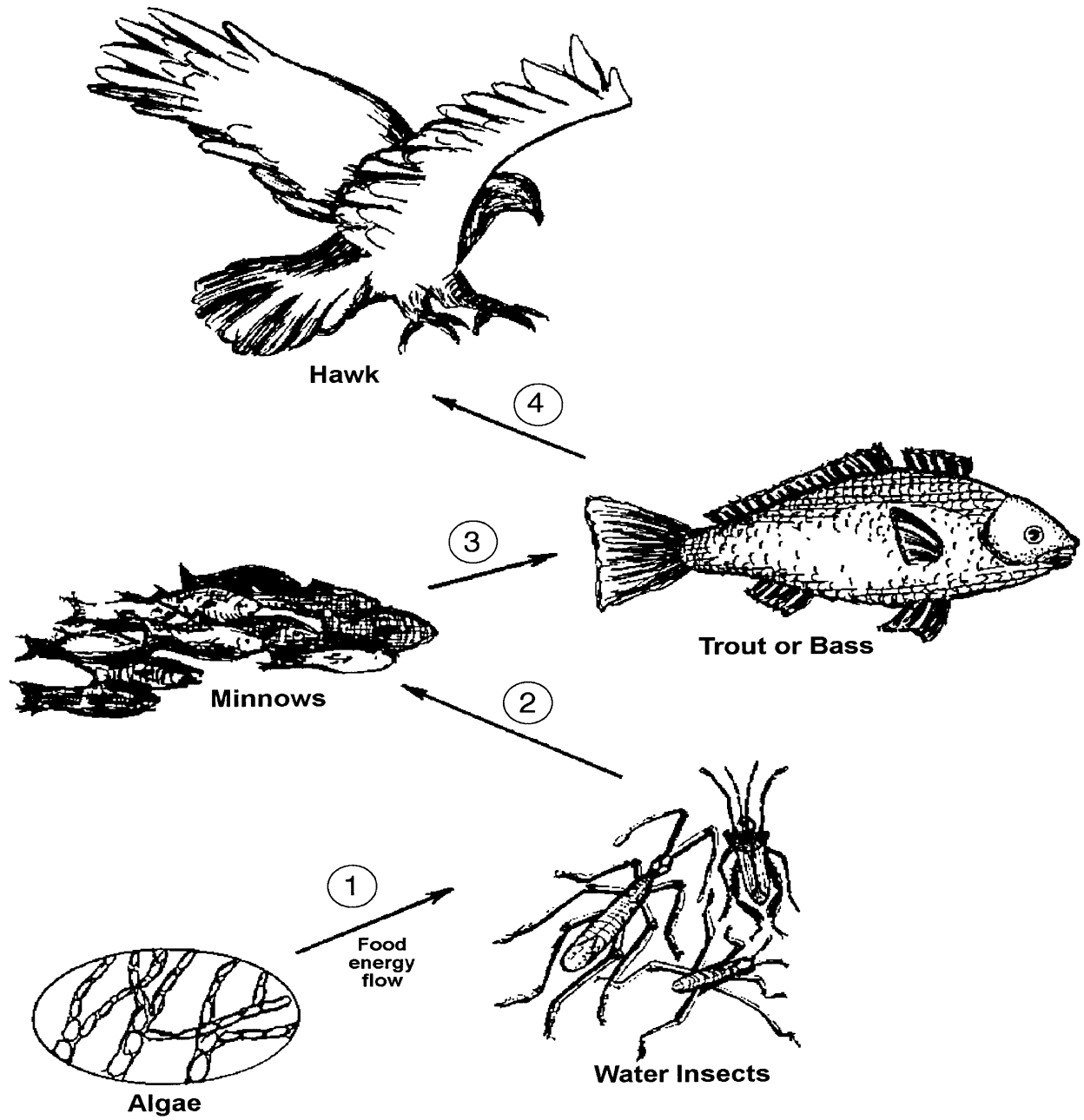
I. *Evaluation*

A unit test is provided at the end of this unit. If a lesson quiz is needed, use questions pertaining to this lesson from the unit test.

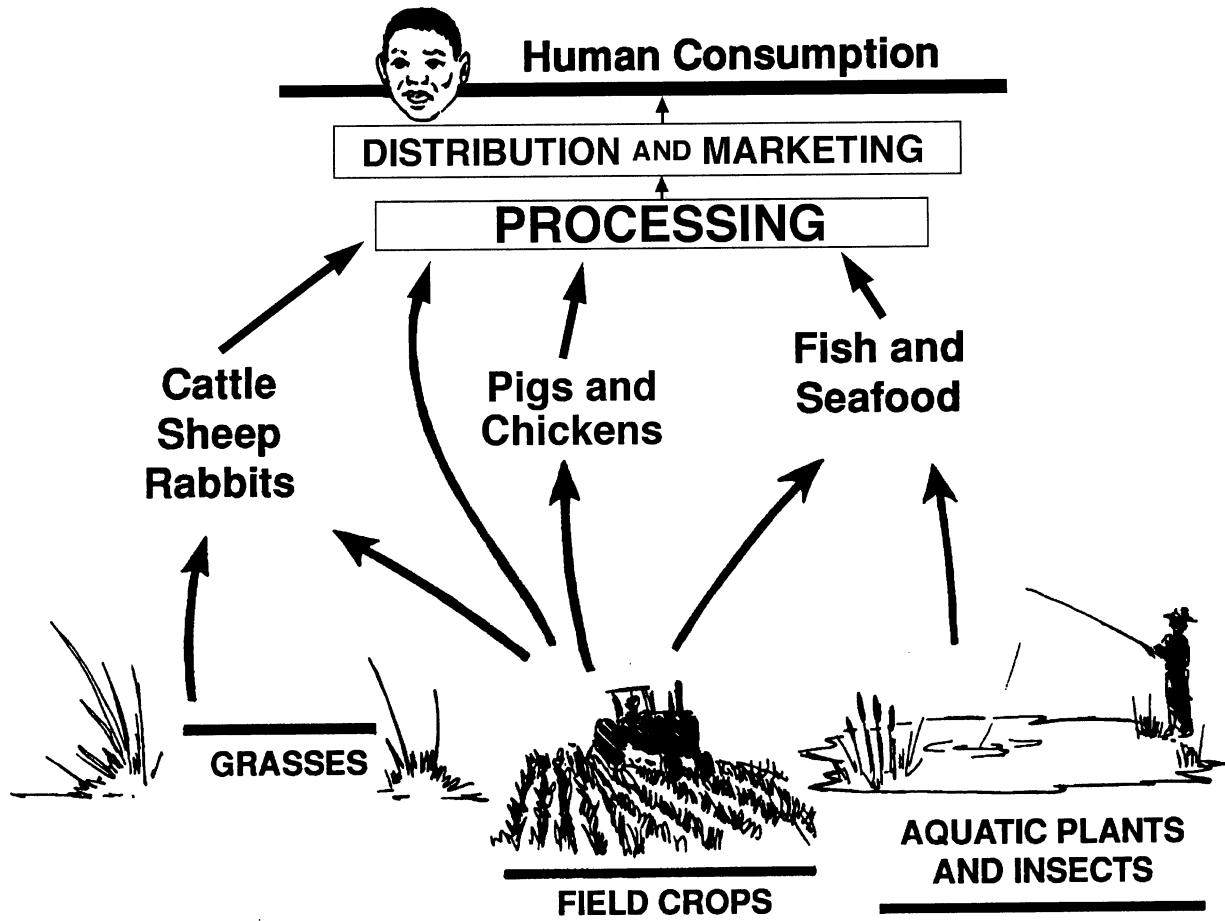
Simple Food Chain in the Natural Environment



Simple Food Chain in the Aquatic Environment



Agricultural Food Chain



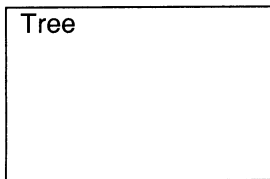
Student Chain

Objective: Students will understand the concept of a "chain" to be used in developing knowledge about food chains.

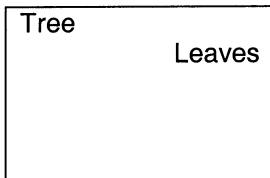
Directions: This motivational activity compares the interconnections in a food chain with the various word associations students make with a word like "tree." As students see how various words all link back to the same source (tree), they will be able to appreciate the concept of links in the food chain. There is not a right or wrong answer to this activity.

Procedure:

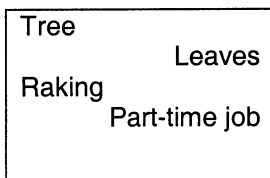
1. Give the first person in a row or table a piece of paper with "tree" printed in the upper corner. Other words selected by the instructor may be used in place of "tree."



2. Tell the first student to write a connection with tree and then pass the paper to the next student.



3. The second student writes a connection to the first person's word. In turn, the third, fourth, fifth, etc., person follows the same process.



4. Finally, the last student writes down his/her connection on the paper and brings it to the instructor.
5. Share the series of connections with the class. Be sure to ask each student to share how each connection relates back to the previous connection.
6. In closing, tell the students that there are many food chains, just like there were many different connections made by students in this activity.

Food Web

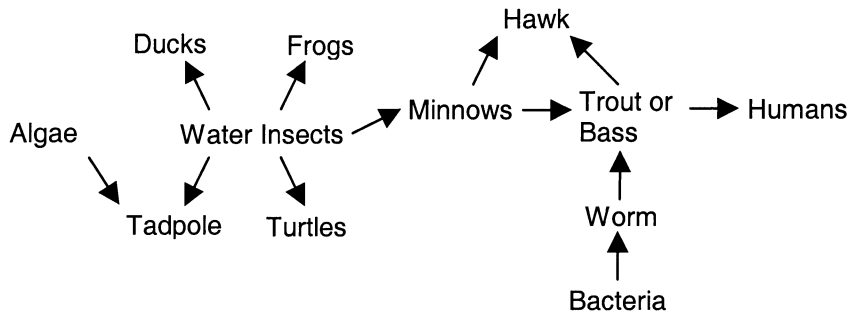
Objective: Students will develop an understanding of how food webs work.

Materials and Equipment:

Poster paper
Markers

Procedure:

1. Discuss TM 1.1 and 1.2 so students have a basic understanding of a food chain.
2. Next, expand this concept to a food web by asking students what else might eat the rabbit, what might eat the fox, etc.
3. Using poster paper and markers, have students brainstorm and create graphs listing a large food web using at least 15 organisms (see example below). Remind students to show the correct food energy flow with the arrows.



4. Note which group has the longest food chain with the most numbers of organisms involved.
5. Post them and have students explain the interconnections.

UNIT IV - PRODUCTS FROM AGRICULTURE

Lesson 2: Food Products from Plants

Competency/Objective: Identify food products from plants.

Study Questions

1. **What food products come from grain?**
2. **What food products come from vegetables?**
3. **What food products come from fruits?**
4. **What food products come from other plants?**
5. **What information is contained in the food label?**

References

1. *Exploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000. Unit IV.
2. Transparency Masters
TM 2.1 Cereal Food Label Ingredients
TM 2.2 Key Parts of a Food Label
3. Activity Sheets
AS 2.1 Food Inventory
AS 2.2 Do You Know Your Food Label?
AS 2.3 Compare Food Labels

UNIT IV - PRODUCTS FROM AGRICULTURE

Lesson 2: Food Products from Plants

TEACHING PROCEDURES

A. **Review**

In the last lesson, we discussed the many food chains in the natural environment (ecosystem). People in agriculture have learned to manage the food chains to produce larger amounts of food than would be produced naturally. We will now focus on the variety of food products provided by plants.

B. **Motivation**

1. Bring in a name brand, grocery store brand, and generic brand of potato chips. Have students sample some of each. Ask students which one was the healthiest, cost the least or most, tasted the best, etc.
2. Bring in several items produced from plants such as fresh fruits or vegetables, canned fruits or vegetables, or other processed foods from plants. Ask students to identify the products and where they are produced.
3. Bring in five to seven fresh vegetables (e.g., green bean, broccoli, cauliflower, and spinach). Encourage students to taste the raw vegetables. The next day have the vegetables cooked for students to taste. Discuss the students' reactions.

C. **Assignment**

D. **Supervised Study**

E. **Discussion**

Q1. What food products come from grains?

A1.

- a) **Flour**
- b) **Cereals**
- c) **Cooking oils**
- d) **Pasta**
- e) **Protein and soybean meal**
- f) **Starch**
- g) **Dextrose for sweeteners**
- h) **Snack chips and crackers**
- i) **Popcorn**

Bring in and discuss samples of grains grown in the area and some products produced from those grains. Ask students to think of other products made from locally produced grains. Show TM 2.1 and identify the ingredients that came from plants.

Q2. What food products come from vegetables?

A2.

- a) **Fresh vegetables**
- b) **Canned vegetables**
- c) **Frozen vegetables**

- d) **Vegetable juices**
- e) **Soups**

Bring in various food items that contain vegetables and have the students identify the vegetables on the list of ingredients. Discuss the vegetables in those products and other products.

Q3. What food products come from fruits?

A3.

- a) **Fresh fruit**
- b) **Canned fruit**
- c) **Frozen fruit**
- d) **Dried fruit**
- e) **Fruit juices**
- f) **Jams and jellies**

Ask students to discuss what products are processed from fruits. Bring in various dried fruits and have students try to identify them. Students can then eat the dried fruit.

Q4. What food products come from other plants?

A4.

- a) **Maple syrup**
- b) **Herbs**
- c) **Chocolate**
- d) **Nuts**
- e) **Mustard**
- f) **Tea**
- g) **Coffee**
- h) **Spices**

Divide the class into groups of three or four students. Have them brainstorm other food products that come from plants. Students may think of products that are not listed above. Assign AS 2.1 to have students identify various food products from plants that they have at home or can find in a grocery store.

Q5. What information is contained in the food label?

A5. The following items can be found in the Nutrition Facts food label:

- a) **Serving size**
- b) **Total calories and calories from fat**
- c) **Percentage (%) daily value**
- d) **Total fat**
- e) **Cholesterol**
- f) **Sodium**
- g) **Potassium**
- h) **Carbohydrates**
- i) **Protein**
- j) **Vitamins and minerals**
- k) **Daily values footnote**
- l) **Calories per gram footnote**
- m) **Ingredients**

Show TM 2.2 to illustrate the key parts of a food label. The numbers on the graphic correspond to the listing of key parts in the Student Reference. Assign AS 2.2 to have

students find information on a food label. For more practice in reading food labels, have students complete AS 2.3.

F. **Other Activities**

1. For a week, have students inventory foods served in school lunches to determine which foods came from plants or have plant products in them.
2. Visit a farmers' market to see which fruits and vegetables are grown locally.
3. Invite a 4-H representative to class to discuss food products from plants.

G. **Conclusion**

Foods from plants make up a large portion of the human diet. Foods from grains, vegetables, fruits, and other plants may be eaten fresh or in a variety of processed forms. Food labels provide nutritional information to help consumers make informed buying decisions.

H. **Answers to Activity Sheets**

AS 2.1 Food Inventory

Answers will vary.

AS 2.2 Do You Know Your Food Label?

1. 10
2. 450
3. 12
4. Cholesterol
5.
 - a. corn
 - b. vegetable oil
 - c. soybean
 - d. cottonseed

AS 2.3 Compare Food Labels

Answers will vary.

I. **Evaluation**

A unit test is provided at the end of this unit. If a lesson quiz is needed, use questions pertaining to this lesson from the unit test.

Cereal Food Label Ingredients

INGREDIENTS: OAT FLOUR, SUGAR, WHEAT STARCH, DRIED APPLE PIECES, BROWN SUGAR, CORN SYRUP, MALT, SALT, PARTIALLY HYDROGENATED VEGETABLE OIL (CONTAINS ONE OR MORE OF THE FOLLOWING OILS: CANOLA, SOYBEAN), CINNAMON, CALCIUM CARBONATE, TRISODIUM PHOSPHATE, SODIUM ASCORBATE (VITAMIN C), ZINC OXIDE, NIACINAMIDE, REDUCED IRON, CALCIUM PANTOTHENATE, BHT (A PRESERVATIVE), VITAMIN A PALMITATE, THIAMIN MONONITRATE (VITAMIN B1), PYRIDOXINE HYDROCHLORIDE (VITAMIN B6), RIBOFLAVIN (VITAMIN B2), FOLIC ACID, VITAMIN B12, AND VITAMIN D.

Key Parts of a Food Label

Nutrition Facts			
Serving Size 1 cup (30g)			
Servings Per Container about 14			
		Cereal with 1/2 cup Vitamins A&D	
Amount Per Serving	Cereal	Skim Milk	
Calories	110	150	
Calories from Fat	0	0	
% Daily Value**			
Total Fat 0g*	0%	0%	
Saturated Fat 0g	0%	0%	
Cholesterol 0mg	0%	0%	
Sodium 120mg	5%	8%	
Potassium 35mg	1%	7%	
Total Carbohydrate 26g	9%	11%	
Dietary Fiber 2g	8%	8%	
Sugars 15g			
Other Carbohydrate 9g			
Protein 2g			
Vitamin A	25%	30%	
Vitamin C	25%	25%	
Calcium	0%	15%	
Iron	25%	25%	
Vitamin D	10%	25%	
Thiamin	25%	30%	
Riboflavin	25%	35%	
Niacin	25%	25%	
Vitamin B6	25%	25%	
Folate	25%	25%	
Phosphorus	2%	15%	
Magnesium	2%	6%	
Zinc	25%	30%	
*Amount in cereal. One-half cup skim milk contributes an additional 40 calories, 65mg sodium, 6g total carbohydrate (6g sugars), and 4g protein.			
**Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:			
	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Potassium		3500mg	3500mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g
Calories per gram: Fat 9 • Carbohydrate 4 • Protein 4			

INGREDIENTS: OAT FLOUR, SUGAR, WHEAT STARCH, DRIED APPLE PIECES, BROWN SUGAR, CORN SYRUP, MALT, SALT, PARTIALLY HYDROGENATED VEGETABLE OIL (CONTAINS ONE OR MORE OF THE FOLLOWING OILS: CANOLA, SOY-BEAN), CINNAMON, CALCIUM CARBONATE, TRISODIUM PHOSPHATE, SODIUM ASCORBATE (VITAMIN C), ZINC OXIDE, NIACINAMIDE, REDUCED IRON, CALCIUM PANTOTHENATE, BHT (A PRESERVATIVE), VITAMIN A PALMITATE, THIAMIN MONONITRATE (VITAMIN B1), PYRIDOXINE HYDROCHLORIDE (VITAMIN B6), RIBOFLAVIN (VITAMIN B2), FOLIC ACID, VITAMIN B12, AND VITAMIN D.

Do You Know Your Food Label?

Objective: Students will read information found on a food label.

Directions: Answer the following questions about the food label at the right.

1. There are _____ chips in one serving.
2. It's Friday Video Night and you eat 1/4 of the bag (30 chips) during the evening. This is _____ calories.
3. One serving of the chips supplies _____ % of the daily requirement for fat.
4. The chips do not contain _____. (Hint: High levels of this substance contribute to heart problems.)
5. List the ingredients that came from plants:
 - a. _____
 - b. _____
 - c. _____
 - d. _____

Nutrition Facts			
Serving Size 1 oz (28g/about 10 chips)			
Servings Per Container 12			
Amount Per Serving			
Calories 150	Calories from Fat 70		

	% Daily Value*		
Total Fat 8g	12%		
Saturated Fat 1.5g	8%		
Cholesterol 0mg	0%		
Sodium 170mg	7%		
Total Carbohydrate 18g	6%		
Dietary Fiber 1g	4%		
Sugars 0g			
Protein 2g			

Vitamin A 0%	•	Vitamin C 0%	
Calcium 2%	•	Iron 2%	
*Percent daily values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:			
	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:			
Fat 9 • Carbohydrate 4 • Protein 4			

INGREDIENTS

CORN, VEGETABLE OIL (MAY CONTAIN ONE OR MORE OF THE FOLLOWING: CORN, PARTIALLY HYDROGENATED SOYBEAN, COTTONSEED), SALT.

Compare Food Labels

Objective: Students will compare food labels of two brands of a favorite food.

Directions: Obtain the following information from the Nutrition Facts food label found on the package of two brands of your favorite crackers, chips, cereals, pop, popcorn, etc. Make sure the serving size is the same, record what you paid for each item at the grocery store, and attach both labels to this assignment. Answer the questions on the next page.

Name of Product		
Serving Size		
Servings per Container		
Calories per Serving		
Calories from Fat		
Total Fat (g)		
Saturated Fat (g)		
Cholesterol (mg)		
Sodium (mg)		
Potassium (mg)		
Total Carbohydrate (g)		
Dietary Fiber (g)		
Sugars (g)		
Protein (g)		
Vitamin A (%)		
Vitamin C (%)		
Iron (%)		
Calcium (%)		
Wt. of Total Package		
Price		
Price/Serving (price÷servings per container)		

Key Questions:

1. Based on a comparison of the two labels, which product is more nutritious to eat? Explain why.
2. Based on the nutritional information, price, and taste, which product do you recommend? Explain your answer.

UNIT IV - PRODUCTS FROM AGRICULTURE

Lesson 3: Food Products from Animals

Competency/Objective: Identify food products from animals.

Study Questions

1. What food products come from beef cattle?
2. What food products come from hogs?
3. What food products come from sheep?
4. What food products come from poultry?
5. What food products come from dairy animals?
6. What are some examples of fish and seafood?
7. What are some examples of processed meats?
8. What information is contained in the meat label?

References

1. *Exploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit IV.
2. Transparency Masters

TM 3.1 Wholesale and Retail Cuts of Beef
TM 3.2 Meat Consumption Trends in the United States
TM 3.3 Know Your Meat Label
3. Handouts

HO 3.1 Per Capita Consumption of Meat Products in the United States
HO 3.2 Beef Chart
HO 3.3 Pork Chart
HO 3.4 Lamb Chart
HO 3.5 Meat Labels
4. Activity Sheets

AS 3.1 Identify the Most Popular Meat Product
AS 3.2 Animal Food Products
AS 3.3 Identifying per Capita Consumption Trends of Meat Products
AS 3.4 Processing Whipped Cream and Butter
AS 3.5 Reading a Meat Label

UNIT IV - PRODUCTS FROM AGRICULTURE

Lesson 3: Food Products from Animals

TEACHING PROCEDURES

A. **Review**

Americans eat many foods produced from plants. They are essential for a balanced diet. However, a number of food products are also produced from animals.

B. **Motivation**

1. Ask students what category of meat is most popular in the United States. This will lead to listing and explaining the major categories: beef, chicken, fish, lamb, pork, turkey, and veal. Explain the concept of per capita consumption and then distribute AS 3.1. Use HO 3.1 to provide the actual figures. Discuss and compare answers.
2. Ask students what is in a hamburger. Obviously, it is ground beef. Then ask them why it is called hamburger, a pork name, when it is actually beef. Offer extra credit to the student(s) with the answer the following day. (It originated in Hamburg, Germany.)
3. Bring in samples of a variety of meats and have students try to distinguish between different types of meat.

C. **Assignment**

D. **Supervised Study**

E. **Discussion**

Q1. **What food products come from beef cattle?**

A1.

- a) Hamburger
- b) Steak
- c) Roast
- d) Veal - young cattle

Show TM 3.1, distribute copies of HO 3.2, and discuss the common cuts of beef.

Q2. **What food products come from hogs?**

A2.

- a) Pork chops
- b) Ham
- c) Bacon

Distribute HO 3.3 and discuss the common cuts of pork.

Q3. **What food products come from sheep?**

A3.

- a) Lamb chops
- b) Leg of lamb

Distribute HO 3.4 and discuss the common cuts of lamb. Have student complete AS 3.2 to test their knowledge of beef, pork, and lamb cuts.

Q4. What food products come from poultry?

A4.

- a) **Eggs**
- b) **Meat**

Ask students to discuss what foods come from poultry. Assign AS 3.3 to have students graph the U.S. meat consumption trends. Show TM 3.2 to better illustrate meat consumption trends.

Q5. What food products come from dairy animals?

A5.

- a) **Milk**
- b) **Cheese**
- c) **Ice cream**
- d) **Yogurt**
- e) **Sour cream**
- f) **Cottage cheese**
- g) **Butter**

Bring in samples of butter and margarine. Conduct a taste test to see if students can tell the difference between the two products. The taste difference in butter comes primarily from the fat content. Have students do AS 3.4 to create whipped cream and butter from cream. This can be a group activity or an individual student activity.

Q6. What are some examples of fish and seafood?

A6.

- a) **Fish**
 - 1) **Catfish**
 - 2) **Trout**
 - 3) **Bass**
 - 4) **Tuna**
 - 5) **Salmon**
 - 6) **Halibut**
 - 7) **Cod**
 - 8) **Shark**
- b) **Seafood**
 - 1) **Lobster**
 - 2) **Crabs**
 - 3) **Oysters**
 - 4) **Scallops**
 - 5) **Shrimp**
 - 6) **Clams**

Ask students to identify fish and seafood they have eaten. List suggestions on the board. Ask students to describe their experiences in catching some of the fish and/or seafood they identified.

Q7. What are some examples of processed meats?

A7.

- a) **Processed beef and pork**
 - 1) **Luncheon meats**
 - 2) **Hot dogs**
 - 3) **Pepperoni**
- b) **Processed chicken patties and nuggets**

Discuss the various types of processed meats and have students tell their favorites.

Q8. What information is contained in the meat label?

A8.

- a) **Species**
- b) **Wholesale cut**
- c) **Retail cut**
- d) **Total price**
- e) **Price/lb.**
- f) **Net weight**
- g) **"Sell by" date**

Show TM 3.3 and discuss the key information on a meat label. Distribute copies of HO 3.5 and assign AS 3.5 to have students answer questions about sample meat labels.

F. *Other Activities*

1. Conduct a cooking/tasting day with a variety of meats and fish.
2. Visit a farm to observe how livestock are raised.
3. Write to livestock breed associations and ask for additional information on the meat characteristics of each breed.
4. Tour a grocery store meat department or packing plant to observe meat processing activities.

G. *Conclusion*

There is a wide variety of food products produced from animals. Some foods are served fresh while others are processed. Meat contains protein needed to maintain good health. Protein can also be acquired from dairy and fish products. Information is provided on meat labels to help consumers make informed decisions.

H. *Answers to Activity Sheets*

AS 3.1 Identify the Most Popular Meat Product

Answers will vary.

AS 3.2 Animal Food Products

CUT OF MEAT	TYPE OF MEAT ANIMAL		
	BEEF	PORK	SHEEP
1. Bacon		X	
2. Sirloin steak	X		
3. T-bone steak	X		
4. Lamb chops			X
5. Filet mignon	X		
6. Loin chop		X	X
7. Kabobs	X		X
8. Flank steak	X		
9. Rump roast	X		
10. Sausage		X	
11. Rib steak	X		
12. Fresh arm picnic		X	
13. Tenderloin	X	X	
14. Round steak	X		
15. Ham slice		X	
16. Loin roast		X	
17. Shoulder steak	X		
18. Leg of lamb			X
19. Short ribs	X		
20. Blade steak	X	X	

AS 3.3 Identifying per Capita Consumption Trends of Meat Products

Answers will vary.

AS 3.4 Processing Whipped Cream and Butter

There are no answers for this activity.

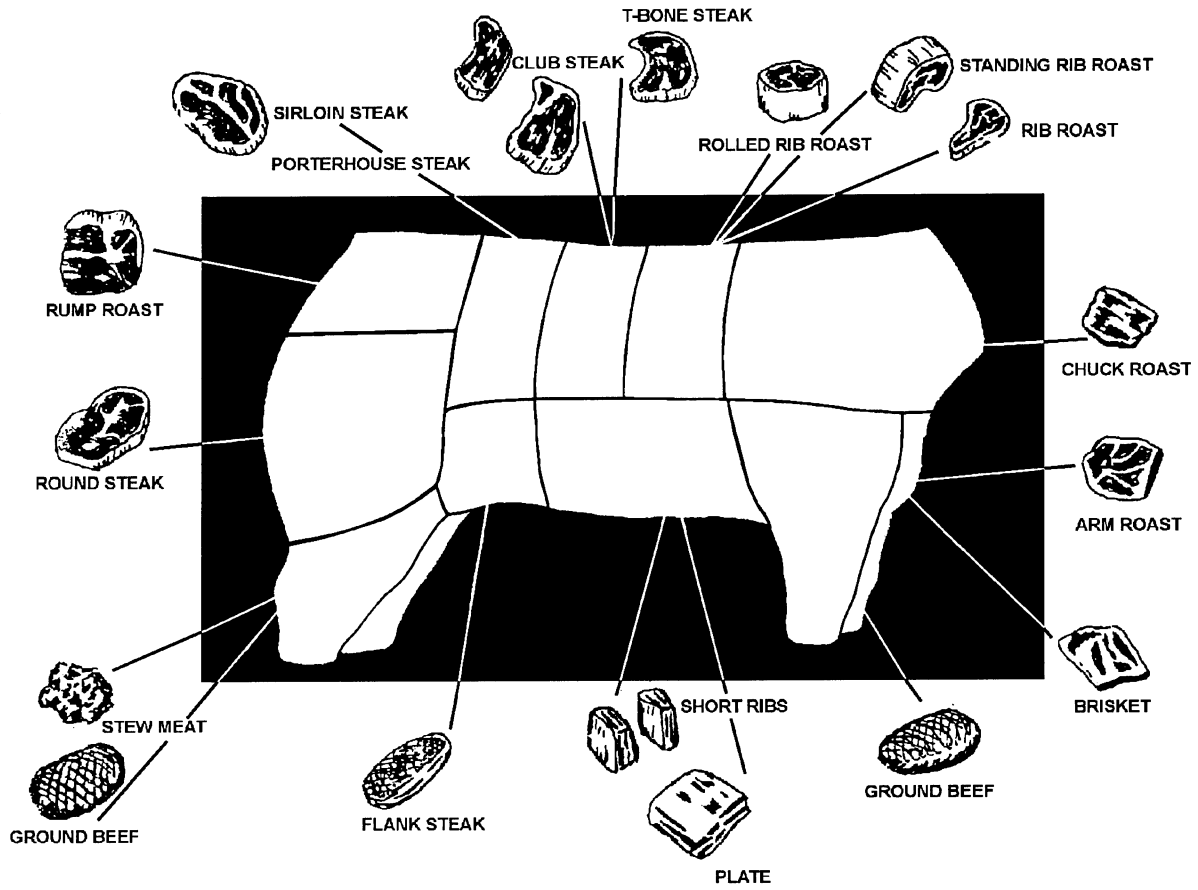
AS 3.5 Reading a Meat Label

1. Species
2. Wholesale cut
3. Retail cut
4. Total price
5. Price/lb.
6. Net wt.
7. "Sell by" date
8. \$4.22
9. Ground beef - 70% lean
10. Loin
11. Dec. 14
12. T-bone pot roast
13. 8, \$ 0.30

I. **Evaluation**

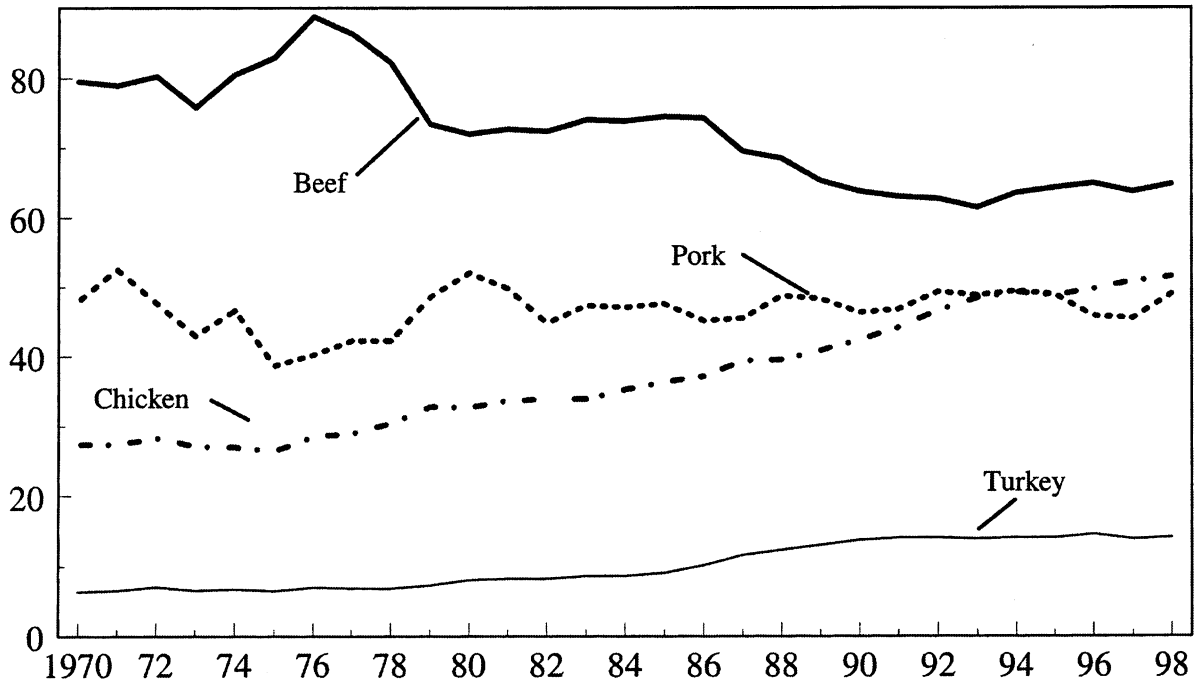
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Wholesale and Retail Cuts of Beef



Meat Consumption Trends in the United States

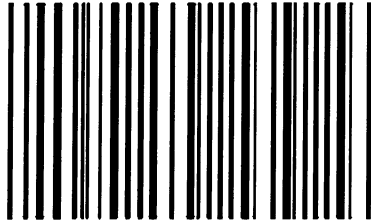
Pounds per capita_{1/}



_{1/} Boneless, trimmed equivalent.

Source: USDA/Economic Research Service.

Know Your Meat Label



**Greiman Angus Meats
FOOD GIANT STORES**

Columbia, Missouri

Species →	BEEF	RIB	← Retail cut
Wholesale cut →	RIBEYE	STEAK	
"Sell by" date →	SELL BY 06-04-00	TOTAL PRICE \$4.76	← Total price
Net weight →	NET WT/CT 0.75 lb.	UNIT PRICE \$6.35	← Price/lb.

Per Capita Consumption of Meat Products in the United States ^{1/}

Year	U.S. Total Population July 1 2/	Beef	Veal	Pork	Lamb	Total 3/	Chicken 4/ & 5/	Turkey	Total 3/	Fish and Shellfish	Total 3/
Millions		-----Pounds-----									
1970	205.052	79.6	2.0	48.0	2.1	131.7	27.4	6.4	33.8	11.7	177.3
1971	207.661	79.0	1.9	52.6	2.1	135.5	27.4	6.6	34.0	11.5	181.0
1972	209.896	80.3	1.6	47.8	2.2	131.8	28.3	7.1	35.4	12.5	179.7
1973	211.909	75.8	1.2	43.0	1.7	121.8	27.1	6.6	33.7	12.7	168.2
1974	213.854	80.6	1.6	46.7	1.5	130.4	27.0	6.8	33.8	12.1	176.3
1975	215.973	83.0	2.8	38.7	1.3	125.8	26.4	6.5	32.9	12.1	170.9
1976	218.035	88.8	2.7	40.3	1.2	133.0	28.5	7.0	35.5	12.9	181.4
1977	220.239	86.3	2.6	42.3	1.1	132.3	29.0	6.9	35.9	12.6	180.9
1978	222.585	82.2	2.0	42.3	1.0	127.5	30.4	6.9	37.3	13.4	178.2
1979	225.055	73.5	1.4	48.6	1.0	124.4	32.8	7.3	40.1	13.0	177.6
1980	227.726	72.1	1.3	52.1	1.0	126.4	32.7	8.1	40.8	12.4	179.6
1981	229.966	72.8	1.3	49.9	1.0	125.1	33.7	8.3	42.1	12.6	179.7
1982	232.188	72.5	1.4	44.9	1.1	119.8	33.9	8.3	42.2	12.4	174.4
1983	234.307	74.1	1.4	47.4	1.1	123.9	34.0	8.7	42.7	13.3	180.0
1984	236.348	73.9	1.5	47.2	1.1	123.7	35.3	8.7	44.0	14.1	181.7
1985	238.466	74.6	1.5	47.7	1.1	124.9	36.4	9.1	45.5	15.0	185.4
1986	240.651	74.4	1.6	45.2	1.0	122.2	37.2	10.2	47.4	15.4	184.9
1987	242.804	69.6	1.3	45.6	1.0	117.4	39.4	11.6	51.0	16.1	184.5
1988	245.021	68.6	1.1	48.8	1.0	119.5	39.6	12.4	51.9	15.1	186.6
1989	247.342	65.4	1.0	48.4	1.0	115.9	40.9	13.1	53.9	15.6	185.4
1990	249.949	63.9	0.9	46.4	1.0	112.3	42.4	13.8	56.3	15.0	183.5
1991	252.636	63.1	0.8	46.9	1.0	111.9	44.2	14.1	58.3	14.8	185.1
1992	255.382	62.8	0.8	49.4	1.0	114.1	46.7	14.1	60.8	14.7	189.5
1993	258.089	61.5	0.8	48.9	1.0	112.1	48.5	14.0	62.5	14.9	189.5
1994	260.602	63.6	0.8	49.5	0.9	114.7	49.3	14.1	63.3	15.1	193.2
1995	263.039	64.4	0.8	49.0	0.9	115.1	48.8	14.1	62.9	14.9	193.0
1996	265.453	65.0	1.0	45.9	0.8	112.8	49.8	14.6	64.4	14.7	191.8
1997	267.901	63.8	0.9	45.6	0.8	111.0	50.9	13.9	64.8	14.5	190.3
1998 P	270.290	64.9	0.7	49.1	0.9	115.6	51.6	14.2	65.8	14.5	195.9

P = Preliminary

1/ Excludes shipments to territories. Boneless equivalent for red meat derived from carcass weight, using conversion factors shown in supply and utilization tables. Boneless equivalent for chicken and turkey derived from ready-to-cook weight, using conversion factors shown in supply and utilization tables. Boneless equivalent or edible weight for fish is calculated by the U.S. Department of Commerce (see fishery products per capita table). 2/ Excludes U.S. territories. 3/ Computed from unrounded data. 4/ Includes skin, neck meat, and giblets. 5/ Excludes the amount of ready-to-cook chicken going to pet food as well as some water leakage that occurs when chicken is cut up before packaging.

Source: USDA/Economic Research Service and U.S. Department of Commerce/National Marine Fisheries.

Beef Chart

RETAIL CUTS OF BEEF – WHERE THEY COME FROM AND HOW TO COOK THEM


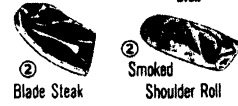







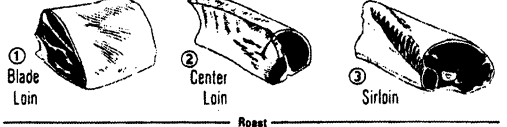
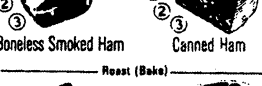
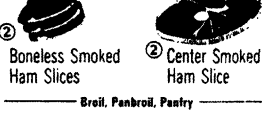
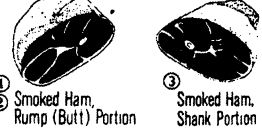
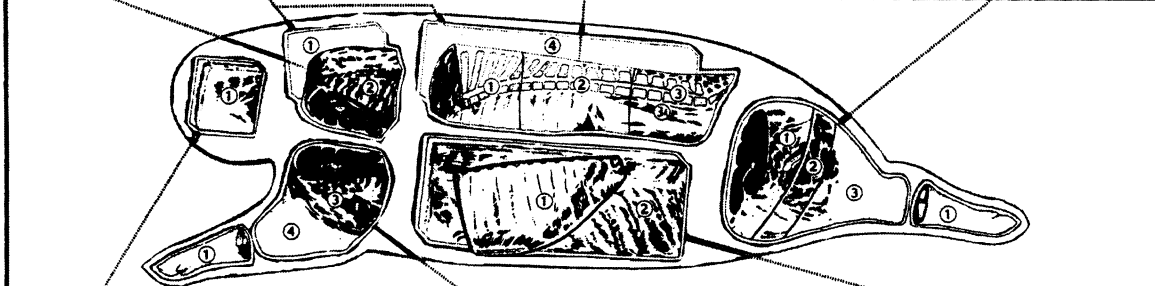


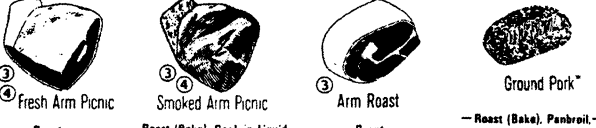
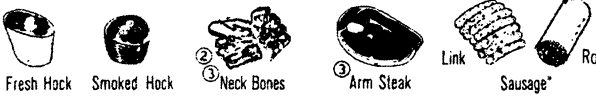

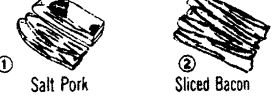
<p>CHUCK Braise. Cook in Liquid.</p>	<p>RIB Roast. Broil. Panbroil. Panfry.</p>	<p>SHORT LOIN Roast. Broil. Panbroil. Panfry.</p>	<p>SIRLOIN Broil. Panbroil. Panfry.</p>	<p>ROUND Braise. Cook in Liquid.</p>
<p>FORE SHANK Braise. Cook in Liquid.</p>	<p>BRISKET Braise. Cook in Liquid.</p>	<p>SHORT PLATE Braise. Cook in Liquid.</p>	<p>FLANK Braise. Cook in Liquid.</p>	<p>TIP Braise.</p>

*May be Roasted, Broiled, Panbroiled or Panfried from high quality beef.
**May be Roasted, (Baked), Broiled, Panbroiled or Panfried.

This chart approved by
National Live Stock and Meat Board

Pork Chart

RETAIL CUTS OF PORK — WHERE THEY COME FROM AND HOW TO COOK THEM

 <p>Cubed Steak* Pork Cubes</p> <p>— Braise, Cook in Liquid, Broil —</p>  <p>Blade Steak Smoked Shoulder Roll</p> <p>— Braise, Panfry — — Roast (Bake), Cook in Liquid —</p>	 <p>Blade Chop Rib Chop Loin Chop Sirloin Chop</p>  <p>Cubed Steak* Butterfly Chop Top Loin Chop Sirloin Cutlet</p> <p>— Braise, Broil, Panbroil, Panfry —</p>	 <p>Boneless Leg (Fresh Ham) Sliced Cooked (Boiled) Ham</p> <p>— Roast — — Heat or Serve Cold —</p>
 <p>Boneless Blade Boston Roast Blade Boston Roast</p> <p>— Braise, Roast —</p>  <p>Fat Back Lard</p> <p>— Pastry, Cook in Liquid — — Pastry, Cookies, Quick Breads, Cakes, Frying —</p> <p>① CLEAR PLATE ② FAT BACK</p>	 <p>Country-Style Ribs Back Ribs Smoked Loin Chop Canadian-Style Bacon</p> <p>— Roast (Bake), Braise, Cook in Liquid — — Roast (Bake), Broil, Panbroil, Panfry —</p>  <p>Boneless Top Loin Roast Boneless Top Loin Roast (Double) Tenderloin</p> <p>— Roast — — Roast (Bake), Braise, Panfry —</p>  <p>Blade Loin Center Loin Sirloin</p> <p>— Roast —</p>	 <p>Boneless Smoked Ham Canned Ham</p> <p>— Roast (Bake) —</p>  <p>Boneless Smoked Ham Slices Center Smoked Ham Slice</p> <p>— Broil, Panbroil, Panfry —</p>  <p>Smoked Ham, Rump (Butt) Portion Smoked Ham, Shank Portion</p> <p>— Roast (Bake), Cook in Liquid —</p>
		
<p>JOWL</p>  <p>Smoked Jowl</p> <p>— Cook in Liquid, Broil, Panbroil, Panfry —</p>  <p>Pig's Feet</p> <p>— Cook in Liquid, Braise —</p>	<p>PICNIC SHOULDER</p>  <p>Fresh Arm Picnic Smoked Arm Picnic Arm Roast Ground Pork*</p> <p>— Roast — — Roast (Bake), Cook in Liquid — — Roast — — Roast (Bake), Panbroil, Panfry —</p>  <p>Fresh Hock Smoked Hock Neck Bones Arm Steak Link Sausage* Roll</p> <p>— Braise, Cook in Liquid — — Cook in Liquid — — Braise, Panfry — — Panfry, Braise, Bake —</p>	<p>① SPARERIBS ② BACON (SIDE PORK)</p>  <p>Spareribs Slab Bacon</p>  <p>Salt Pork Sliced Bacon</p> <p>— Bake, Broil, Panbroil, Panfry, Cook in Liquid — — Bake, Broil, Panbroil, Panfry —</p>

*May be made from Boston Shoulder, Picnic Shoulder, Loin or Leg

This chart approved by
National Live Stock and Meat Board

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Lamb Chart

RETAIL CUTS OF LAMB — WHERE THEY COME FROM AND HOW TO COOK THEM

SHOULDER	NECK	RIB	LOIN	SIRLOIN	LEG
<p>1 Cubes for Kabobs**</p> <p>— Broil —</p> <p>2 Boneless Blade Chops (Saratoga)</p> <p>2 Blade Chop</p> <p>2 Boneless Shoulder</p> <p>3 Cushion Shoulder</p> <p>2 Square Shoulder</p> <p>— Roast —</p>	<p>1 Neck Slices</p> <p>— Braise —</p>	<p>1 Frenched Rib Chops</p> <p>1 Rib Chops</p> <p>— Broil, Panbroil, Pantry —</p> <p>1 Crown Roast</p> <p>1 Rib Roast</p> <p>— Roast —</p>	<p>1 Loin Chops</p> <p>1 Boneless Double Loin Chop</p> <p>— Broil, Panbroil, Pantry —</p> <p>1 Boneless Double Loin Roast</p> <p>1 Loin Roast</p> <p>— Roast —</p>	<p>2 Leg Chop (Steak)</p> <p>— Broil, Panbroil, Pantry —</p> <p>1 Sirloin Chop</p> <p>— Broil, Panbroil, Pantry —</p> <p>1 Boneless Sirloin Roast</p> <p>1 Sirloin Roast</p> <p>— Roast —</p>	<p>2 Center Leg</p> <p>2 American Leg</p> <p>1 Rolled Leg</p> <p>1 Sirloin Half of Leg</p> <p>1 Shank Half of Leg</p> <p>1 French-Style Leg</p> <p>1 French-Style Leg, Sirloin Off</p> <p>— Roast —</p>
FORE SHANK	BREAST	HIND SHANK	GROUND OR CUBED LAMB*		
<p>1 Fore Shank</p> <p>— Braise, Cook in Liquid —</p>	<p>2 Breast</p> <p>2 Rolled Breast</p> <p>2 Stuffed Breast</p> <p>— Roast, Braise —</p>	<p>4 Hind Shank</p> <p>— Braise, Cook in Liquid —</p>	<p>(Large Pieces) Lamb for Stew*</p> <p>(Small Pieces)</p> <p>— Braise, Cook in Liquid —</p>	<p>2 Riblets</p> <p>2 Boneless Riblets</p> <p>2 Spareribs</p> <p>2 Stuffed Chops</p> <p>— Braise, Cook in Liquid —</p>	<p>2 Cubed Steak**</p> <p>2 Lamb Patties*</p> <p>2 Ground Lamb*</p> <p>— Broil, Panbroil, Pantry —</p>

* Lamb for stew or grinding may be made from any cut.

** Kabobs or cube steaks may be made from any thick solid piece of boneless Lamb.

This chart approved by
National Live Stock and Meat Board

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Source: Uniform Retail Meat Identity Standards, National Live Stock and Meat Board

Meat Labels


201589 005212

GREIMAN Meats
Columbia, Missouri

1.06LB. \$1.29
NT WT/CT PRICE/LB.

\$1.37
TOTAL PRICE

GROUND BEEF
NOT LESS THAN 70% LEAN

DEC 12
STORE NO. KEEP REFRIGERATED PURCHASE BY


201589 005212


GREIMAN Meats
Columbia, Missouri

1.45lb \$3.69
NT WT/CT PRICE/LB.

\$5.35
TOTAL PRICE

BONELESS & SKINLESS
CHICKEN BREAST

DEC 16
STORE NO. KEEP REFRIGERATED PURCHASE BY


201589 005212

GREIMAN Meats
Columbia, Missouri

3.30lb \$1.58
NT WT/CT PRICE/LB.

\$5.21
TOTAL PRICE

GROUND BEEF
NOT LESS THAN 60% LEAN

DEC 20
STORE NO. KEEP REFRIGERATED PURCHASE BY


201589 005212


GREIMAN Meats
Columbia, Missouri

0.65lb \$6.49
NT WT/CT PRICE/LB.

\$4.22
TOTAL PRICE

BEEF RIB
RIBEYE STEAK
USDA CHOICE

SEP 11
STORE NO. KEEP REFRIGERATED PURCHASE BY


201589 005212

GREIMAN Meats
Columbia, Missouri

1.00LB. \$1.79
NT WT/CT PRICE/LB.

\$1.79
TOTAL PRICE

GROUND BEEF
NOT LESS THAN 85% LEAN

DEC 12
STORE NO. KEEP REFRIGERATED PURCHASE BY


201589 005212


GREIMAN Meats
Columbia, Missouri

4.19lb \$1.89
NT WT/CT PRICE/LB.

\$7.92
TOTAL PRICE

BEEF CHUCK
T-BONE POT ROAST
USDA CHOICE

DEC 14
STORE NO. KEEP REFRIGERATED PURCHASE BY


201589 005212

GREIMAN Meats
Columbia, Missouri

1.16LB. \$2.19
NT WT/CT PRICE/LB.

\$2.54
TOTAL PRICE

GROUND BEEF
NOT LESS THAN 90% LEAN

DEC 12
STORE NO. KEEP REFRIGERATED PURCHASE BY


201589 005212

GREIMAN Meats
Columbia, Missouri

1.70lb \$1.49
NT WT/CT PRICE/LB.

\$2.53
TOTAL PRICE

FRESH PORK LOIN
ASSORTED CHOPS

DEC 14
STORE NO. KEEP REFRIGERATED PURCHASE BY


201589 005212

GREIMAN Meats
Columbia, Missouri

0.59LB. \$1.99
NT WT/CT PRICE/LB.

\$1.17
TOTAL PRICE

BEEF CHUCK SHOULDER
BONELESS CHARCOAL STEAK
USDA CHOICE

SEP 12
STORE NO. KEEP REFRIGERATED PURCHASE BY


201589 005212

GREIMAN Meats
Columbia, Missouri

0.39lb \$2.19
NT WT/CT PRICE/LB.

\$0.85
TOTAL PRICE

FRESH PORK LOIN
SIRLOIN CHOPS BONELESS

DEC 14
STORE NO. KEEP REFRIGERATED PURCHASE BY

Identify the Most Popular Meat Product

Objective: Students will estimate the average amount of meat they consume per year.

Directions: How much of these items did you eat during the past year? Estimate your consumption. Your instructor will provide the latest actual figures.

CATEGORY	POUNDS PER YEAR	
	MY ESTIMATE	ACTUAL
Beef		
Chicken		
Fish		
Lamb		
Pork		
Turkey		
Veal		

Animal Food Products

Objective: Students will be able to identify the type of meat animal that produces various cuts of meat.

Directions: Using HO 3.2, HO 3.3, and HO 3.4, place a check in the box to identify the type of meat animal that produces the cut of meat. Certain cuts of meat can come from more than one animal.

CUT OF MEAT	TYPE OF MEAT ANIMAL		
	BEEF	PORK	SHEEP
1. Bacon			
2. Sirloin steak			
3. T-bone steak			
4. Lamb chops			
5. Filet mignon			
6. Loin chop			
7. Kabobs			
8. Flank steak			
9. Rump roast			
10. Sausage			
11. Rib steak			
12. Fresh arm picnic			
13. Tenderloin			
14. Round steak			
15. Ham slice			
16. Loin roast			
17. Shoulder steak			
18. Leg of lamb			
19. Short ribs			
20. Blade steak			

Identifying per Capita Consumption Trends of Meat Products

Objective: Students will be able to graph current trends of consumption and predict future trends.

Directions: Use HO 3.1 to develop a graph that will show the trends of consumption in the United States.

1. Plot per capita consumption (pounds per person) of beef, pork, lamb, chicken, and turkey on the vertical (Y) axis and time (years) on the horizontal (X) axis.
2. Next, extend your graph to the year 2030 and predict what you think the trends will be.

Processing Whipped Cream and Butter

Objective: Students will be able to make whipped cream and butter from cream.

Materials and Equipment:

1/2 pint of cream (in store container)

Salt

Crackers

Procedure:

1. Shake container for 10 minutes.
2. Open the container to see if the cream has become whipped cream. Shake slightly longer if whipped cream has not formed.
3. Close the container tightly.
4. Continue shaking until butter forms, approximately 10 minutes.
5. Pour off the liquid, "buttermilk."
6. Add salt to taste.
7. Spread butter on crackers. Enjoy!

Reading a Meat Label

Objective: Students will be able to recognize and use information found on meat labels.

Directions: Answer each of the following questions in the space provided.

Typically, seven items of information are found on a meat label in a grocery store. They are:

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____

Use HO 3.5 to answer questions 8 to 12.

- 8. What is the total price you will pay when buying the ribeye steak? _____
- 9. Which retail item costs the least per pound? _____
- 10. Which wholesale cut do pork chops (assorted) come from? _____
- 11. On what date should the pork sirloin chops be removed from the meat counter? _____
- 12. Which retail cut weighs the most? _____
- 13. Hamburger costs \$1.20 per pound. You purchase 2 pounds and plan to make quarter pound hamburgers. How many hamburgers can you make? _____
How much does each hamburger cost? _____

UNIT IV - PRODUCTS FROM AGRICULTURE

Lesson 4: Food Processing and Food Safety

Competency/Objective: Describe the importance of food processing and safety.

Study Questions

1. **What is food processing?**
2. **Why is food processed?**
3. **How are food products processed?**
4. **What are the steps in processing food from producer to consumer?**
5. **How do you know your food is safe?**
6. **How does food preparation affect quality and safety?**

References

1. *Exploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000. Unit IV.
2. Super Soynuts, Soybean Candies, and/or Mighty MO Munchies

Lee Seed Company
2242 Highway IA 182
Inwood, IA 51240
712-753-4403

The Soy Bin
Route 1, Box 99
Marienthal, KS 67863
316-375-2746

Dwight and Rosemary Hall
Highway 111 West, Box 335
Oregon, MO 64473
800-762-1384
3. Transparency Masters

TM 4.1 Processing Food: From Producer to Consumer
TM 4.2 Recommended Safe Cooking Temperatures
4. Activity Sheets

AS 4.1 Popcorn Processing (Instructor)
AS 4.1 Popcorn Processing (Student)
AS 4.2 Soybean Processing (Instructor)
AS 4.3 Ice Cream Processing (Instructor)
AS 4.3 Ice Cream Processing (Student)
AS 4.4 Food Safety Activities (Instructor)

UNIT IV - PRODUCTS FROM AGRICULTURE

Lesson 4: Food Processing and Food Safety

TEACHING PROCEDURES

A. **Review**

Foods of plant origin come from grains, vegetables, fruits, and other plants. Foods of animal origin come from beef, pork, poultry, sheep, fish, and seafood. Many consumers prefer to eat processed plant food products rather than the raw form. Most meat products are processed as well. This lesson will discuss reasons for food safety and techniques of food processing that help provide nutritious, quality foods for consumers.

B. **Motivation**

1. Bring in samples of dehydrated food such as dried fruit (raisins or apple slices), beef jerky, etc. for students to eat. Then ask students how the food items were processed and why.
2. Obtain samples of a soy-based snack food such as Super Soynuts, Soybean Candies, or Mighty MO Munchies. See References for where to get these foods. Perform a taste test with students to see if they can tell that soybeans were processed to make the product(s).
3. Bring a bag of potatoes to class along with a variety of products made from potatoes (e.g., chips, french fries, shoestring potatoes, and hash browns). Ask students to describe how each of the products was processed.
4. Bring in several different food items and draw a flowchart of the processes those food items go through from producer to consumer. Discuss these processes with the students.
5. Bring in processed meats (bologna, wieners, Spam, chicken strips, etc.) and discuss how they were processed.

C. **Assignment**

D. **Supervised Study**

E. **Discussion**

Q1. **What is food processing?**

A1. **Processing is used to change a raw agricultural product into a consumable product and includes the following steps.**

- a) **Cleaning**
- b) **Drying**
- c) **Weighing**
- d) **Refrigerating**
- e) **Preserving**
- f) **Storing**
- g) **Changing the form**

Discuss processing. Processing can be a very simple or complicated process. Processing strawberries to be frozen whole is quite simple as compared to processing flour. Strawberries have to be washed, sorted, and destemmed before freezing. Wheat has to be cleaned, dried, weighed, and graded for quality before it can be ground into flour.

Depending on the type of flour, it may also be separated into bran and germ before being ground. Have students complete the popcorn activity (AS 4.1). Note that processing also involves the methods and conditions of proper storage.

Q2. Why is food processed?

A2.

- a) **To improve taste**
- b) **To maintain quality**
- c) **To prevent spoilage**
- d) **To ensure food is safe to eat**
- e) **For the convenience of consumers**

Food is an important part of everyday life. Foods must not only be nutritious but also safe from spoilage or contamination. Maintaining food quality is important for consumer acceptance. High-quality foods generally command higher prices than would lower-quality food products. Although quality and safety are important, the convenience of food to the consumer is also an important factor affecting how food is processed.

Q3. How are food products processed?

A3.

- a) **Freezing - reducing the temperature to 0°F to stop microbial growth**
- b) **Heating - heating food to a temperature greater than 180°F; pasteurization for dairy products**
- c) **Dehydration - removing water from foods: beef jerky and raisins**
- d) **Fermentation - breaking down complex carbohydrates: pickles and yogurt**
- e) **Smoking and curing - preserving foods by using salt, brine, smoke, or aging**
- f) **Vacuum packing - removing air from the food product container**
- g) **Irradiation - using radiant energy to improve food safety and extend shelf life**
- h) **Grinding - reducing the particle size: flour and ground beef**
- i) **Homogenization - breaking large fat globules into smaller ones: milk**
- j) **Emulsification - holding together ingredients that normally repel and separate from each other: salad dressing and ice cream**
- k) **Extrusion - puffing a product with high pressure to form a new shape: cereal**
- l) **Separation - removing bone and fat from product**

Discuss the different techniques used to process food. Bring in sample foods that have been processed using these techniques. Conduct AS 4.2 to illustrate food processing procedures. Conduct AS 4.3 as an additional exposure to food processing.

Q4. What are the steps in processing food from producer to consumer?

A4.

- a) **Producer - grows plants or raises animals**
- b) **Harvesting - removing the edible portions from plants in the field**
- c) **Processing - cleaning, separating, handling, and preparing food for distribution**
- d) **Distributing - storing food until it is needed by wholesalers**
- e) **Wholesaling - selling fresh or processed foods to retailers**
- f) **Retailing - selling food to consumers**
- g) **Consumer - eats fresh or processed foods**

Raw agricultural products can go through many steps before they reach the consumer. The more steps a product goes through the higher the marketing cost. If the consumer purchases the product straight from the producer, much of the marketing cost is reduced. For products like apples, purchasing from the producer may be very cost-efficient. For other products like wheat, it would cost the consumer a lot of time to process the wheat into flour. Show TM 4.1 and explain how food is processed, step by step, from a raw commodity to a consumable product.

Q5. How do you know your food is safe?

A5. Food quality is monitored by federal government agencies.

- a) **Environmental Protection Agency (EPA)**
- a) **Food and Drug Administration (FDA)**
- b) **U.S. Department of Agriculture (USDA)**
- c) **The livestock industry has responded by implementing quality assurance programs.**

Food safety is a major concern to consumers. Many steps are taken to ensure that food sold to consumers is safe to eat and is high quality. Several government agencies such as EPA, FDA, and the USDA regulate practices that affect the safety of the nation's food supply. Government inspectors are trained to identify potential problems before they reach consumers. Ask students how they or their parents can avoid this problem.

Q6. How does food preparation affect quality and safety?

A6. Food should be prepared according to the following four steps to keep it safe from harmful bacteria.

- a) **Clean - Wash hands in hot, soapy water before preparing food.**
- b) **Separate - Keep raw meats away from ready-to-eat foods.**
- c) **Cook - Cook foods long enough and at a high enough temperature to kill harmful bacteria.**
- d) **Chill - Refrigerate or freeze leftovers within 2 hours or less.**

Review the four steps to keep food safe from harmful bacteria. Refer to TM 4.2 and explain the recommended safe cooking temperatures. Emphasize the importance of avoiding the temperature danger zone where bacteria grows most rapidly. Food needs to be either cooked quickly or chilled quickly to avoid this temperature zone. Conduct AS 4.4 to help students understand food safety issues.

F. *Other Activities*

1. Have each student bring a label from a food product. These can be read in class with a discussion about the different processing needs. Identify preservatives and additives that are used to maintain the quality of the food.
2. Bring a food product or raw food ingredient and put it through selected processes to become the finished product. This product can be eaten in class when complete. Examples of foods and their products include apples for applesauce, oranges for orange juice, chuck steak for hamburger.
3. Access the National Pork Producers' web page and take the "Can Your Kitchen Pass the Food Safety Test?" The address of the page is <<http://www.nppc.org/CONS/SAFETY/START.html>>.

G. **Conclusion**

Food safety and processing affects everyone because of the need for safe, wholesome food. Processing involves all the steps of going from a raw agricultural product to a consumable product. We process food to improve taste, maintain quality, prevent spoilage, and to provide a safe and convenient product for consumers. Many different methods and steps can be used to process food. U.S. government inspectors monitor the food processing industry to ensure safe food for consumers. Keeping food safe from harmful bacteria is an important food safety principle.

H. **Answers to Activity Sheets**

AS 4.1 Popcorn Processing

Answers will vary.

AS 4.2 Soybean Processing

There are no answers for this activity.

AS 4.3 Ice Cream Processing

1. The freezing point of water is actually lowered by adding rock salt to the ice. Ice cream freezes at 21^oF.
2. The amount of milk fat affects the flavor and amount of calories in ice cream. The greater the milk fat, the richer the flavor and the higher amount of calories.

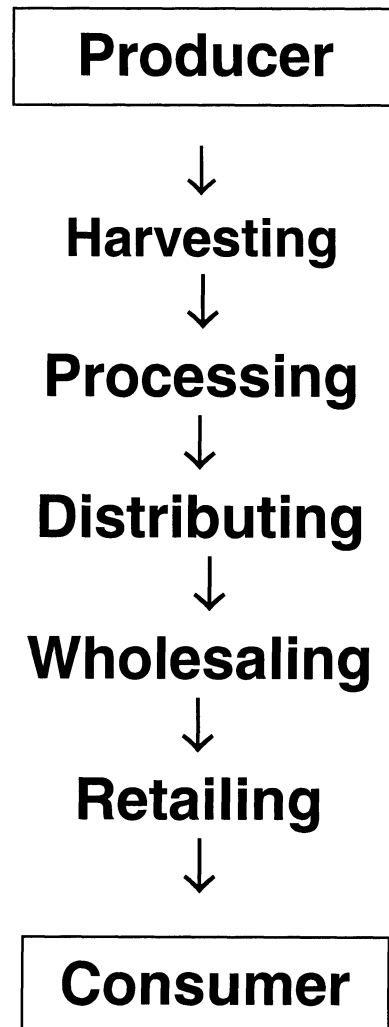
AS 4.4 Food Safety Activities

Results will vary.

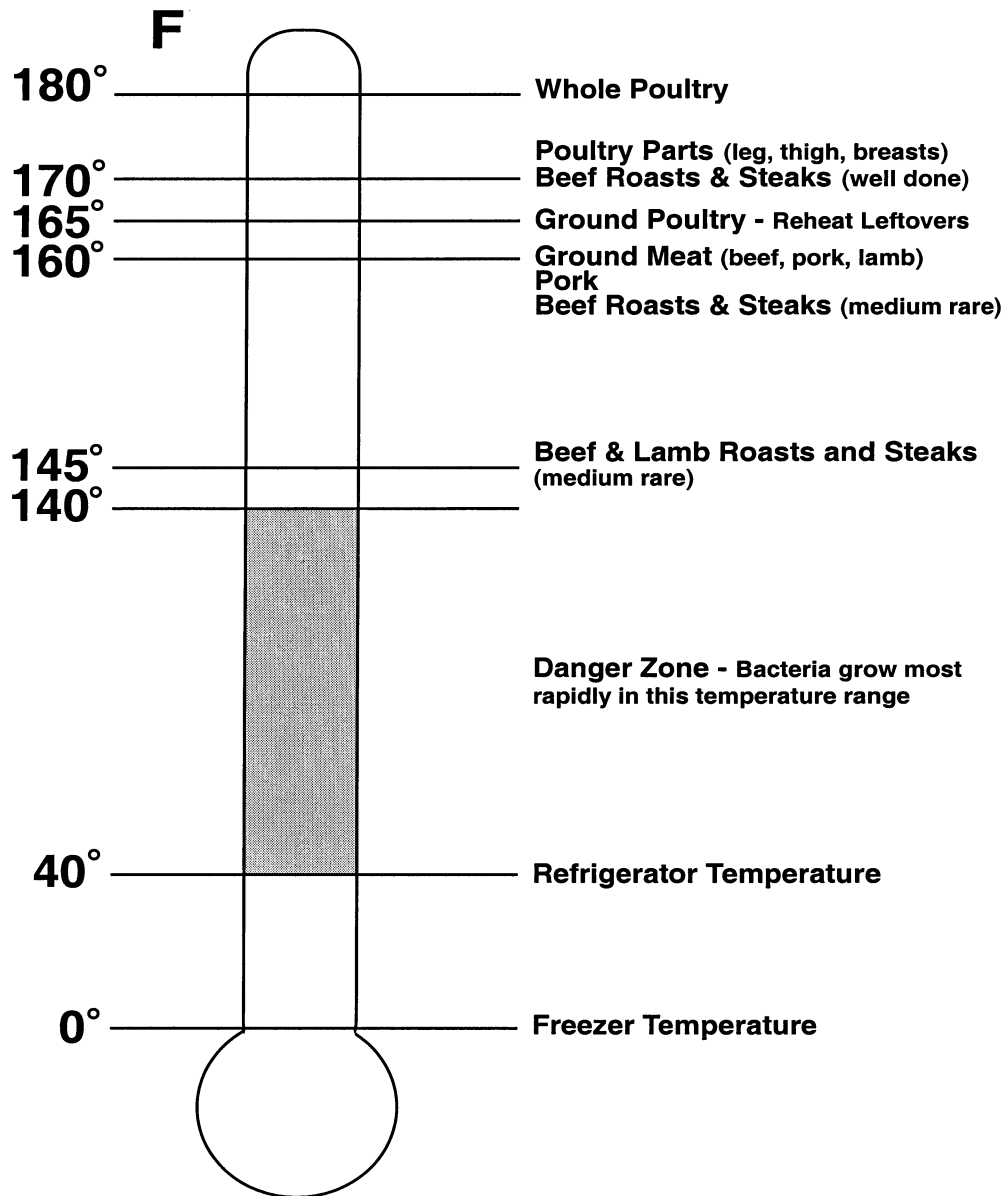
I. **Evaluation**

A unit test is provided at the end of this unit. If a lesson quiz is needed, use questions pertaining to this lesson from the unit test.

Processing Food: From Producer to Consumer



Recommended Safe Cooking Temperatures



Popcorn Processing

Objective: Students will describe the importance of maintaining proper moisture level during the processing and storage of popcorn.

Materials and Equipment:

Popcorn (3/4 cup per group of five to six students)
Water
Oven
Popcorn poppers (one per group)
Vegetable oil (not needed if using air poppers)
Paper towels or napkins
Salt

Before conducting this activity the instructor should:

1. Divide popcorn into three equal-sized samples.
2. Place one sample of popcorn in water overnight.
3. Place a second sample of popcorn in an oven at 200°F for 2 hours.
4. Keep a third sample in a sealed plastic bag to maintain moisture content.

Procedure:

1. Divide class into groups of five or six students.
2. Have students follow the procedures outlined on AS 4.1 (Student). You may modify the activity by not discussing what happened to each popcorn sample before students begin. Then they could brainstorm ideas/theories of why the two samples did not pop.
3. Lead a discussion. What happened? Did all three samples pop? Why not?

The first two samples should not pop because the moisture level is not right. The third sample should pop because the moisture level was maintained around 13%. The moisture level must stay between 11.5 and 14.5% for the popcorn to pop. Have students sample the popped corn.

Problem-Solving Challenge:

Ask students to prevent a popcorn kernel from popping. They must understand that the hull (outer covering) on a popcorn kernel holds in water found inside. When the kernel is heated, the water boils, turns to steam, and expands. Finally, the pressure builds high enough for the kernel to explode. Students might think of puncturing the kernel to allow air to dry it out in addition to adding water or heating the kernel. Would freezing affect the popcorn kernel?

Discuss with the students that proper handling of the raw product during processing is a key step.

Popcorn Processing

Objective: Students will describe the importance of maintaining proper moisture level during the processing and storage of popcorn.

Materials and Equipment:

- 1/4 c - Sample #1 - popcorn that has been soaked in water
- 1/4 c - Sample #2 - popcorn baked in the oven
- 1/4 c - Sample #3 - popcorn straight out of the bag
- Vegetable oil (if needed)
- Popcorn popper
- Three bowls or containers for the popped corn
- Salt
- Paper towels or napkins

Procedure:

1. The instructor will place sample #1 in popper and turn popper on. Allow 10 minutes for popping then turn the popper off.

CAUTION: Do not allow popcorn to pop too long. It will burn.
2. Pour corn into bowl.
3. Record the results in the table below.
4. Repeat steps 1, 2, and 3 for sample #2.
5. Repeat steps 1, 2, and 3 for sample #3.
6. Add salt to the popped corn. Enjoy!

Popcorn	Did the sample pop?	Why or why not?
Sample #1		
Sample #2		
Sample #3		

Key Question:

How do processing and storage affect the quality of popcorn?

Soybean Processing

Objective: Students will learn how to process the soybean into an edible food product.

Activity Length: Overnight soak, 1-hour dry time, 1 lab period

Materials and Equipment:

Soybeans, dry (must be cleaned)

Water

1 quart vegetable oil for frying

Salt

Deep fat fryer

Paper towels

Procedure:

1. Clean soybeans by removing all foreign material and washing thoroughly.
2. Soak soybeans in water overnight.
3. Drain beans thoroughly. The skins may be removed if desired. Place beans on absorbent paper and allow to air-dry about 1 hour.
4. Place oil in a deep fat fryer or a heavy, deep saucepan. Heat oil to 350^o F.
CAUTION: Oil is very hot. Be careful when working around the heated oil.
5. Put about 1 cup of beans in a fryer basket. Lower basket slowly into the hot fat. Moisture in the beans may cause excessive splattering if beans are lowered rapidly into the fat.
6. Fry beans about 6 to 8 minutes or until crisp and lightly browned.
7. Remove from oil.
8. Drain beans on absorbent paper.
9. Sprinkle with salt.
10. When cool, sample. The remaining beans should be stored in a tightly covered container.

Credit: The Missouri Soybean Association and the Missouri Soybean Merchandising Council, P.O. Box 104778, Jefferson City, MO 65110.

Ice Cream Processing

Objective: Students will process ice cream.

Variations for the Activity:

1. Nuts may be added to the ice cream by putting this ingredient with the 1 cup of milk, 1 cup of whipping cream, etc., that goes in the quart freezer bag.
2. We used 2% milk. Students could try this with 1% and skim milk to see if they like the flavor as well as the 2% milk.
3. If you want pairs of students to conduct this activity rather than groups of four, divide the ingredients in half and use pint and half-gallon freezer bags.

Ice Cream Processing

Objective: Students will process ice cream.

Materials and Equipment (group of four):

1 cup 2% milk
1 cup whipping cream or half and half
¼ cup sugar (4 tablespoons)
½ teaspoon vanilla
1 cup rock salt
1-quart freezer bag
1-gallon freezer bag
Measuring spoon and measuring cup
Duct tape
Four 8-oz. sundae cups
Four spoons

Class Materials:

Ice supply
Various toppings for ice cream
Towels, hot/cold mitts or old gloves
Scissors

Procedure:

1. Each group adds 1 cup of milk, 1 cup of whipping cream or Half and Half, ¼ cup of sugar (4 tablespoons), and ½ teaspoon vanilla to a quart freezer bag. Use duct tape to seal the open end of the bag, keeping some air in the bag.
2. Place the quart freezer bag inside a 1-gallon freezer bag. Pack ice around the quart bag and add 1 cup of rock salt and ¾ cup of water. The gallon bag should then be tightly sealed using the duct tape.
3. Students should take turns shaking the bag until the ice cream is frozen, which usually takes 10-15 minutes. Towels, hot/cold mitts, or old gloves can be used to protect your hands from the cold.
4. Carefully cut open the gallon freezer bag and discard the ice and rock salt. Rinse the quart bag containing the ice cream. Cut a corner of the bag with clean scissors and squeeze out the ice cream.
5. Eat the ice cream plain or add your favorite toppings.

Key Questions:

1. Why is rock salt added to the ice?
2. How does the amount of milk fat affect ice cream?

Food Safety Activities

Objective: Students will develop an awareness of food safety.

Activity 1 - Home Refrigerator Survey**Procedure:**

Have students check the temperature of their home refrigerator and compile the results. Then tell them that refrigerators should stay at 40°F or less. This temperature won't kill the bacteria, but it will keep bacteria from multiplying.

Activity 2 - Removing Bacteria from Your Hands**Procedure:**

1. Ask for three student volunteers. (This activity could be modified for more students or the whole class.)
2. Each student rubs 1 tablespoon of cooking oil all over his/her hands until completely coated.
3. Next sprinkle bacteria (1 teaspoon of cinnamon) on each student's hands. Students should rub it around until evenly distributed.
4. Each student will wash hands by rubbing them briskly for 20 seconds as follows:
Student 1: wash hands with cold water and no soap
Student 2: wash hands with warm water and no soap
Student 3: wash hands with warm water and soap
5. Have the class observe the student volunteers' hands after washing to determine the method that removed the least and most bacteria.

Activity 3 - Visual Bacteria**Materials and Equipment:**

Two small apples washed in advance

Small clean knife

Cutting board

Potato peeler (if available)

Two sterilized jars with screw-top lids (Use rubbing alcohol to sterilize. Label one "unwashed hands" and the other "washed hands.")

Procedure:

1. Ask students to raise their hands if they haven't washed their hands for several hours. Select one student to assist with the experiment. (This activity could be modified for the whole class.)
2. Have the student peel one apple and cut it in half on the cutting board. Place half of the apple in the jar labeled "unwashed hands." Screw the lid on tightly.
3. Next the student should briskly wash his/her hands in hot, soapy water for 20 seconds. In addition, wash the potato peeler, knife, and cutting board with hot, soapy water and wipe items

with a disinfectant cleaner.

4. Have the student peel the second apple and cut it in half. Place half of the apple in the jar labeled "washed hands." Screw the lid on tightly.
5. Place the jars in a warm place and observe daily for a week. (If the experiment was conducted properly, an increased level of bacteria-related growth should be evident on the "unwashed hands" sample.)

UNIT IV – PRODUCTS FROM AGRICULTURE

Lesson 5: Fiber Products from Agriculture

Competency/Objective: Identify fiber products from agriculture.

Study Questions

1. **What fiber products come from plants?**
2. **What fiber products come from animals?**
3. **What are synthetic fibers?**
4. **How do natural fibers differ from synthetic fibers?**

References

1. *Exploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit IV.
2. Transparency Master
TM 5.1 Steps in Processing Wool
3. Activity Sheets
AS 5.1 Create a Sweater Pattern
AS 5.2 Clothing Labels
AS 5.3 Scavenger Hunt for Fiber Trivia

UNIT IV - PRODUCTS FROM AGRICULTURE

Lesson 5: Fiber Products from Agriculture

TEACHING PROCEDURES

A. **Review**

Cattle, hogs, sheep, poultry, and plants are commonly produced for food. Some plants and animals also provide fiber products. This lesson will discuss some of the fiber products from agriculture.

B. **Motivation**

1. Ask students to identify the name of the covering material found on pool tables. They should answer "felt." Hold up a sample of felt and ask students how it is made. Explain that felt is a nonwoven fabric made by layering thin sheets of carded wool fibers and treating them with heat, moisture, and pressure to produce a fabric that does not fray or ravel.
2. Use dye or markers to turn white cotton balls into red, blue, black, etc. Ask students how cotton became that color. A typical answer is by dyeing. Are there other ways? Ask students to think back to the genetic engineering lesson. Will we see blue cotton growing in our fields in the future?

C. **Assignment**

D. **Supervised Study**

E. **Discussion**

Q1. **What fiber products come from plants?**

A1.

- a) Cotton
- b) Linen - flax
- c) Rope, burlap, and twine - hemp
- d) Acetate and rayon - manufactured from cellulose from trees

Pass around samples of cotton, polyester, linen, rayon, acetate, rope, burlap, and twine. After students have had an opportunity to look at the samples, ask them to identify the samples and what they are made from.

Q2. **What fiber products come from animals?**

A2.

- a) Wool - sheep
- b) Mohair - Angora goats
- c) Silk - silkworms
- d) Paint brush fibers - animal hair
- e) Violin strings - animal intestines
- f) Feathers for pillows and quilts - chickens and ducks
- g) Surgical sutures - animal intestines

Bring in an article of clothing made from wool and a sample of raw wool. Discuss where

wool comes from. Note that many of the fibers from animals are by-products of animal production and processing. Take a field trip to see lambs being sheared. Refer to TM 5.1 to demonstrate the steps in processing wool. Conduct AS 5.1 so students can participate in creating a pattern for a sweater. Ask students when wool can be dyed during the process. Answer: Each wool fiber absorbs dyes so deeply that dying at any processing step after scouring is effective. Wool dyed immediately after it is scoured is stock-dyed. If spun into yarn first, it's yarn-dyed. And if weaved into a piece of fabric and then dyed, it is piece-dyed. To weave a patterned fabric, stock-dyed or yarn-dyed threads are used. Plain-colored fabrics are usually piece-dyed. More information on this topic is available from the American Wool Council's general wool information web site at <http://www.sheepusa.org/>.

Q3. What are synthetic fibers?

A3. Synthetic fibers are made entirely from chemicals derived from raw materials such as coal, petroleum, and natural gas.

- a) **Acrylic**
- b) **Nylon**
- c) **Polyester**

Bring in some samples of polyester, nylon, and acrylic cloth. Describe how these fibers were developed when the raw materials were relatively inexpensive. As the price of the raw materials increases, so will the cost of these fibers.

Q4. How do natural fibers differ from synthetic fibers?

A4.

- a) **Natural fibers come from inexhaustible resources.**
- b) **Synthetic fibers come from exhaustible resources.**

Discuss how synthetic fibers differ from natural fibers. Explain the difference between inexhaustible and exhaustible resources. Note that exhaustible resources are limited in supply. Conduct AS 5.2 to illustrate the different types of ingredients in synthetic fibers and natural fibers. Have students debate the use of natural fibers versus synthetic fibers. Assign AS 5.3 in which students use the Internet to discover information about cotton, polyester, and wool.

F. *Other Activities*

1. Have students develop a bulletin board or display to illustrate the variety of fiber materials produced in agriculture.
2. Bring in small samples of hemp rope and nylon rope. Have students evaluate the differences. Look at roughness, durability, etc.
3. Have a clothing and textiles expert compare cost, care, appearance, etc., of clothing made from natural fibers to clothing made from synthetic fibers.
4. Order educational materials about cotton at <http://www.cotton.org/ncc/education/index.htm>. Some are free.

G. *Conclusion*

Many fiber materials are processed from agricultural products. Cotton and wool are produced in the United States to help meet the demand for quality fabrics. Cotton is grown in southern states. Wool

is from sheep that are raised throughout the United States. Many other fiber products are by-products of agricultural production. Fiber products produced from agricultural sources are inexhaustible whereas synthetic fibers are produced from raw materials that are limited in supply.

H. **Answers to Activity Sheets**

AS 5.1 Create a Sweater Pattern

Results will vary.

AS 5.2 Clothing Labels

Answers will vary.

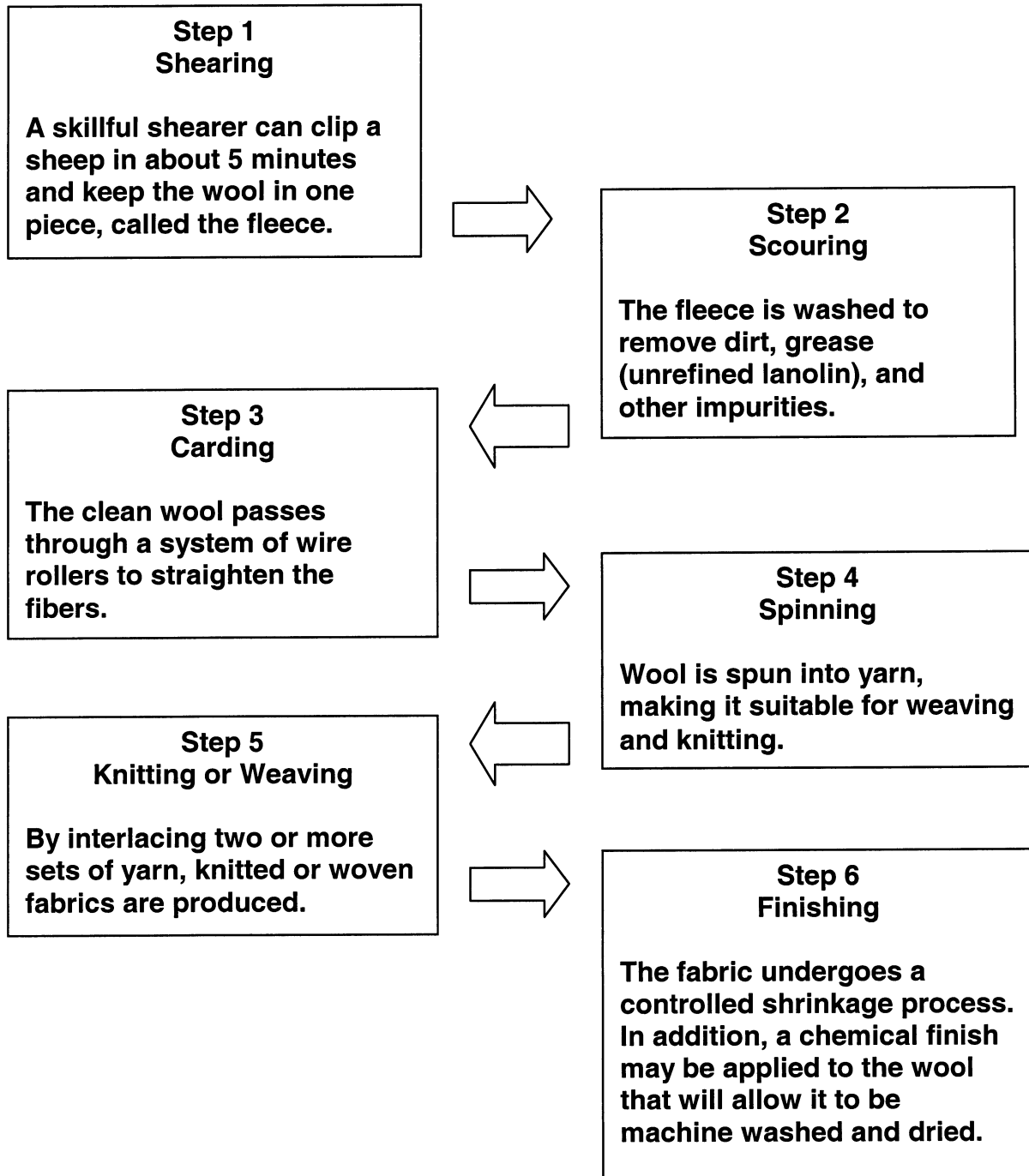
AS 5.3 Scavenger Hunt for Fiber Trivia

1. This material has received a fabric treatment that strengthens the hydrogen "bridges" that connect cellulose molecules in a cotton fiber.
2. Cotton outsells all synthetic fibers combined.
3. In 1880, U.S. Navy sailors were issued an elbow- and hip-length undershirt. When laid out on a flat surface, it resembled a perfect "T."
4. It was said to be a miracle fiber that could be worn for 68 days straight without ironing and still look presentable.
5. Sales declined in the 70s because of negative public image in the late 60s as a result of the polyester double-knit fabrics.
6. It is heated, extruded through the spinnerets, and cools upon hitting the air.
7. It is a fiber with a minuscule diameter, which allows it to be woven into very fine fabrics. These fabrics can be made to look and feel like silk.
8. It has tiny pores that open and take the dye inside the fiber.
9. It helps wool to withstand repeated machine laundering while still retaining softness, shape, and color.

I. **Evaluation**

A unit test is provided at the end of this unit. If a lesson quiz is needed, use questions pertaining to this lesson from the unit test.

Steps in Processing Wool



Lesson 5: Fiber Products from Agriculture

Name _____

Create a Sweater Pattern

Objective: Students will design a color pattern for a sweater.

Materials and Equipment:

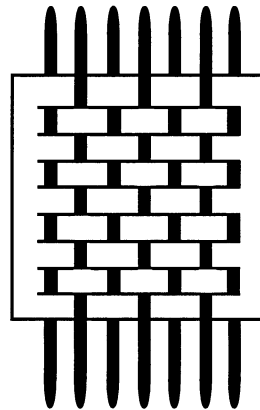
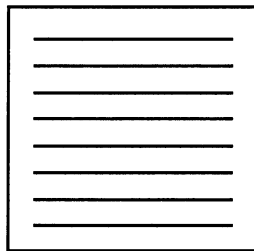
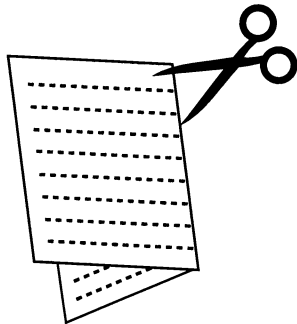
Paper (8 ½ x 11, white and colored)

Scissors

Markers

Directions: You are a member of the design team for Riley Unlimited Sweaters. Your task is to design a color pattern for the new fall sweaters. Read the following steps before beginning.

1. Weaving produces cloth by interlacing two sets of yarn at right angles. To make the first set of yarn, fold a piece of paper in half and make cuts from the fold out to about 1 inch from the edge. Open the paper.
2. Next, cut long narrow strips of paper to weave in and out of the paper. These represent the second set of yarn.
3. To make the design of your new sweater more interesting, you may vary the width of your cuts or make your cuts wavy. You may use different colors of paper in your second set. Finally, glue or tape the strips in place along the edges.



Clothing Labels

Objective: Students will develop an understanding of the differences in synthetic fibers and natural fibers.

Directions: Search for clothing labels that have 100% of one fiber and others that are made from a number of different fibers. Record the information below and bring in two examples of the synthetic and natural fibers.

Name of Clothing Item	Ingredients

Scavenger Hunt for Fiber Trivia

Objective: Students will use the Internet to discover information about cotton, polyester, and wool.

Directions: Using the web sites listed below, answer the following questions about these three common fiber products.

<<http://ipmwww.ncsu.edu/cottonpickin>>

<<http://einstein.human.cornell.edu/polyester/polyester.home.html>>

<<http://www.fabriclink.com/faq.html>>

Cotton

1. What is wrinkle-resistant cotton?
2. What fiber do consumers buy the most?
3. How did the T-shirt get its name?

Polyester

4. When polyester was first introduced to the American public in 1951, what unique claim was made?
5. Why did polyester sales drastically decline in the 1970s?
6. Polyester is a "melt spun" fiber. Explain.
7. What is a polyester microfiber?

Wool

8. Why does wool dye so well?
9. What is superwash?

UNIT IV - PRODUCTS FROM AGRICULTURE

Lesson 6: Nonfood Products from Agriculture

Competency/Objective: Describe nonfood products from agriculture.

Study Questions

1. **What nonfood products are made from grains?**
2. **What nonfood products are made from trees?**
3. **What nonfood products are made from other plants?**
4. **What nonfood products are made from livestock?**

References

1. *Exploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit IV.
2. Transparency Master
TM 6.1 Corn Has Many Uses
3. Activity Sheets
AS 6.1 Biodegradable Plastic
AS 6.2 Cornstarch Activities (Instructor)
AS 6.3 The Papermaking Kit (Instructor)
AS 6.4 Nonfood Products from Cattle and Hogs

UNIT IV - PRODUCTS FROM AGRICULTURE

Lesson 6: Nonfood Products from Agriculture

TEACHING PROCEDURES

A. **Review**

Many of the fibers in clothing come from agriculture. Cotton has remained one of the most common fabrics used for clothing. Wool is also popular for suits and sweaters. This lesson will discuss many of the other nonfood products from agriculture.

B. **Motivation**

1. Obtain packing peanuts made from cornstarch. Put one in a jar of water. Screw the lid on and shake it. Open the lid and have students verify that the packing peanut has "disappeared." Ask students why this occurred. The answer is the packing peanut is 95% cornstarch and naturally degrades when it comes into contact with water. This process is similar to leaving a slice of bread outside.
2. Hold up a magazine or newspaper. Ask students what the newspaper has to do with agriculture. Many answers can be justified. In this unit, however, the answer to emphasize is as follows: Soy ink was used to print the newspaper. Ask students how they can tell soy ink was used. The answer is the logo "PRINTED WITH SOY INK" can be found in the publication.
3. Bring to class a leather basketball, baseball glove, shoe (or boot), and jacket. Ask students to identify what the articles have in common. Have students identify other products that could be made from leather.

C. **Assignment**

D. **Supervised Study**

E. **Discussion**

Q1. **What nonfood products are made from grains?**

A1.

- a) Ethanol (grain alcohol)
- b) Packing peanuts
- c) Noncorrosive road deicer
- d) Superabsorbent polymers
- e) Biodegradable plastics
- f) Animal feed
- g) Industrial products
- h) Soy printing ink
- i) Construction materials
- j) Soy diesel

Ask students to discuss nonfood products processed from grains such as ethanol and biodegradable plastics. Describe how the use of these products helps reduce Americans' dependence on petroleum-based products. Show TM 6.1 to illustrate uses of corn. Conduct AC 6.1 in which students create biodegradable plastic and AS 6.2 in which students

can experiment with materials that contain cornstarch. Students can work in groups of three or four or on their own.

Q2. What nonfood products are made from trees?

A2.

- a) **Lumber**
- b) **Paper**
- c) **Cardboard**
- d) **Christmas trees**
- e) **Charcoal**
- f) **Bark chips and mulch**
- g) **Turpentine**
- h) **Varnish**
- i) **Paints**

Ask students to name products from trees. List the answers on the chalkboard as they are discussed. Conduct the papermaking activity in AS 6.3.

Q3. What nonfood products are made from other plants?

A3.

- a) **Ornamentation, landscaping, erosion control, and shade - trees, shrubs, ground covers, and grasses**
- b) **Flower arrangements - flowers**
- c) **Insecticides**
- d) **Medicines - aloe vera**
- e) **Perfume**

Pass around a bottle of shampoo or hand lotion containing aloe vera. Have students discuss the aloe and other plants that provide ingredients for nonfood products.

Q4. What nonfood products are made from livestock?

A4.

- a) **Detergents, soaps, glues, and candles - animal fats**
- b) **Insulin and replacement heart valves for humans - hogs**
- c) **Feathers - chickens and ducks**
- d) **Leather - cattle and hogs**
 - 1) **Clothing**
 - 2) **Upholstery**
 - 3) **Book covers**
 - 4) **Luggage**
- e) **Lanolin - wool**
- f) **Meal products, fertilizers, animal feeds - bones, feathers, blood, and fish**

Ask students why the agricultural industry wants to find new uses for animal parts. Why is it beneficial to be able to use feathers and leather? Describe the economic benefits of using the by-products of production or processing systems. Note that many of the nonfood products are made from materials that would be wasted or thrown away if alternative uses were not discovered. Assign AS 6.4 to have students research nonfood products from cattle and hogs.

F. **Other Activities**

1. Divide the class into transportation groups, which represent the following sources of fuel or energy:
 - Fossil (gasoline, diesel)
 - Inexhaustible (ethanol, soy diesel)
 - Electric
 - Solar
 - NuclearUsing the Internet, allow one class period for students to research their group. Have students identify advantages and disadvantages and then report to the class.
2. Have students write a paper about nonfood products from animals or plants.
3. Have students develop a chart with a cow, pig, chicken, soybeans, or corn in the center. Around the outside, provide examples of nonfood products that are derived from the raw material.
4. Show videos about wood products available from the Missouri Department of Conservation <<http://www.conservation.state.mo.us/>>.

G. **Conclusion**

Many nonfood products are processed from animals and plants. Some plants and animals are raised specifically for the special products they provide. Other products are by-products of plant or animal production.

H. **Answers to Activity Sheets**

AS 6.1 Biodegradable Plastic

The instructor should determine if the results are satisfactory.

AS 6.2 Cornstarch Activities

The instructor should determine if the results are satisfactory.

AS 6.3 The Papermaking Kit

The instructor should determine if the results are satisfactory.

AS 6.4 Nonfood Products from Cattle and Hogs

Category	Nonfood Products from Cattle	Nonfood Products from Hogs
Pharmaceuticals/Health Care	Blood factor Collagen Heparin Insulin Thrombin	Heart valves Insulin Skin

Category	Nonfood Products from Cattle	Nonfood Products from Hogs
Household Products	Candles Ceramics Deodorants Detergents Floor wax Insulation	Linoleum Mouthwash Paints Plastic Soups Toothpaste
Textiles/Clothing	Shoes Boots Belts Wallets Gloves Luggage	Buttons Fabric dye
Travel	Antifreeze Asphalt Lubricants Tires	Antifreeze Tires

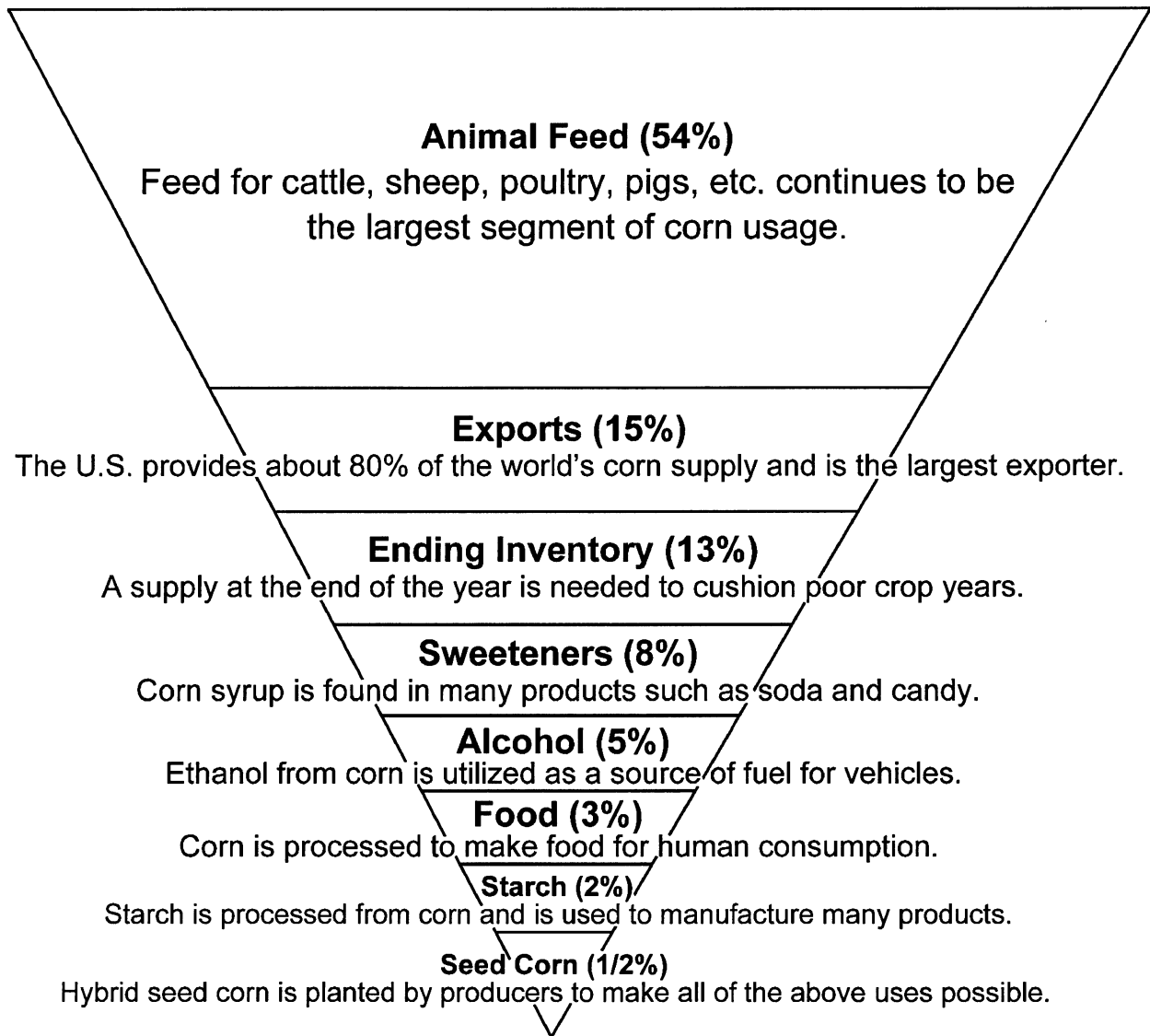
I. **Answers to Evaluation**

1. a
2. d
3. c
4. a
5. c
6. b
7. a
8. c
9. a
10. b
11. d
12. c
13. b
14. a
15. b
16. d
17. a
18. c
19. c
20. a
21. b
22. a
23. d
24. d
25. a
26. e
27. f
28. c
29. b
30. d
31. Whole milk has 5% cream or milkfat. Two % milk has 2% cream or milkfat. Skim milk has all cream removed.

32.
 - a. Clean – Wash hands for 20 seconds in hot, soapy water before preparing food.
 - b. Separate – Reduce cross-contamination by keeping raw meat products separate from ready-to-eat foods.
 - c. Cook – Select appropriate cooking temperatures and length of time to properly cook food.
 - d. Chill – Refrigerate or freeze leftovers within 2 hours or less.

Corn Has Many Uses

Approximately 9 billion bushels of corn are produced each year



Biodegradable Plastic

Objective: Students will create biodegradable plastic.

Materials and Equipment:

Cornstarch
Water
Tablespoon
Microwave oven
Corn oil
Paper cup
Stir stick
Food coloring
Eye dropper

Procedure:

1. Place 1 tablespoon of cornstarch in a paper cup.
2. Add 2 drops of corn oil to the cornstarch.
3. Add 1 tablespoon of water to the corn oil and cornstarch.
4. Stir the mixture.
5. Add 2 drops of your favorite food coloring to the mixture and stir well.
6. Microwave for 25 seconds on high.
7. When it is cool enough to handle, carefully remove the material from the cup.
8. Roll the material into a ball.

Cornstarch Activities

Objective: Students will recognize some different uses of various materials that contain cornstarch.

Materials and Equipment:

Normal golf tee
Biodegradable golf tee (one for each student or group)
Jar
Water
Toothpick/straw
6-oz. plastic cup (one for each student or group)
Superabsorbent polymer
Teaspoon

Note: Ordering information for the biodegradable golf tees and superabsorbent polymer is in the Supervised Study section of Lesson 1 of this unit.

Activity 1 - golf tee

Procedure:

Put a normal golf tee and a biodegradable golf tee in a jar of water. Observe it each week until the biodegradable golf tee begins to degrade.

Activity 2 - superabsorbent polymer

Procedure:

1. Give each student or group a 6-oz. plastic cup half full of water.
2. Add 2 teaspoons of superabsorbent polymer to the cup and mix with a toothpick or straw. In less than 1 minute, the mixture in the cup should turn to a gelatin or applesauce consistency. If this does not happen, experiment by adding more of the superabsorbent polymer or reducing the amount of water.

UNIT IV - PRODUCTS FROM AGRICULTURE

AS 6.3

Lesson 6: Nonfood Products from Agriculture

Instructor

The Papermaking Kit

Objective: Students will learn how to make paper.

This kit is an innovative, hands-on classroom project that involves students in the art of making paper. Each kit is capable of meeting the needs of a classroom of approximately 30 students. Instructions are provided with each kit.

Cost: \$8.00/kit

Order from the following address:

Minnesota Forest Industries
902 Medical Arts Building
324 West Superior Street
Duluth, MN 55802
(218) 722-5013
<minntrees@aol.com>
<<http://www.minnesotaforests.com>>

Note: Instructions for making paper can also be found in Boy Scout/Girl Scout publications.

Nonfood Products from Cattle and Hogs

Objective: Students will be able to identify nonfood products from cattle and hogs.

Directions: List at least two nonfood products in each of the categories that comes from cattle and hogs. Access the following Internet sites for research:

<<http://www.nppc.org/ForKids/byproducts.html>>

<http://www.beef.org/library/publications/wow_that_cow/index.htm>

Category	Nonfood Products from Cattle	Nonfood Products from Hogs
Pharmaceuticals/Health Care		
Household Products		
Textiles/Clothing		
Transportation		

UNIT EVALUATION

Circle the letter of the best answer.

1. The four main parts of a food chain are _____.
 - a. Sun, producer, consumer, decomposer
 - b. Animals, plants, humans, grain
 - c. Sun, humans, recycler, bacteria
 - d. Sun, plants, herbivores, humans

2. In the agricultural food chain, the primary producers are _____.
 - a. Livestock
 - b. Sheep
 - c. Soybeans
 - d. Plants

3. _____ is an example of people manipulating the food chain.
 - a. Spider eating an insect
 - b. Fish in a river
 - c. Domestication of animals
 - d. Recycling paper

4. Which of the following products are processed from grain?
 - a. Flour, cereal, sweeteners
 - b. Soups, cereal, sweeteners
 - c. Pasta, snack chips, juices
 - d. Spices, jelly, tea

5. How are fruits and vegetables processed?
 - a. Fresh and packed in oils
 - b. Canned and cereals
 - c. Frozen and fresh
 - d. Dried and hermetically sealed

6. White bread is usually made from _____.
 - a. Rice
 - b. Wheat
 - c. Barley
 - d. Oats

7. Which of the following is an important product of plants grown in Missouri?
- Pecans
 - Chocolate
 - Maple syrup
 - Coffee
8. What is the term used for the meat from young cattle?
- Hamburger
 - Beef
 - Veal
 - Porterhouse
9. Which of the following products are from dairy animals?
- Milk, ice cream, yogurt
 - Veal, processed patties, lard
 - Butter, milk, eggs
 - Cheese, luncheon meat, dextrose
10. All of the following products are obtained from hogs except _____.
- Pork chops
 - Hamburger
 - Ham
 - Bacon
11. Which of the following is a freshwater fish?
- Shrimp
 - Scallops
 - Lobster
 - Catfish
12. Who cleans, separates, handles, and prepares food for the distributor?
- Harvester
 - Wholesaler
 - Processor
 - Producer
13. Which of the following is not a reason for processing foods?
- To improve taste
 - To decrease additives
 - To prevent spoilage
 - For the convenience of consumers
14. Which of the following describes the pasteurization process?
- Heating a dairy product to kill bacteria
 - Cooling a dairy product to kill bacteria
 - Removing the moisture content to kill bacteria
 - Removing fat from a dairy product to kill bacteria

15. Reducing the size of fat particles is a food process called _____.
- Fermentation
 - Homogenization
 - Emulsification
 - Extrusion
16. Forcing a food component through an opening under high pressure is a food process called _____.
- Fermentation
 - Homogenization
 - Emulsification
 - Extrusion
17. Where can consumers purchase food products directly from producers?
- Farmers' market
 - Grocery store
 - Wholesaler
 - Food warehouse
18. To safely store food in a refrigerator, the temperature should be maintained at _____°F or lower.
- 5
 - 20
 - 40
 - 47
19. Which of the following fibers is manufactured from cellulose from tree fibers?
- Cotton
 - Flax
 - Rayon
 - Mohair
20. Which of the following fibers can be used to make rope?
- Hemp
 - Acetate
 - Flax
 - Angora
21. Which of the following fibers is produced by a worm?
- Wool
 - Silk
 - Angora
 - Mohair

22. Which of the following is made from petroleum chemicals?

- a. Polyester
- b. Angora
- c. Rayon
- d. Burlap

23. Which of the following is a synthetic fiber?

- a. Wool
- b. Flax
- c. Silk
- d. Nylon

24. Gasohol is produced by blending gasoline with _____.

- a. 5% soy oil
- b. 10% dextrose from corn
- c. 10% STP
- d. 10% ethanol from corn

Identify what plant, animal, or by-product from the right column can produce the by-products in the left column.

25. _____ Packing peanuts

a. Cornstarch

26. _____ Printing ink

b. Ducks

27. _____ Charcoal

c. Pigs

28. _____ Insulin

d. Sheep wool

29. _____ Down comforters

e. Soybeans

30. _____ Lanolin in hand lotion

f. Trees

Complete the following short answer questions.

31. Explain the difference between whole milk, 2% milk, and skim milk.

32. Identify and briefly explain the four steps to keep our food safe from harmful bacteria.

- a.
- b.
- c.
- d.