

4H 945

Revised 7/2017

4-H / FFA Dairy Foods Contest

Coaches Guide

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4-H / FFA INTRODUCTION TO DAIRY FOODS JUDGING

OBJECTIVES

Purpose: The purpose of this program is to train the individual to judge those dairy products by appearances, textures, quality and flavors that reflect some production, processing, or handling condition which has influenced the quality of the finished dairy product. On the other hand, these same characteristics can prove quite helpful in the identification of various cheeses and the evaluation of their respective quality, as well as real dairy versus non-dairy or substitutes. Thus, the learning objectives for this program are:

1. To learn about the marketing aspects of dairy products;
2. Product identification;
3. Evaluating and identifying dairy product defects based on organolytic (sensory) techniques to detect flavor, texture and appearance attributes.
4. The familiarizing of the student with processing, handling and storage practices that affect dairy product quality; and
5. Teach to be an informed consumer when purchasing and consuming dairy products.

IMPLEMENTATION AND PARTICIPANT SCHEDULE

Registration Fees

Coaches with individuals and/or teams desiring to participate in either of the following State Judging events must send a complete payment to Purdue University - Judging Account along with the registration form.

Dairy FoodsRegistration only (no lunch included)..... \$12.00/contestant

This is an invitational state level contest.

Offers four divisions:

- 1) Junior Consumer – grades 3-8
- 2) Junior Production – grades 3-8
- 3) Senior 4-H (Consumer) – grades 9-12
- 4) Senior FFA (Production) – grades 9-12

Use standard 4-H/FFA Official Judging Contest Event Registration Form found on the Indiana 4-H Website: www.four-h.purdue.edu under CDE (Career Development Event) to register your team or individuals. Mail or email registration form to:

Tony Carrell, Extension Specialist
State 4-H Office
615 W State St
West Lafayette, IN 47907
Email: tcarrell@purdue.edu

A. State Contest Requirements for Junior Division

1. Registration due: **September 1**
2. Counties or schools can register a maximum of three teams, regardless of division.
3. Counties and schools can also enter junior teams. Juniors are those individuals that are in 8th grade or below. Junior teams must be designated as Consumer Division or Production Division.
4. A team consists of 4 members with the lowest member score dropped.

B. Awards for Junior Divisions

1. The Junior contest is designed as a learning opportunity. Winners will be announced and plaques will be awarded to the top 5 individuals. No trips will be awarded.
2. Plaques will be awarded to the top 3 teams, whether 4-H or FFA.

C. Awards for Senior Divisions

1. Winners will be announced and plaques will be awarded to the top 5 individuals.
2. Plaques will be awarded to the top 3 teams, whether 4-H or FFA.
3. Top Sr. 4-H team wins a trip to the National Dairy Conference and World Dairy Expo.
4. Top Sr. Individual is awarded the State Fair Achievement Trip to Washington, D.C.
5. Top 4 FFA teams receive plaques at the State Convention
6. Top FFA team is invited to compete at the National Contest at the National Convention
7. Top 10 individuals receive ribbons

STATE CONTEST CLASSES (JUNIOR AND SENIOR CONTEST)

A. The contest classes are as follows:

<u>4-H SENIOR AND JUNIOR CONSUMER DIVISION</u>		<u>FFA SENIOR AND JUNIOR PRODUCTION DIVISION</u>	
1.	Milk Flavor Identification and Evaluation 54 points	1.	Milk Flavor Identification and Evaluation 54 points
2.	Cheese Identification 54 points	2.	Cheese Identification 54 points
3.	Problem Solving Class 54 points	3.	Problem Solving Class 54 points
4.	Ice Cream Evaluation 54 points	4a.	California Mastitis Test 32 points
		4b.	Fat Content Identification 36 points
5.	Questions on the Consumer Aspects of Dairy Products and Marketing 50 points	5.	Questions on Milk Production and Marketing 50 points

- a) Contestants will be allowed 30 minutes for each class as defined above. Additional time may be granted by the contest coordinator.
- b) The score for each contestant is the total number of points for each class added together for correct answers. Ties for individual awards will be broken by class (1) or by class (2), if (1) does not break the ties.
- c) Tie-breaker 3 - The individual having the highest total score, after the quiz score has been omitted, will be declared the winner.
- d) Tie-breaker 4 - The individual having the highest combined score on milk samples, problem solving and cheese identification will be declared the winner.

B. Class Description

1. Milk Samples (*scantron section labeled Milk Flavor, Defects*)

- Six milk samples will be scored on flavor (taste and odor); intensity levels are numbered
- Use score card 4H-653 MILK SAMPLES
- Possible score: 54 points maximum
- Reference: "Newer Knowledge of Milk and Other Fluid Dairy Products," 2000. National Dairy Council, Rosemont, IL 6018-4233 (ISBN 1-55647-095-9)

2. Cheese Identification (*scantron section labeled Identification of Cheeses*)

- Nine cheese samples for identification will be selected from the following list:

Asiago	Havarti
Blue	Monterey (Jack)
Brie/Camembert	Mozzarella/Pizza
Cheddar (mild)	Munster
Cheddar (sharp)	Processed American
Colby	Provolone
Cream/Neufchatel	Romano
Edam/Gouda	Swiss
Feta Cheese	Parmesan
- Use score card 4-H-654 IDENTIFICATION OF CHEESES
- Possible score: 54 points maximum
- Reference: "Newer Knowledge of Cheese and Other Cheese Products," 2000. National Dairy Council, Rosemont, IL or Indiana 4-H Website: www.four-h.purdue.edu

3. Problem Solving (*scantron sections labeled Natural/Imitation Dairy Identification AND Problem Solving*)

- Use score sheet 4-H 714 PROBLEM SOLVING
- Possible Score: 54 points maximum

Part I

- Six samples for identification as a real or artificial dairy product will be selected from the following list:

Creams

coffee cream
non-dairy creamer
condensed milk
filled milk

Cheeses

cheese
cottage cheese
vegetable cheese

Spread

butter
cream cheese
margarine

Cultured products

tofu
yogurt
sour cream
"No Fat" sour cream

Toppings

whipped toppings
whipped cream

Dairy frozen desserts
"No Fat" ice cream
ice cream

Specialty Milks
Soy
Lactose-free

Part II

- Six questions will be asked related to any of the following topics:

- Principles of merchandising dairy foods.
- Factors impacting the demand for and commercial use of milk and dairy foods/products.
- Nutritional value of dairy foods/products and their role in the diet.
- Current issues relative to the marketing of milk and dairy foods/products and new developments in dairy foods processing.

4. Ice Cream Samples (4-H Senior and Junior Consumer Divisions Only) *no scantron*

- Six ice cream samples will be scored on flavor, body and texture
- Use score card 4-H-656 ICE CREAM
- Possible Score: 54 points maximum
- References: a. "Dairy Products Judging" from University of Tennessee, pages 17-21

4a. California Mastitis Test (CMT) (FFA Senior and Junior Production Divisions Only) (*scantron section labeled CMT*)

- Four CMT test reading will be conducted
- Use score card 4-H-657 Milk CMT & Milker Unit
- Possible Score: 32 points maximum
- Reference: University of Missouri Extension, *Using the California Mastitis Test*, by Robert T. Marshall and J. E. Edmondson, Department of Food Science and Nutrition and Barry Stevens, Department of Animal Sciences. This reference is found on the Indiana 4-h Website: www.four-h.purdue.edu

4b. Milk Fat Content of Fresh Milk Products (*scantron section labeled Fat Content Identification*)

- Four samples of fresh fluid milk products will be identified according to their content of milk fat.
- Possible Score: 36 points maximum
- Use score card 4-H-657 Milk CMT & Milk Fat Content

Total Possible Score For 4a and 4b Combined: -68 To 0

5. Questions (*scantron sections labeled Written Exam*)

4-H Senior and Junior Consumer - Consumer Aspects of Dairy Products and Marketing

- Twenty-five objective questions on Consumer Aspects of Dairy Products
- Twenty-five objective questions on Marketing
- Possible Score: 50 points maximum

FFA Senior and Junior Production - Milk Production And Marketing

- Twenty-five objective questions on Milk Production
- Twenty-five objective questions on Marketing
- Possible Score: 50 points maximum

6. References for both 4-H and FFA questions:

- Recommended references to study for written tests

- a) Hoard's Dairyman, PO Box 801, Fort Atkinson, Wisconsin 53538. Phone (414) 563-5551. Issues used are from September of previous year to August of current year.
- b) "Questions and Answers on Federal Milk Marketing Orders," AMS-559, revised, 1975, Dairy Division, AMS, USDA, Washington, D.C. 20250. <http://www.ams.usda.gov>
- c) Farmers Bulletin 2259,"Judging and Scoring Milk and Cheese," Dairy Division, CMS, USDA, Washington, D.C. 20250.
- d) Using the California Mastitis Test published by the University of Missouri-Columbia Extension Division, Columbia, Missouri 65211. See Indiana 4-H Website www.four-h.purdue.edu.
- e) *Dairy Facts – International Dairy Foods Association, 1250 H Street, N.W. Suite 900, Washington DC 20005 Phone– 202-732-4332– www.idfa.org*
- f) The American Dairy Association of Indiana, Inc, The Dairy & Nutrition Council of Indiana, Inc. - Divisions of Milk Promotion Services of Indiana, Inc.. <http://www.indianadairycouncil.org/>
- g) "How to Buy Dairy Products," HGB-255, revised, 2007, Dairy Division, AMS, USDA, Washington, D.C. 20250. Available from the Indiana 4-H website: www.four-h.purdue.edu.
- h) "Milk for Manufacturing Purposes and its Production and Processing, Recommended Requirements," 2005, Dairy Division, AMS, USDA, Washington, D.C. 20250. <http://www.ams.usda.gov> or www.four-h.purdue.edu.
- i) Newer Knowledge Dairy Foods Series (Cheese, Milk, Other Dairy), 2000. National Dairy Council, Rosemont, IL or Indiana 4-H Website: www.four-h.purdue.edu

SCANTRON ANSWER SHEETS

All contestants will use a scantron answer sheet. A copy of this answer sheet is available in this guide book and on the 4-H web site at

<https://extension.purdue.edu/4h/Pages/Career%20Development%20Events/Dairy-Foods-CDE.aspx>.

The exception will be Ice Cream Evaluation. Contestants in the Senior 4-H and Junior Consumer divisions will use the scantron answer sheet and ice cream evaluation answer sheet.



LESSON ONE: IMPORTANCE OF SENSES IN EVALUATION



Project Skill: Developing Sensory Awareness

Life Skill: Acquiring Knowledge

Materials:

- American cheese (6 oz.)
- Swiss cheese (6 oz.)
- Milk (4 cups)
- Buttermilk (1 cup)
- Garlic powder (1 bottle)
- Salt (1 Tbsp.)
- Sugar (1 Tbsp.)
- Medium sized jars with lids (5)
- 2 oz. paper cups (5 for each student)
- A sketch of a tongue
- Bile salts or quinine (available from HS science lab or pharmacy)

Before Meeting:

The day before teaching this lesson, prepare the materials as described below.

1. Cut both kinds of cheeses into pieces approximately one inch square. Place each kind of cheese in separate plastic bag.
2. Pour one cup of milk into four separate jars with lids. Mix one of the following ingredients in each jar and label as indicated below:
 - (1) Garlic - Mix 1/4 tsp. of garlic powder in 1 cup of milk
 - (2) Salty - Mix 1 Tbsp. of salt in 1 cup of milk
 - (3) Sweet - Mix 1 Tbsp. of sugar in 1 cup of milk
 - (4) Bitter - Mix 1/16 tsp. of bile salts in 1 cup of milk
 - (5) Sour - 1 cup of buttermilk

During Meeting: *Meeting should be conducted in a room with a sink & running water.*

1. Give a brief overview of the importance of the three senses in evaluating dairy products.

Key points to cover:

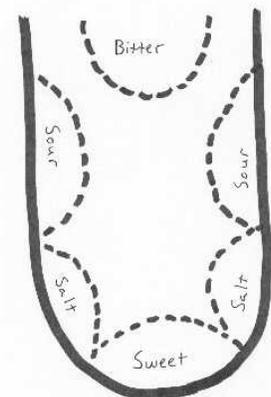
- Sight**
- enables you to visually inspect characteristics (color, shape, texture) of dairy products; and
 - enables you to identify similarities and differences between products.
- Smell**
- enables you to detect odors; and
 - enables you to determine the flavor of a dairy product when you combine odor with taste.
- Taste**
- enables you to detect four primary taste sensations (sweet, sour, salty and bitter) on specific locations on the tongue:

Salt - along the sides of the tongue

Sweet - on the tip of the tongue

Bitter - on the top surface of the tongue

Sour - along the sides of the tongue



2. Conduct sight sensory awareness exercise.

- Give each youth a piece of American cheese and a piece of Swiss cheese.
- Ask the following questions and discuss:

Q: What differences do you see between the American and Swiss cheese?

A:

	American	Swiss
Color	Yellow	Light yellow to white
Shape	No holes	Presence of smooth holes
Rind	No rind	No rind

Q: What other cheeses have you seen in the store? Do they look any different than the American or Swiss cheese? How?

A: Refer to the table of Cheese Identification and description on page 24 for the descriptions of other cheeses.

Q: What are some other foods that can be identified by using sight?

A: Most foods. Your eyes prepare you for eating food.

3. Conduct smell sensory awareness exercise.

- Give each youth five cups.
- Have youth label cups 1, 2, 3, 4, 5.
- Pour each of the prepared milk samples into these cups.
- Have youth smell each sample one at a time.
- Ask the following questions:

Q: What smell did you pick up from cups 1 and 5?

A: (1) Garlic (5) Buttermilk

Q: Did you pick up any other odors from the samples in cup 2, 3 and 4?

A: No. Salty, sweet, and bitter can't be detected by smell.

Q: How do you check to see if milk is fresh or sour when you take the milk out of the refrigerator?

A: Smell.

Q: What are some other foods that can be distinguished by smell?

A: Pizza, popcorn, etc.

4. Conduct taste sensory awareness exercise.

- Discuss locations of taste receptors by using tongue sketch.
- Have youth evaluate milk samples used in smell sensory awareness exercise one at a time by performing the following steps:
 - 1) Swish each sample around the mouth, being sure to cover the whole tongue. Hold sample in mouth for no longer than 10 seconds. Then spit the sample out.
 - 2) After each sample, rinse mouth with water and then spit the water into the sink.
 - 3) Determine where on the tongue you pick up a taste and what taste it is.
- Ask the following questions:

Q: At what area of the tongue did you pick up the taste in cup 1,2,3,4 and 5?

A: Salty - along the side and tip of the tongue

Sweet - on the very front of the tongue

Bitter - on the top surface of the tongue

Sour - along the sides of the tongue

Q: What are other foods that you can distinguish by taste?

A: Milkshakes, various soft drinks, candy bars, etc.

Facts About Milk



BACKGROUND INFORMATION

Before refrigeration, most milk was consumed within a few miles of where it was produced. But with the rapid growth of cities came many changes; sanitation regulations, modern milking equipment, mechanical refrigeration, pasteurizing and bottling plants, the cream separator, special milk trains, and tank trucks. With these innovations, there was a shifting of the processing and the delivery of milk from farms to processing plants. Along with these changes came the scientific study of cow breeding and recognition that feeding is important for increasing a cow's milk production.

MILK PRODUCTION

- A cow has the ability to convert **foraged** feed into delicious and nutritious milk.
- The composition of her milk is about the same day after day. It is the quantity rather than the **quality** of milk that varies with her feed.
- When eating only grasses in a pasture or hay in the winter, a good cow makes about 12 quarts of milk daily.
- When the cow is fed silage and **concentrates**, she can produce 25 quarts of milk a day or more.
- The cow's four-compartment digestive system helps her accomplish the process of turning her feed into milk.
- Without much chewing, a cow's feed is swallowed and goes into the first compartment of her stomach, the

rumen.

- In the next compartment, the **reticulum**, the food is squeezed into wads called "cuds". They are about the size of chicken eggs. These are ejected back into the mouth and are chewed to break up the fibers. When the chewed cud returns to the rumen, microorganisms convert most of the food into fatty acids. These are absorbed into the blood and used for energy and to make milk fat.
- The remaining fine material and fluid enter the third compartment, the **omasum**, in which water is squeezed out.
- In the fourth compartment, the **abomasum**, chemical digestion begins with gastric juices and acid. Digestion continues in the intestine, where the nutrients are absorbed into the bloodstream.

A milking machine unit has four teat-shaped rubber cups that are attached to the cow's teats. The milk is removed by suction provided by a pulsating vacuum. The cows are milked at least twice a day. Milking takes three to five minutes per cow. When withdrawn, the milk is at the cow's body temperature of about 100° F, and it flows into a refrigerated tank, which is at least 45° F. The cold temperature maintains the high quality of milk while it is held for pickup.

PROCESSING

The tank truck driver will take the milk to the processing plant first, inspecting the milk to determine if it is cold and has a clean aroma. He obtains a sample that will be tested at the processing plant. Then the

cold milk is pumped from the refrigerated farm tank through a clean, sanitized hose into the insulated tank on the truck.

After the milk sample has passed several tests at the processing plant, it is pumped through sanitized pipes into the processing plant's refrigerated holding tanks.

MILK QUALITY

We buy the milk with the latest freshness date. We want milk with high drinking quality. The drinking quality includes the feel, taste, and smell that a person experiences when the product is taken into the mouth. The sense of smell is important in determining the flavor. A person is influenced very much by the sense of smell in making decisions relative to the flavor quality of most foods consumed.

The quality of the milk production on the farm largely determines the quality of dairy products found in the dairy case. Flavors of milk and dairy products may be caused by one or more factors:

- health of cow,
- feed consumed by the cow,
- bacterial action,
- chemical changes,
- absorption of foreign flavors by the milk after the milk is collected.

Because the consumption of dairy products depends primarily upon their flavor, dairymen are very cautious about feeding and milking practices. Here are some examples:

- if cows eat silage on pasture containing onions immediately before milking their freshly drawn milk will have off-flavors
- improper cleaning and sanitizing of equipment and improper cooling of milk also contribute to off-flavors in milk and milk products

The flavor of normal whole milk is pleasantly sweet and leaves only a clean, pleasing sensation. If an odor or aftertaste is detected, the milk has a **flavor defect**. Major flavor defects include bitter, feed, flat-watery, foreign, garlic/onion, high acid, malty, oxidized, rancid, salty, and unclean taste. See the milk flavor defect chart on page 15 for the causes of these flavor defects and how to prevent them. By understanding their origins, you will have a better basis for identifying and recognizing each of these flavor defects.

The hauler evaluates milk in farm bulk tanks before being pumped into the tank truck, but the critical quality checks begin at the dairy plant. Judging and scoring of milk and milk products are an important part of quality control, which starts in the receiving department and continues throughout the processing operation. Milk processing plants have various points during the process where they check for irregularities that will affect product quality. Normally, the quality control staff will evaluate the milk products after a few days of storage. They use the same procedure and similar score card that we use to measure the quality of the products they produce. The quality control is important for maintaining a high quality of milk product.

DETERMINING THE FLAVOR

Before tasting a milk sample, you should note the odor or aroma. Smell the open container of milk rather than the individual cup, since the greater volume in the bottle makes it easier to detect the odor.

Frequently, odor alone is sufficient to classify milk properly. Tasting will enable you to further substantiate the flavor identified by the aroma. Odor plays a very important part in quality determination at a dairy-receiving platform. Because flavors become more volatile at higher temperatures, keep samples at room

temperature. A cold sample (below 45° F) chills your mouth and makes it difficult for you to distinguish certain flavors.

The ideal natural and pleasant flavor of fresh milk should be kept in mind for comparison. The mental image will help in distinguishing between samples that show varying characteristics and types of flavor.

MILK NUTRIENTS

Milk is about 87 percent water and 13 percent solids. The solids consist of fat and the fat-soluble vitamins as well as proteins, carbohydrates, water-soluble vitamins and minerals.

Following is a list of the nutrients provided by milk and an explanation of their benefits:

protein – builds and maintains body tissues and body fluids and helps form enzymes, hormones, body fluids, and antibodies that fight infection. It can also be used for increased energy. Casein makes up 82% of the total protein in milk. Because it contains all the essential amino acids, Casein is used as the standard by which the protein quality of other foods is measured.

carbohydrates – provide energy. The carbohydrate **lactose** is found almost exclusively in milk since it is the sugar secreted by the mammary glands. Lactose aids the absorption of the minerals calcium, phosphorus, magnesium, and zinc.

fats – supply energy and carry the fat-soluble vitamins A, D, E, and K. Milk fatty acids are 66 percent saturated, 30 percent mono-unsaturated, and 4 percent polyunsaturated.

vitamins – regulate body processes. Fat-soluble vitamins A and D are in milk

fat. **Carotenoids**, which give milk its creamy color, are converted to vitamin A in the body. Vitamin A aids growth, helps maintain the health of tissues that protect against infection, and forms substances needed for sight in dim light. Vitamin D helps the body absorb calcium to make strong bones and teeth and to maintain bones. Vitamin B2 regulates the body's production of energy from dietary fat, carbohydrate, and protein. It also promotes healthy skin and eyes.

minerals – build and maintain body cells and regulate body processes. Milk is best known for the mineral calcium.

calcium – helps teeth and bones become stronger and helps prevent and lower high blood pressure.

TYPES OF MILK

There are four major types of milks:

1. **Fresh fluid milk** includes:
 - a) Whole milk – shipped in interstate commerce must be pasteurized, ultra-pasteurized, or **UHT** processed, and it must contain at least 3.25% milk fat and 8.25% solids not fat
 - b) Low fat milk – has some milk fat removed. The product's name will declare the percentage of milk fat, 0.5%, 1%, 1.5% or 2%. All low fat milks must contain at least 8.25% solids not fat
 - c) Skim milk – has as much fat removed as possible. It must contain less than 0.5% milk fat and at least 8.25% solids not fat. It must be pasteurized, ultra-pasteurized, or UHT processed and fortified with 2,000 International Units (IU) of vitamin A per quart
 - d) Flavored milk – is made by adding characterizing flavors, with or without

coloring and nutritive sweeteners, to a specific standardized milk

- e) Skim milk
- f) Acidified and cultured milk
- g) Cultured buttermilk which can be made from low fat, whole or concentrated milks or reconstituted non-fat dry milk
- h) Acidophilus cultured milk

- 2. **Manufactured milk products** include:
 - evaporated milk
 - evaporated skim milk
 - sweetened condensed milk
- 3. **Powder milk** includes nonfat powder milk, nonfat powder milk fortified with vitamins A and D contains 2,000 IU of vitamin A and 400 IU of vitamin D per quart when reconstituted according to label directions.
- 4. **Specialty milks** include:
 - multi-vitamin
 - multi-mineral milks
 - lactose-treated milk
 - low sodium milk.

MARKETING

The milk marketing and promotion programs are administrated by the United States Department of Agriculture. Entry into these programs requires that the dairy producer qualify as a Grade A operation. Upon qualification, the dairy producer may participate in the Market Order Program. The program brings marketing benefits to both farmers and milk handlers.

Most milks have one of three use classifications.

- 1) **Class I:** uses generally include products for fluid milk products such as whole milk, skim milk, low fat milk, butter-milk, and flavored milk drinks.
- 2) **Class II:** uses refer to "soft" products such as cottage cheese, ice cream, and yogurt.
- 3) **Class III:** uses refer to hard cheese.
- 4) **Class IV:** uses refer to butter and dry milk powder.

The Market Order establishes prices by classes according to the use of the milk. A value is established for each class based on the current market value of the products included in that class.

The percentage of total milk used in each class is determined, then the percentage for each class is multiplied by the price established for that class to determine its value. The total of the four values is called the uniform price for that market order.

The uniform price is then used to calculate the value of milk fat and protein within the market order. Each individual producer's payment is determined by calculating the value of the total pounds of milk fat and protein shipped.

STORAGE TIPS

- When shopping, pick up the milk just before checking out.
- Refrigerate fresh milk at 40° F or below as soon as possible after purchase or delivery to the home.
- Use milk in the order of purchase
- Chill UHT milk before serving. After it is opened, keep it refrigerated.
- Refrigerate powder milk once it is reconstituted.
- After pouring the milk you need, return the remainder to the refrigerator
- If you don't use all the poured milk, refrigerate the unused milk separately. Don't pour it back in the original container.
- Close containers to prevent the milk from absorbing flavors from other foods in the refrigerator.
- Store dry milk in a cool, dry place. Reseal the container after opening.
- Store canned milk in a cool, dry place. After opening, pour the unused milk into a clean container and refrigerate.
- Humidity causes dry milk to lump and may change the color and the flavor. If this occurs, the milk should not be used.

Definition of Terms

Carotenoids -give milk creamy color and are converted to vitamin A in the body.

Concentrates – are the mixture of grain and seed oil cake, with protein, minerals, and vitamins added. It is so called because it supplies concentrated nutrients and energy.

Forage – food for animals especially when taken by grazing.

Lactose – aids the absorption of the minerals calcium, phosphorus, magnesium, and zinc. The carbohydrate lactose is found almost exclusively in milk.

Perishable – liable to spoil or decay.

UHT – Ultra High Temperature. A way to process milk so it may be stored at room temperature for up to three months.

Market Order Program

Quality – degree of excellence; possessing essential character such as being wholesome, safe, nutritious and acceptable for consumption.

Silage – is chopped green corn, sorghum, and soybeans.

An additional resource, Guidelines for Preventing Off-Flavors and Rancid Flavors in Milk, is available from the Dairy Practices Council at

<http://www.dairypc.org/catalog/guidelines/flavor/preventing-off-flavors-in-milk>

MILK FLAVOR DEFECT CHART

Their Causes and Prevention

Flavor Defect	Possible Causes	Prevention
Bitter	<ol style="list-style-type: none"> 1. Cows eating bitter weeds 2. Mastitic or stripper cows 3. Certain types of bacteria 	<ol style="list-style-type: none"> 1. Eliminate weeds 2. Withhold milk of stripper cows 3. Use clean, sanitized equipment
Feed	<ol style="list-style-type: none"> 1. Strong silage feed before milking 2. Strong pasture feeds 3. Poor ventilation 4. Sudden feed changes 	<ol style="list-style-type: none"> 1. Feed after milking 2. Do not pasture for 4 hrs. before milking 3. Ventilate feeding area 4. Make gradual feed changes
Flat-Watery	<ol style="list-style-type: none"> 1. Milk has been diluted with water 	<ol style="list-style-type: none"> 1. Dry out holding tanks completely
Foreign	<ol style="list-style-type: none"> 1. Sanitizers in equipment 2. Some barn or crop sprays 3. Some fly sprays 4. Teat medicants 	<ol style="list-style-type: none"> 1. Drain thoroughly 2. Ventilate. Don't expose milk equipment 3. Ventilate 4. Clean Teats well
Garlic or Onion	<ol style="list-style-type: none"> 1. Cow eats or smells wild garlic or onion 	<ol style="list-style-type: none"> 1. Control pasture
High Acid	<ol style="list-style-type: none"> 1. Unclean equipment 2. Poor cooling 	<ol style="list-style-type: none"> 1. Clean and sanitize equipment 2. Promptly cool to below 40° F
Malty	<ol style="list-style-type: none"> 1. Contamination with malty bacteria 2. Poor cooling 	<ol style="list-style-type: none"> 1. Clean and sanitize all equipment 2. Cool properly
Metallic/Oxidized	<ol style="list-style-type: none"> 1. Individual cows 2. Exposed copper in milk equipment 3. Milk exposed to any light 	<ol style="list-style-type: none"> 1. Segregate susceptible milk 2. Eliminate copper and white metal 3. Avoid exposure to light
Rancid	<ol style="list-style-type: none"> 1. Late lactation 2. Air leaks in pipe line systems 3. High risers in pipe lines 4. Continuous operation milk pumps 5. Excessive agitation above 50° F 6. Bulk cooler deficiency 	<ol style="list-style-type: none"> 1. Dry off stripper cows 2. Eliminate air leaks 3. Minimize risers 4. Run pump intermittently 5. Check bulk tank agitation 6. Be sure compressor is plugged in and has sufficient refrigerant to cool to 40° F within 2 hrs.
Salty	<ol style="list-style-type: none"> 1. Late lactation 2. Mastitic Milk 	<ol style="list-style-type: none"> 1. Withhold milk 2. Discard
Unclean	<ol style="list-style-type: none"> 1. Poorly ventilated stables 2. Unclean equipment 3. Unclean udders and flanks 4. Moldy feed 5. Musty, milk-stoned equipment 	<ol style="list-style-type: none"> 1. Ventilate 2. Keep equipment clean 3. Clean and clip 4. Avoid spoiled feeds 5. Properly clean and store equipment



LESSON TWO: EVALUATING MILK



Project Skill: Detecting Flavor in Milk

Life Skill: Problem Solving

Materials:

- Homogenized whole milk (1 gal.)
- Raw milk directly from cow (1 pt.)
- Grape nut type cereal (2 Tbsp.)
- Medium sized jars with lids (6)
- Buttermilk (2 Tbsp.)
- Bile salt (1 Tbsp.)
- Milk flavor score sheet (one for each student, sample sheet is on page 20 in this module)
- 2 OZ. paper cups (6 for each student)
- Green onion (1)
- Copper pennies (2 or 3)
- Drinking water (4 Tbsp.)
- Molasses (1 Tbsp.)
- Clorox (4 Tbsp.)
- Salt (1 Tbsp.)

Before Meeting:

The day before teaching this lesson, prepare the materials listed.

1. Divide homogenized whole milk into 6 separate jars with lids.
2. Use the ingredients listed above, prepare 6 milk samples in each jar as outlined in the table below, and label each jar 1, 2, 3, 4, 5, 6.
3. Prepare samples as the table indicates:

Defects	Ingredients used to create defects	Amount to add to 1 qt. of milk	Other things to do
Bitter	Bile salts	1 Tbsp.	
Feed	Molasses	1 Tbsp.	
Flat/Watery	Water	4 Tbsp.	Refrigerate overnight
Foreign	Clorox	4 Tbsp.	Refrigerate overnight
Onion	Juice from gr. onion	4 drops	Refrigerate overnight
High Acid	Buttermilk Whole Milk	2 Tbsp. Buttermilk to 1 qt. whole milk	Warm to 80° F before mixing, then refrigerate the mixture overnight
Malty	Grape nut cereal	2 Tbsp.	Filter cereal out after soaking for 2 hrs.
Oxidized	Whole Milk	Expose to sunlight	30 minutes
Rancid	Whole Milk and 0.3 ml Butyric acid	9:1 ratio	Warm the mixture to about 98° F and refrigerate overnight at 45° F
Salty	Salt	1 Tbsp.	
Unclean	Acid and rancid samples	2 qts.	Mix two together
Cooked	Whole Milk	2 qts.	Heat to near boiling, cool to room temp, then place in refrigerator overnight
Lacks Freshness	Whole Milk	Expose milk to sunlight	10 minutes

4. Samples to be used in this lesson will be Flat/Watery, Onion, High Acid, Malty, Oxidized, and Rancid.

During Meeting: *This meeting should be conducted in a room with a sink with running water.*

1. Give general information about milk production and detecting flavor defects in milk.
Key points to cover:
 - The flavor of normal milk is pleasantly sweet
 - The milk has a flavor defect if an odor or after taste is detected.
 - In general, five things can produce a flavor defect:
 - health of the cow
 - bacterial action
 - chemical changes
 - feed consumed by the cow
 - absorption of foreign flavors.
2. Review locations of taste receptors by having youth tell the locations of sour, salty, bitter, and sweet sensations.
3. Conduct milk evaluation exercise.
 - Give each youth 6 cups.
 - Have youth label cups 1, 2, 3, 4, 5, 6.
 - Pour each of the 6 prepared milk samples into youth cups.
 - Have youth evaluate milk samples for defects one at a time by performing the following steps:
 - 1) Note the odor first
 - 2) Swish each sample around the mouth, being sure to cover the whole tongue and hold the sample in the mouth for no longer than 10 seconds. Then spit the sample into the sink
 - 3) After each sample, rinse your mouth with water and then spit the water into the sink.
 - Ask the following questions:

Q: What flavor did you pick up from the sample in cup 1? (2, 3, 4, 5, 6?)

A: Flat/Watery (1) - tasteless flavor
Onion (2) - onion flavor
High Acid (3) - sour flavor
Malty (4) - walnut or grape nut flavor
Oxidized (5) - cardboard flavor (sunlight)
Rancid (6) - pungent

Q: How do you check to see if the milk you bought has flavor defects?

A: Smell and taste

Q: What are the possible causes of flavor defect? (flat-watery, onion, high acid, malty, oxidized and rancid)

A: Refer to the MILK FLAVOR DEFECT CHART on page 16.

Q: How can you prevent the defect from occurring?

A: Refer to the MILK FLAVOR DEFECT CHART on page 16.
 - Give each youth a copy of score sheet and have them fill in the sheet.
 - 1) If you prepared the milk samples as listed above, all samples would have pronounced defect.
 - 2) Instruction for using the score sheet is included on the score sheet.

Facts About Cheese



BACKGROUND INFORMATION

During the early history of United States, cheese was made on farms for family use and for sale in nearby communities. In Rome, New York, cheese making changed from a family art to a great industry when the first factory was built and began producing cheddar cheese in 1851. Through the application of controlled process methods, American cheese-makers have successfully manufactured virtually all types of cheese and have created distinctive, original, domestic varieties such as Brick, Colby, and Monterey.

CHEESE MAKING

Cheese is the fresh or matured product obtained by draining the whey after coagulating casein, the major protein in milk. The casein is coagulated by acid from selected microorganisms and/or by milk-clotting enzymes added to milk. The resulting curd is cubed, cut, heated, drained, and salted. Fresh, or uncured, cheese, such as cottage and cream, can be eaten immediately.

Ripening, or curing, of the manipulated curd includes exposure to a temperature-humidity controlled environment for a specified length of time. Changes during curing are brought about by specially selected:

- enzymes,
- bacteria,
- mold,
- yeast,

- or combinations of these curing agents in or on the cheese.

During ripening, nutrients, such as protein, fat, and carbohydrate, are changed to simpler compounds that produce the characteristic flavor and affect the final texture of the cheese.

Making natural cheese is an art. It consists of removing most of the milk solids from the milk by coagulating with rennet or a bacterial culture or both, and separating the curd from the whey by heating, draining, and dressing. Various combinations of milk are used to make specific types of cheese. For example, cottage cheese is made from skim milk, cheddar cheese from whole milk, cream cheese from milk plus cream, and Swiss and Edam from mixtures of whole and skim milk. Most cheese produced today is made from heat-treated or pasteurized milk.

CHEESE NUTRIENTS

Cheese is a concentrated source of many of the nutrients of milk, especially casein, calcium, phosphorous, and vitamin A. It is one of nature's most versatile foods. It is nutritious and readily digested.

- To make 1 pound of cheddar cheese it takes approximately 10 lbs. of milk or almost 5 qts.
- Nearly 1/2 of the total solids of whole milk remain in the cheese curd and approximately 4/5 of the milk's original protein.
- Butter fat content is about 20-30% of its total weight.

Milk fat is responsible for much of the characteristic flavor and texture of cheese. Varying amounts of whey are released during the cutting of the cheese curd, which consists of the water-soluble carbohydrate **lactose**, whey proteins, soluble salts, vitamins such as riboflavin, and other components.

Nutrition information about cheese is provided on the wrapper or container as a service to consumers. The Food and Drug Administration govern the composition of cheese. The federal definitions and standards of identity define the food by specifying:

- the ingredients used;
- the composition (the maximum moisture content and the minimum percentage of fat in the cheese solids or in the total mass);
- the requirements concerning pasteurization of the milk and the minimum ripening period required for each type of cheese; and
- the production procedures, any specific requirements peculiar to a variety or class of cheese.

TYPES OF CHEESE

Natural cheeses are classified according to the processing conditions used. The process factors that distinguish these types are whether the cheese is un-ripened or ripened/aged, the moisture and fat content, and the unique flavor qualities developed by the cheese type.

The distinctive flavor, body, and texture characteristics of the various cheeses on the market are determined by:

- 1) the kind of milk used;
- 2) the methods used or coagulating the milk, cutting, cooking and forming the curd;
- 3) type of culture used;
- 4) salting; and

5) ripening conditions.

After cheese has been formed into its characteristic shape, it is coated with wax or wrapped and aged. Cheese may be classified as: very hard, hard, semi-soft, or soft.

CHEESE IDENTIFICATION

To identify cheese, one should be able to differentiate it by its body, texture, color, and flavor.

Body is used to designate the physical properties, including firmness, cohesiveness, elasticity, and plasticity. Physical properties of cheese are affected by the methods of processing and the composition of cheese. The physical properties describe the appearance and feeling of the cheese when a plug of it is removed from the cheese with a trier.

Texture is the term used to describe the manner in which the cheese particles are bound together. Close texture shows only a few openings between the particles, whereas open texture shows spaces between the particles.

Color may range from off-white to orange. However, color alone should not be depended upon as distinguishing factor, only as a guide to be used with the other characteristics of the cheese sample.

Flavor is the term used to describe the taste and smell of the products. It is the most critical distinguishing factor in identifying the cheese. It will help distinguish one cheese from another. High-quality cheese has a flavor described as clean, fine, nutty, and pleasantly sweet. How close the cheese flavor comes to this ideal flavor will depend on the type of bacterial activity and chemical changes that occur during the

manufacturing and curing process. Often a body and texture defect will be associated with a specific flavor defect. After you have examined the body and texture of the cheese carefully, you will then determine the flavor by

- 1) noting the odor of the cheese cube as you pass it slowly under the nose;
- 2) working a portion of the plug between the thumb and forefingers;
- 3) smelling for odors; and
- 4) tasting a small piece of the cheese.

STORAGE TIPS

- Cheese should not be kept outside of the refrigerator for extended periods.
- Exposed to air and heat, cheese dries out and might become moldy.
- Proper storage at 40° F preserves the original flavor and appearance and insures full use of the cheese without waste.
- Use of the original wrappings to protect the cheese is good for refrigerator storage.
- Cheese should be covered tightly to exclude air if large pieces are to be stored for a long period of time.
- Hard cheese such as Cheddar, Swiss, and Parmesan may be kept for several weeks.
- Soft cheese such as cream, cottage, Neufchatel, fresh Ricotta, Brie, and Camembert are highly **perishable** and should be used within days after purchase.

- Most natural cheese can be successfully frozen for 6 to 8 weeks if unopened in the original package.
- After being removed from the freezer, cheese should be thawed in the refrigerator for 24 hours and served soon after thawing.
- The body and texture of the thawed cheese could be crumbly during handing and serving.

Definition of Terms

Casein - the major protein in milk that forms the cheese curd.

Coagulate - the gathering, or clotting, of solids in a mixture

Curd - is separated from whey by heating, draining, and pressing. It is cubed, cut, heated and salted.

Rennet - a protein splitting enzyme used to make cheese and is responsible for the curd formation, comes from the stomach of a calf.

Whey - the watery by-product drained away from the cheese curd consists of lactose, milk salts, and whey protein suspended in water.

CHEESE IDENTIFICATION AND DESCRIPTION TABLE

Name	Body and Texture	Flavor	Color
Asiago	semi-firm to firm depending on age	nutty mild flavor	fresh is off-white, aged is yellowish
Blue	semi-soft, pasty, and crumbly	tangy, peppery, spicy	white marbled with blue-green mold
Brie/Camembert	soft, thin crust, creamy interior	mild to pungent	white crust and creamy yellow interior
Mild cheddar	firm and smooth, some mechanical openings	mild, nut-like	white to orange
Sharp cheddar	smooth and waxy, some mechanical openings	sharp, nut-like	white to orange
Colby	softer, more openings than cheddar	mild to mellow	white to orange
Cream/Neufchatel	soft and smooth	mild, slightly acid	white to light cream
Edam/Gouda	semi-soft to firm, smooth, small round holes	mild, sometimes salty	creamy yellow with red wax
Feta Cheese	soft to semi-hard, slightly grainy	tangy, salty flavor	white
Havarti	semi-soft, rindless and bright surface, small eyes	buttery sweet	cream to yellowish
Monterey (Jack)	semi-soft to hard, evenly dispersed small openings	mild, mellow	white to light cream
Mozzarella/pizza	semi-soft, plastic	mild delicate	creamy white
Munster	semi-soft, waxy, small mechanical openings	mild to mellow	yellow, tan, or white surface, creamy inside
Parmesan	very hard, granule	sharp	light yellow with brown coating
Processed American	no holes, soft	mild, sweet	nearly white to orange
Provolone	hard, stringy	bland to sharp, smoky, and salty	light golden yellow to brown
Romano	very hard, granule	sharply piquant	light yellow with brown coating
Swiss	firm and smooth, medium to large round eyes	sweet, hazel nut-like	pale yellow



LESSON THREE: IDENTIFYING CHEESES



Project Skill: Identifying Different Kinds of Cheeses

Life Skill: Problem Solving

Materials:

- 6 oz. of 9 of the following cheeses: American, Blue, Brick, Brie, Mild Cheddar, Sharp Cheddar, Colby, Cream, Edam / Gouda, Monterey (Jack), Mozzarella, Munster, Parmesan, Provolone, and Swiss
- Plastic bags (9)
- Large paper plates (1 for each student)
- Cheese identification score sheet (one copy for each student)

Before Meeting:

The day before teaching this lesson, prepare the materials listed.

1. Cut each kind of the 9 selected cheeses into pieces about one inch square.
2. Place each kind of cheese in separate plastic bag and label as 1, 2, 3, 4, 5, 6, 7, 8, and 9. Keep a key for your records. Do not write the name of the cheese on the bag!

During Meeting:

1. Give a brief overview about cheese identification:
Key points to cover:

Cheese Identification – Four characteristics are used to identify cheeses: body, texture, color, and flavor:

Body: Physical properties including firmness, cohesiveness, elasticity, and plasticity;

Texture: The manner in which the cheese particles are knit together,

Flavor: Taste and smell of the products. It is the most critical distinguishing factor in identifying the cheese. It will help distinguish one similar looking cheese from another. The flavor can be determined by noting the odor of the freshly drawn plug as you pass it slowly under the nose, working a portion of the plug between the thumb and forefingers, smelling for odors, and tasting a small piece of the cheese;

Color: Ranges from off-white to orange. Color alone should not be a distinguishing factor.

2. Conduct cheese identification exercise:
 - Give each youth 1 plate.
 - Have youth divide it into nine sections and label them 1 through 9.
 - Have each youth come to the front of the room and put a piece of cheese from the numbered plastic bag on the appropriate numbered section on the plate.
 - Have youth identify cheeses one at a time by performing the following steps.
 - 1) Smell, feel, break apart and taste each sample.
 - 2) Eat the sample, being sure to cover the whole tongue.
 - 3) After each sample, rinse your mouth with water and then spit the water into the sink.

- Ask the following questions:
 - Q: What flavor did you pick up from the sample in the plate? (1 through 9)
 - A: Refer to the table below on Cheese Identification and Description.

 - Q: What color did you see? (sample on plate, 1 through 9)
 - A: Refer to the table on page 24 on Cheese Identification and Description.

 - Q: What does its body / texture look like when you break it apart and feel it?
 - A: Refer to the table on page 24 on Cheese Identification and Description.

 - Q: How do you identify a kind of cheese?
 - A: Smell, feel, and break apart to see the body and texture characteristics. Look at its colors and taste it
- Give each youth a copy of identification sheet and fill in the sheet. Instructions for using the score sheet are included in the identification sheet.

Facts About Ice Cream



ICE CREAM MAKING

Ice cream is made from many ingredients. The differences among ice creams are influenced by the ingredients used. Each of these ingredients performs an essential task.

Milk fat - Rich mellow milk fat imparts a full creamy flavor. It produces a smooth texture and helps ice cream resist melting.

Nonfat milk - derived solids - When water and milk fat are removed from whole milk, the part remaining is nonfat milk solids. These solids add just enough influence to round out the delicate taste and tend to give a smooth, compact texture to Ice cream.

Sweeteners - Many kinds of nutritive sweeteners are used, the most common being:

- sucrose (cane or beet sugars)
- corn syrup and corn syrup solids
- maple sugar
- honey
- invert sugar

They enhance the sweetness flavor in balance with the milk fat.

Egg yolk solids - Egg yolks add richness, food value, and a delicate flavor. They improve whipping ability.

Stabilizers - Stabilizer prevent the formation of large, coarse ice crystals. They have a high water-holding capacity and form a film around tiny drops of water.

Emulsifiers - Emulsifiers improve whipping quality and give smooth, dry texture.

Flavorings - Spices, fruit and fruit juice, chocolate, nutmeats, candy, cookies, pie, and cake are a few of the many flavoring ingredients used.

Acid ingredients - Tartness in fruit sherbets and ice comes from the fruits used and fruit acid.

Air and overrun - The air incorporated into the ice cream mix during freezing. Adds volume to the ice cream.

Ingredients must be declared in descending order of their relative amounts used in the mix recipe. Each ingredient may be declared by an acceptable common or usual name, such as milk, cream, sugar, eggs. Any added coloring should also be declared.

Great care is taken to select the right ingredients in the right proportions. Expertise and continuous care are needed throughout the manufacturing process, but the final ice cream can be no higher in quality than the original mix.

- 1) Blending the mix comes first. The ingredients blended might include milk, cream, condensed milk, and syrup. Dry items such as nonfat dry milk, dried eggs, sugar, and stabilizers are added carefully to prevent lumps.
- 2) The mix is then pasteurized. This is rapid heating of the mix to an established minimum temperature,

holding at that temperature for a specified time, and then rapid cooling. **Pasteurization** destroys harmful bacteria, aids in blending ingredients, improves flavor and keeping quality, and produces a more uniform product.

- 3) During pasteurization, the mix is homogenized. The mix is forced through tiny valve openings. Fat globules are "squeezed" to possibly one-tenth normal size. From the homogenizer, the ice cream mix is passed through a cooler. It is then aged in a refrigerated vat for 3 to 4 hours, at a temperature of 40° F or lower. Then the ice cream will be frozen and hardened.
- 4) Fast freezing is essential to obtaining a smooth product. Ice crystals that are formed quickly are smaller than those formed slowly. While freezing quickly, the mix is rapidly agitated to remove heat and incorporated air into the mix by rotating blades. In addition, the ice cream must be hardened. Rapid hardening at - 20° F or colder, prevents large ice crystals from forming.

ICE CREAM JUDGING

The technique of judging ice cream is different in many respects from the scoring of other dairy products. Only vanilla ice cream is used in a judging contest. The ice cream score sheet is divided into two parts: **flavor & body and texture**. In judging ice cream, an ice cream sample is very seldom given a full score on flavor or body and texture.

Ice cream should be stored between -10° F and -25° F., and must be warmed to 5° F to 10° F for judging. At this temperature, the product is still partially frozen, which allows for the evaluation of the body and texture. A fairly accurate impression of its body and texture characteristics may be noted by the way the ice cream responds to dipping.

Notice the way the ice cream cuts and the feel of the dipper as it cutting edge passes through the ice cream. It is important to note whether the ice cream tends to curl up behind the dipper, thus indicating excessive gumminess or stickiness.

After the sample has been taken from the container, the examination for further body and texture characteristics and for flavor may begin at once. Several determinations must be made simultaneously once the sample is placed in the mouth. By pressing a small portion of the frozen ice cream against the roof of the mouth, the smoothness, the coarseness, the presence of sandiness and the relative size of the ice crystals may be determined.

Vanilla ice cream should be pleasantly sweet, having a creamy, delicate vanilla flavor that cleans up well, leaving only a very pleasant after taste. The flavor of any one ingredient should not be so strong that it predominates over the flavor of the other ingredients when first tasted.

ICE CREAM NUTRIENTS

Milk fat, protein, calcium and riboflavin (vitamin B2) are the main nutrients in ice cream. Ice cream is a natural for dessert because its caloric value is moderate, and its nutrient value helps to meet daily nutrient needs. It is mandatory to declare on the label for the nutrients that have been added.

STORAGE TIPS

- Tightly covered ice cream stored at 0° F will keep up to two months.
- Ice cream that partially thaws and then re-hardens forms large crystals, resulting in an unpleasantly coarse, icy texture.
- When ice cream taken from the freezer is so hard that the spoon bends, the freezer temperature is around the zero degree range.

- Before serving, ice cream should be transferred from freezer to refrigerator for up to 30 minutes, it will soften enough to spoon out readily but won't have completely thawed.
- After serving, press a piece of foil or plastic wrap over the exposed surface of the unused ice cream before re-closing the carton. This protects the ice cream from absorbing freezer odors and prohibits the formation of a tough, discolored layer caused by evaporation from the exposed surface.

Definition of Terms

Frozen yogurt - has less milk fat and higher acidity than ice cream and less sugar than sherbet. Also, a yogurt culture has been used to produce the mix base.

Homogenized - forcing fat particles through small openings to even out the distribution in the mixture

Ice Cream – refers to frozen deserts made from dairy products, ranging from fat free to 20% or more of milk fat

Pasteurization - heating of the mixture to kill undesirable bacteria

Soft ice cream - these products are soft and ready to eat when drawn from the freezer. The total solids in the mix is lower than for ice cream.

ICE CREAM BODY AND TEXTURE DEFECTS TABLE

Name	Major Characteristics	How to Detect	Possible Causes
Coarse/Icy	Rough appearance, large ice crystals, feeling of unusual coldness in the mouth	Felt easily between teeth or with tongue due to rapid melting of ice crystals	a) Slow freezing of the solution at the freezer b) Frozen ice cream is exposed to temp. fluctuation
Crumbly	A tendency of falling apart when the ice cream is dipped	Response to dipping	Low solids, low stabilizer
Fluffy	Light, airy ice cream	Response to dipping and tasting	Too many emulsifiers (egg yolk solids, mono- and diglycerides, and fatty acid esters)
Gummy	Sticky body, curls up behind the dipper leaving coarse, irregular waves	Response to dipping	Excessive use of stabilizer, sweetener
Sandy	Hard, uniform particles, crystals of lactose	A thin layer of ice cream put against the roof of the mouth with the tongue. Rough feel.	A high total solids, age, and heat shocking resulting in the milk sugar lactose crystallizing
Soggy	Heavy, mushy	Keeps its shape when melting	Too many stabilizers
Weak	Soft	Body melts easily	Not enough milk fat, milk fat solids, or total milk solids

ICE CREAM FLAVOR DEFECTS TABLE

Name	Major Characteristics	Possible Causes
Cooked	Cooked flavor	A) The mix heated too high and held too long at that temperature B) The use of condensed milk or dried milk powder to build the total solids in the mix
Lacks Flavoring	Weak vanilla taste	Not enough vanilla flavoring
Too High Flavor	Strong, dominant vanilla taste	Futile attempt to enhance flavor by using too much vanilla
Unnatural Flavor	Sharp and burning sensation on the sides of the tongue	Low quality vanilla
High Acid	High acid flavor	The development of lactic acid in one or more of the dairy products used
Lacks Fine Flavor	Lacks ideal vanilla ice cream flavor	Lacks ideal vanilla ice cream flavor
Lacks Freshness	Slight storage flavor observed during latter part of tasting time	Storage problem creating decomposition of proteins due to long cold storage
Metallic	Puckery, off-flavor sensation in the clean-up	Defect just before flavor becomes oxidized; shelf-life problem
Old Ingredients	Aged ingredient flavor persists as an aftertaste	Milk protein has degraded while storage prior to use as an ingredient
Oxidized	Metallic flavor	Copper metal has been in contact with the milk during handling
Rancid	Slight soapy taste	Poor temperature control of raw milk which permitted lipase enzyme activity
Salty	Slight salty taste	Too much whey
Storage	A lack of freshness	Held for a considerable length of time in cold storage, low activity
Lacks Sweetness		Failure to add enough syrup or sucrose for a balanced flavor
Syrup Flavor	Overpowering syrup flavor	Too much corn syrup and corn syrup solids, maple syrup or honey in an attempt to produce body
Too Sweet	Sweetness that overpowers vanilla flavor	Too much sucrose (cane or beet sugars) in the attempt to enhance the creamy flavor



LESSON FOUR: EVALUATING ICE CREAM



Project Skill: Detecting Flavor Defects in Ice Cream

Life Skill: Problem Solving

Materials:

- Expensive brand (may be \$4-7 a half gal.) *Ingredients: fresh milk, pure sugar, real cream, nothing artificial*
- Ice cream score sheet (one copy for each youth)
- 2 oz paper cups (1 for each youth)
- Low priced brand (may be \$2-3 half gal.) *Ingredients: milk cream, sugar, sweetener, buttermilk, stabilizer, artificial color.*
- Plastic spoons (1 for each youth)

Before Meeting:

The day before teaching this lesson, pre-prepare the materials listed.

1. Store the samples in freezer at about -10° to -25° F.

During Meeting:

1. Give a general overview on detecting flavor defects in ice cream.

Key points to cover on evaluation:

- Several determinations must be made simultaneously once the sample is placed in the mouth.
- The flavor of normal ice cream should be pleasantly sweet.
- The flavor of any one ingredient should not be so strong that it predominates over the flavor of the other ingredients when first tasted.
- The defects in ice cream are determined by its body/texture and flavor.

Body / Texture: The physical properties of ice cream, including ice crystals, low solids, sticky body, sandy texture, can be noted by the way the ice cream responds to dipping.

Flavor: Taste and smell of the products, like cooked, high acid, rancid, storage flavor, etc.

2. Conduct ice cream evaluation exercise.

Special Note: Use actual commercial ice cream samples that have not been doctored. For this reason we have provided sample questions to ask, but cannot provide correct answers for them. Answers will depend on the commercial ice cream sample used in the lesson.

We suggest expensive and low-priced brands to show the greatest quality difference. Expensive ice cream does not always mean high quality, since brand ingredients affect the quality of the ice cream. The characteristics of typical flavor defects and the major body and texture defects will be described in the table on pages 32 and 33.

- a) Give each youth 1 cup and a spoon.
- b) Put a scoop of one of the sample into youth cups.
- c) Have youth evaluate ice cream for defects one at a time by performing the following steps.
 - 1) Note the odor first.
 - 2) Place one spoon of ice cream into the mouth, manipulating the sample between the tongue and palate. Note the taste and odor sensation.
 - 3) Swallow the first sample when the flavor defects have been determined.
 - 4) Ask the following questions:
 - Q: What flavor did you pick up from the sample?
 - Q: Where did you pick up the flavor?
 - 5) Fill in the score sheet.
 - 6) If there is more than one defect, mark all the defects found and choose the most severe one. The lower the score is, the more severe the defects are.
 - 7) After the flavor has been determined, place a second spoon of the same sample into the mouth.
 - 8) Note the smoothness, coarseness, the presence of sandiness, and the relative size of the ice crystals by pressing a small portion of the ice cream against the roof of the mouth to determine the body and texture defects. Also scrape the spoon face through the ice cream. Notice if sticky, crumbly or gelatin-like characteristics are present.
 - 9) Ask the following questions:
 - Q: Did you notice any coarseness, sandiness or ice crystals? (for coarse and sandy ice cream)
 - Q: Did the ice cream become liquid as soon as you put it in your mouth? (for crumbly ice cream)
 - Q: How did the ice cream behave as you scraped the surface with the open face of your spoon? (Was it sticky? Was the body crumbly? Did the ice cream have a gelatin appearance? - indicates a heavy body due to over stabilizing)
 - Q: How do you check to see if the ice cream you bought has flavor and body/texture defects?
 - A: Smell, taste, feel in the mouth, and the way the ice cream responds to dipping.
 - 10) Fill in the score sheet.

If there is more than one defect, mark all the defects found and choose the most severe one. The lower the score is, the more severe the defects are.

- d) Use the same procedures described above to evaluate sample 2.

**ICE CREAM SCORESHEET
4-H/FFA DAIRY FOODS CONTEST**

**4-H 656
REV 6/2013**

In the sample column, write an (X) beside the flavor and body and texture defect(s) that are present. **Mark up to 2 defects.**



SCORE

BODY & TEXTURE DEFECTS	S	D	P	SAMPLE NUMBER					
				1	2	3	4	5	6
Coarse/Icy	4	2	1						
Crumbly	4	3	1						
Fluffy	3	2	1						
Gummy	4	2	1						
Sandy	2	1	-						
Soggy	4	3	2						
Weak	4	2	1						

KEY AND SCORING

X = Presence of defect

+1 point for each defect identified

FLAVOR DEFECTS	S	D	P	SAMPLE NUMBER					
				1	2	3	4	5	6
Cooked	9	7	5						
Lacks flavoring	9	8	7						
Too high flavor	9	8	7						
Unnatural flavor	8	6	4						
High acid	4	2	1						
Lacks fine flavor	9	8	7						
Lacks freshness	8	7	6						
Metallic	6	4	2						
Old ingredients	6	4	2						
Oxidized	6	4	1						
Rancid	4	2	-						
Salty	8	7	5						
Storage	7	6	4						
Lacks sweetness	9	8	7						
Syrup flavor	9	7	5						
Too sweet	9	8	7						

KEY AND SCORING

X = Presence of defect

+2 points for each defect identified

POSSIBLE SCORE 54 Maximum

NOTE: The lower the number, the more objectionable the defect (10 = no defect, 1= unusable quality).

In each sample column, write (S), (D) or (P) indicating the intensity of the most objectionable flavor defect and body/texture defect.

	SAMPLE NUMBER					
	1	2	3	4	5	6
Body & Texture Intensity						
Flavor Intensity						

KEY AND SCORING

S = Slight defect

D = Definite defect

P = Pronounced defect

N = No Defect

+3 points for each intensity that is correct

Facts About Real & Non-Dairy Products



BACKGROUND INFORMATION

Modern technology now makes it possible to manufacture a variety of items, including imitation food products that look like real foods. These imitation products may look and taste like many of the real foods you have been eating all your life. However, imitations are simply not as nutritious as real foods.

You can count on real foods from the Basic Four Food Groups (milk, meat, fruit, vegetable and grain) to supply you with all of the 50 or so nutrients you must have for good health. Imitation products do not provide all or as much of these nutrients as their traditional counterparts do. In fact, the U.S. Food and Drug Administration defines the word imitation to mean “nutritionally inferior.”

DISTINGUISHING REAL PRODUCTS FROM NON-DAIRY PRODUCTS

Imitation products have no legal standard of identity. Manufacturers are free to change ingredients whenever they want. So when you buy an imitation cheese you do not always know what you are getting. You just cannot count on imitations to be consistent

Dairy foods are frequently imitated. There are imitations for over a dozen real cheeses, including Colby, cheddar, cream, mozzarella, and even American pasteurized processed cheese. In addition, there are products that copy such real foods as butter, cream, whipped cream, sour cream and ice cream. In some areas of the country even imitations of milk are being sold.

It would probably be difficult to remember the name of every imitation product. However, you can spot imitation products if you remember the three categories of food where imitations are likely to be found, which are dairy foods, juices, and processed meats. In addition, you should also look for the word “**imitation**”, “**non-dairy**” or “**substitute**” on the food package since the U.S. Food and Drug Administration requires that any food made to imitate and substitute for a real food and which is nutritionally inferior to the real food must bear the label “imitation.”

Most food manufacturers print a list of ingredients on their food packages. These ingredient lists can be another tool for telling real and non-dairy products apart. To identify real foods, examine the ingredient list of foods commonly imitated.

Finally you should remember which foods are imitated, how imitations are merchandised, and how you can use the food labels to sort real foods from imitations. Take advantage of industrial trademarks that identify real products such as the dairy industry trademark, the REAL seal. The symbol found only on real dairy foods, is your assurance that the food was made with milk. Not all dairy foods carry the REAL seal. So you will have to read the labels to be sure the product is not an imitation. But when you see the REAL seal, you know it is real.

In modern society, where buyers must beware, food selection is a responsibility. To get the most for your money and the best for your health, take time to make sure you always get the real thing.

INGREDIENTS

Half and Half Coffee Cream	Milk, cream, sodium citrate, disodium phosphate
Non-Dairy Creamer (non-dairy)	Water, corn syrup solids, partially hydrogenated soybean or cottonseed oil, sodium caseinate, dipotassium phosphate, polysorbate 60, sodium stearoyl lactylate, artificial flavor, carrageenan, artificial color
Condensed Milk (dairy)	Concentrated whole milk and sugar
Filled milk (Milnot) Non-dairy	Non-fat milk, partially hydrogenated soybean oil, contains 0.5% or less of: dipotassium phosphate, carrageenan, vitamin A palmitate, vitamin D3
Sour Cream	Cultured cream, skim milk, enzymes
No Fat Sour Cream (non-dairy, or dairy-look for "Real Seal")	Cultured non-fat milk, cultured milk, whey protein concentrate, food starch modified, artificial color, gelatin, natural flavor, potassium sorbate, vitamin A palmitate, enzymes
Yogurt (dairy)	Cultured pasteurized low-fat milk, sugar, nonfat milk, natural flavor, pectin, vitamin A palmitate, vitamin D3
Whipped Cream (dairy)	Cream, non-fat milk solids, mono and diglycerides, polysorbate 80, carrageenan
Whipped Toppings (non-dairy)	Water, partially hydrogenated vegetable oil (palm kernel, cottonseed, and/or soybean oil), corn syrup, sortitol, fructose, sodium caseinate, cellulose gel, corn starch, mono- and diglycerides, lecithin, polysorbate 60, polysorbate 80, sortitan monostearate, disodium phosphate, sodium alginate, salt, artificial and natural flavors
Ice Cream (dairy)	Milk, cream, sugar, natural flavor
Fat Free Ice Cream (non-dairy or dairy-look for "Real Seal")	Sugar, condensed skim milk, corn syrup, whey protein concentrate, mono- and diglycerides, locust bean gum, guar gum, carrageenan, dextrose, maltodextrin, natural and artificial flavor, vitamin A palmitate, annatto color, water
Cheese (dairy)	Pasteurized milk, cheese culture, salt, enzymes, annatto
Cottage cheese (dairy)	Cultured skim milk, cultured cream, whey, salt, cultured dairy solids, cultured dextrose, sorbic acid, citric acid, carrageenan, guar gum, locust bean gum.

Vegetable Cheese (non-dairy)	Veggie milk (filtered water, organic soymilk solids, organic tofu), isolated soy protein, brown rice maltodextrin and protein, evaporated cane juice, sea salt, oat fiber, vegetable mono- and diglycerides, vitamin-mineral blend (tricalcium phosphate, vitamin A palmitate, vitamin C, ferric orthophosphate, vitamin E, vitamin D3, vitamin B6, vitamin B12, folic acid), casein, unhydrogenated canola vegetable oil, natural flavors, sodium phosphate, tricalcium phosphates, corn starch, sea salt, citric acid, sorbic acid, beta apo carotenal
Butter (dairy)	Cream, salt, annatto
Margarine (non-dairy)	Liquid soybean oil, partially hydrogenated soybean oil, water, buttermilk, salt, soy lecithin, vegetable mono- and diglycerides sodium benzoate, artificial flavor, vitamin A palmitate, beta carotene
Cream cheese (dairy)	Pasteurized non-fat milk and milk fat, cheese culture, whey protein concentrate, salt, stabilizers (xanthan and/or carobean and/or guar gums)
Chocolate (dairy)	Pasteurized homogenized milk, high fructose corn syrup, sugar, non-fat milk, cocoa processed with alkali salt, artificial flavor, carrageenan
Soy milk (non-dairy)	Filtered water, whole soybeans, evaporated cane juice, cocoa processed with alkali, calcium carbonate, natural flavors, sea salt, carrageenan, vitamin A palmitate, riboflavin (B2), vitamin D2, Vitamin B12



LESSON FIVE: DIFFERENTIATING REAL AND IMITATION DAIRY PRODUCTS



Project Skill: Identifying Real and Imitation Dairy Products

Life Skill: Problem Solving

Materials:

- Coffee cream
- Sour cream
- Whipped toppings
- Ice cream
- Cheese
- Butter
- Non-dairy creamer
- Fat Free sour cream
- Whipped cream
- Margarine
- Imitation cheese
- Specialty Milks
- Score sheet on problem solving (one copy for each youth)

Before Meeting:

The day before teaching this lesson, purchase the materials listed above.

During Meeting:

1. Give a general overview on identifying real and artificial dairy products.

Key points to cover:

- Imitation products may look and taste like many of the real foods you have been eating all your life, but they are not as nutritious as real foods.
- You don't always know when you are buying imitation foods;
- Remember that imitations are likely to be found in dairy foods.

How do you spot imitation products?

- Look for the word "imitation" on the food label and it is required that all the imitation foods should bear this label.
- Look for the term "non-dairy" on the labels of foods normally made with milk.
- Look at a list of ingredients on food packages and these ingredient lists can be another tool for telling dairy foods and non-dairy foods.
- Imitations are sometimes cheaper than real foods.
- Things to keep in mind while shopping:
 - 1) Take your time shopping for food.
 - 2) Examine packages carefully, especially labels and ingredients.
 - 3) Make sure you are getting what you think you are buying.
- Imitations are often located among real foods in the grocery store.

2. Conduct identification exercise:

Special Note: We are using actual commercial samples that have not been doctored. For this reason we have provided sample questions to ask, but cannot provide correct answers for them. Answers will depend on the commercial samples used in the lesson.

- a) Give each youth two sample products.
- b) Have youth identify real dairy products and non-dairy products by performing the following steps.
 - Look for the word "imitation" or fat-free on the food package.
 - Look for the term "non-dairy" on the labels of foods normally made with milk.
 - Compare labels of ingredient lists for real dairy product and non-dairy one.
 - Examine the ingredient list of foods commonly imitated, and remember:
 - the first ingredient of a real cheese is milk or cheese.
 - the first ingredient of a real cream is cream.
 - the first ingredient of a real butter is butter.
 - real dairy foods do not contain vegetable oil.
 - Compare the tastes of each of the two samples, paying particular attention to mouth feel and flavor clean-up.
 - Ask the following questions:
 - Q: What kinds of foods usually have imitations?
 - A: Dairy foods, juices and processed meats.
 - Q: Do broccoli and rice have imitations?
 - A: No.
 - Q: Among all the samples, which ones bear "imitation", "non-dairy", or "substitute" food labels?
 - Q: What differences have you noticed when you are comparing the ingredient labels of coffee cream and non-dairy creamer, sour cream and imitation sour cream; whipped toppings and whipped cream; ice cream and millarine; cheese and imitation cheese; butter and margarine?
 - A: Refer to Ingredient table included in this lesson.
 - Q: Where do you usually find non-dairy products in the grocery store?
 - A: Non-dairy products are often found among real foods.
 - Q: How do you check to see if the dairy products you pick up from the store are real ones or artificial ones?
 - A: By looking at the label on the food package and their lists of ingredients.
 - Fill in the score sheet.

California Mastitis Testing

The California Mastitis Test (CMT) is a rapid, accurate, cow-side test to help determine somatic cell counts (SCC) in a specific cow. The test was developed to sample individual quarters to determine the presence of subclinical mastitis. A cow with subclinical mastitis does not have abnormal looking milk or other clinical signs such as a swollen or painful udder. The test can also be conducted on bucket and bulk tank milk samples to help determine somatic cell counts (SCC) of the entire herd.

How to Perform the Test: (See figures 1-5.) A small sample of milk (approximately ½ teaspoon) from each quarter is collected into a plastic paddle that has 4 shallow cups marked A, B, C and D. An equal amount of CMT reagent is added to the milk. The paddle is rotated to mix the contents. In approximately 10 seconds, read the score while continuing to rotate the paddle. Because the reaction disappears within 20 seconds, the test must be read quickly.



Figure 1



Figure 2

Clean each teat with alcohol.

Squirt a small amount of milk from each quarter into the appropriate quadrant of the paddle.



Figure 3



Figure 4

1/2 teaspoon of milk is sufficient.

Mix an equal ratio of reagent to milk.

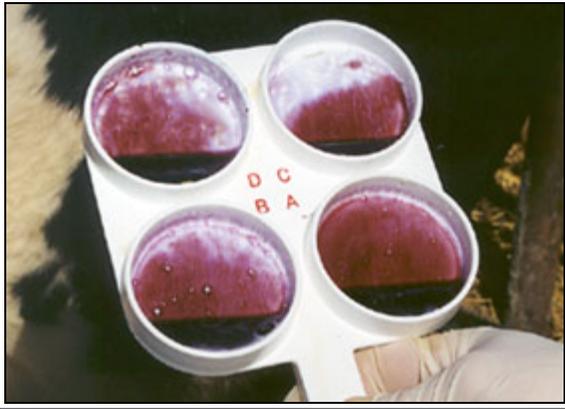


Figure 5

Read and record the results.

How to Read the Results: The CMT reagent reacts with the white blood cells and the mixture thickens or gels in proportion to the amount of infection present. To become accurate and consistent, practice this test on cows with a known SCC.

Sample of Figure 5	CMT Score	Participant Score*
A	T	2
B	2	6
C	1	4
D	3	8

CMT Score	Average Somatic Count (Cells per milliliter)	Description of reaction
N (negative)	100,000	No thickening, homogeneous.
T (trace)	300,000	Slight thickening. Reaction disappears in 10 seconds.
1	900,000	Distinct thickening, no gel formation.
2	2,700,000	Thickens immediately, begins to gel, levels in the bottom of cup.
3	8,100,000	Gel is formed, surface elevates, with a central peak above the mass.

Scoring Guide

CMT Test Score	Appearance	Participant Score*
Negative	Mixture liquid, no precipitate	0
T	Slight precipitate tend to disappear with paddle movement	2
1	Distinct precipitate but does not gel	4
2	Distinct gel formation	6
3	Strong gel formation, which tends to adhere to paddle. Forms distinct central peak	8

*Participants scores only even numbers for CMT test

Visit a local dairy farm and ask for samples of fresh non-pasteurized milk. You want to get a variety of fresh milk samples from the farm of non-mastitis cows, maybe an occasional flare up, and from “hot” mastitis cows. You will need reagent solution to perform the actual CMT test on the milk samples. Many dairy farms utilize this test right in the barn and may have some supplies that you could use or order from NASCO 1-800-558-9595 or from their on-line catalog <http://www.enasco.com/>.



LESSON SIX: CMT



Project Skill: CMT

Life Skill: Problem Solving

Materials:

- MILK CMT SCORE SHEET (one copy for each student)
- Slide sets on Milk Quality (milking equipment parts and defects - Media Center at Purdue Undergraduate Library) or see Indiana 4-H Website: www.four-h.purdue.edu then search for Dairy Food for a set of printable pictures.
- CMT paddles and reagent mix
- Fresh milk samples from a local dairy, 4 pints or quarts each. Can be a few days old. Suggest milk from 3-4 cows in different stage of lactation. One sample maybe from the bulk tank.

Before Meeting:

The day before teaching this lesson, prepare the materials listed.

1. Make copies of the pictures for each youth in the class.

2. Collect milk samples from Dairy Farm and mix up reagent mix..

During Meeting: *This meeting can be conducted at a dairy farm.*

1. Give general information about CMT test;

Key points to cover:

Judging CMT: - see pages 40-42 of this guide or

Reference: University of Missouri Extension, *Using the California Mastitis Test*, by Robert T. Marshall and J. E. Edmondson, Department of Food Science and Nutrition and Barry Stevens, Department of Animal Sciences. This reference is found on the Indiana 4-H Website: www.four-h.purdue.edu.

2. Conduct judging exercise:

a) Judging CMT.

- 1) Have youth conduct CMT test on sample of milks.
- 2) Have an experienced youth conduct test for small group of students. The CMT sample has a short life span.
- 3) Ask the following questions:
 - Q. What are the differences you found between the samples?
 - A. Gelling will occur on high bacteria count samples.
 - Q. What score would you give each sample ... and so on?
 - A. Samples showing less gelling will receive lower scores.

3. Fill the score sheet for the CMT test.

Facts About Milk Fat

One component of milk is fat. The amount of fat contained in a dairy cow's milk is dependent on not only its breed but also feed and management practices. Raw milk must continually be agitated in the on-farm storage tank, otherwise this fat will rise to the top of undisturbed milk. To learn more about milk composition and milk fat, go to

<http://www.milkfacts.info/Milk%20Composition/Fat.htm> or
http://classes.ansci.illinois.edu/ansc438/milkcomposition/milkcomp_fat.html

Once this raw milk arrives at a processing facility it is pasteurized to kill any harmful bacteria and the fat, commonly referred to as cream, is mechanically separated from the milk. This milk fat is then used to make products like butter, or is sometimes homogenized and mixed with milk to create consumable milk products, like 2% milk that is commonly purchased by consumers. By homogenizing the milk fat it

breaks up the fat globules so they will remain suspended in the milk and will not separate when the milk carton is sitting in the refrigerator at home.

For the purpose of this contest, youth will be required to identify the following products based on their milk fat content:

Nonfat or Skim milk – contains less than .5% milk fat

Reduced fat milk – contains 2% milk fat

Milk – contains 3.3% milk fat

Half and Half – contains 10.5% milk fat

Coffee cream – contains 18% milk fat

Whipping cream – contains 30% milk fat

Contestants will identify these products based on visual observation and tasting skills. Products should be cold when evaluating.

Lesson Seven - Milk Fat Content

Supplies Needed:

Clear plastic condiment or drinking cups, or small paper cups (1 oz. size is ideal, but no larger than 4 oz. size)
Nonfat or skim milk
2% milk
Whole milk
Half and Half
Coffee cream
Whipping cream

Procedure:

1. Make sure each product is at refrigerator temperature.
2. Pour a small amount (1/2 oz. is plenty) of each product in a sampling container, one for each person.
3. Beginning with the nonfat or skim milk, observe the products characteristics. What is the viscosity or thickness of each product? Swirl the product in the sampling container and observe how the product will adhere to the side of the container as well as how long it takes to slide off the side. The more fat in the milk product, the higher its viscosity.
4. Beginning with the nonfat or skim milk, taste each product. Do not swallow the product, but swirl it around in your mouth and on your tongue. What does it feel like? What are you taste buds telling you? Is it forming a film on the roof of your mouth? The more fat in the milk product, the more of a film there will be on your tongue and roof of the mouth.
5. Between taste samples, cleanse your palate with an apple, apple juice, unsalted cracker, water, etc.



SAMPLE QUESTIONS



The following questions are samples of what participants will encounter in the Dairy Foods Judging Contest. All participants will answer the first 10 general questions, then FFA members will answer 15 questions about production and 4-H members will answer 15 questions about consumerism/Dairy Products. (Note – The total number of questions will be 25 in 2013 as opposed to the customary 50 questions as in past years.)

MARKETING QUESTIONS

1. An example of Manufacturing Grade use for milk would be to make:
 - a. Condensed Milk
 - b. Manufacturing grade does not exist
 - c. Buttermilk
 - d. Fluid
 - e. None of the above

2. An example of a Class I use for milk would be:
 - a. Cheese
 - b. Ice Cream
 - c. Cultured products
 - d. Fluid milk and milk drinks
 - e. Cottage Cheese

3. Raw milk produced under conditions that do not qualify for a Grade A rating, is marketed as:
 - a. Manufacturing grade
 - b. Milk for butter making
 - c. Milk for powder conversion
 - d. All of the above
 - e. None of the above

4. The milk marketing system is necessary to:
 - a. Promote milk use
 - b. Promote dairy products
 - c. Monitor the milk value and use
 - d. Monitor the milk's quality
 - e. None of the above

5. Ice cream would be an example of a Class _____ type milk use:
 - a. I
 - b. II
 - c. III
 - d. IV
 - e. B

1. When month-to-month milk prices are relatively stable, which of the below listed classifications would receive the *lowest* milk price?
 - a. Class A
 - b. Class II
 - c. Class I
 - d. Class III
 - e. Cannot determine from given information

2. In periods of stable or declining production and fluid milk consumption, but rising cheese consumption, which listed classification, would benefit most?
 - a. Class I
 - b. Class II
 - c. Class III
 - d. Class IV
 - e. Class A

3. The support pricing program administered by the regulating agency purchases which dairy product(s)?
 - a. Fluid milk and cheese
 - b. Cheese and cultured products
 - c. Milk products
 - d. Cheese, butter and milk powder
 - e. Cottage cheese

4. A common market practice is to classify the dairy product use of the milk. How many classifying categories are there?
 - a. Four
 - b. None
 - c. One
 - d. Two
 - e. Three

5. Calculate the blend price for a market order that has placed:
65% of the milk supply as fluid at \$14.50 per hundred weight;
18% of the milk supply in ice cream at \$11.28 per hundred weight; and
17% of the milk supply in milk powder at \$10.25 per hundred weight.

The blend price would be:

- a. \$11.28
- b. \$12.01
- c. \$13.20
- d. \$36.03
- e. \$12.38

6. An example of a Class III use for milk would be to make:
- A Class III use does not exist
 - Ice cream
 - Milk powder
 - Cottage cheese
 - Hard Cheese
7. Under the current method of pricing, which breed of cows would yield the highest price per hundred weight?
- Holstein.
 - Cross-breed.
 - Guernsey.
 - Jersey.
 - Brown Swiss.
8. Manufactured grade milk is automatically placed in what level of use classification?
- II
 - III
 - IV
 - I
 - Does not exist as a classification.
9. An example of a Class II use of milk would be to make:
- Butter.
 - Milk powder.
 - Ice Cream.
 - Cheese.
 - None of the above.
10. In order for a dairy farmer to qualify for the regulated milk marketing system, that person's milk production environment must also qualify as:
- A U.S.D.A. premium farm
 - A manufacturing Grade Farm
 - A Grade "A" Farm
 - A state gold star farm
 - An Indiana State approved farm
11. If a popular new flavor of milk was introduced, which class of milk would benefit most?
- Class I
 - Class C
 - Class II
 - Class III
 - Class IV

12. To assure an equitable and orderly milk marketing system to the dairy farmer and the milk processor, the federal government created which of the following?
- The Milk Cooperative Milk Market Order
 - The Sate Milk Market Orders
 - The Federal Milk Market Orders
 - The Mid-East Marketing Agency
 - Milk Services of Indiana
13. The milk marketing system is administered by the:
- Mid-East Marketing Agency.
 - Indiana State Board of Health.
 - U.S. Department of Agriculture.
 - Purdue University
 - Food and Drug Administration
14. Milk's final retail value is based on:
- How it has been used to make dairy products.
 - How it is graded.
 - Where it was produced.
 - How it is distributed to the consumer.
 - All of the above.
15. The price a dairy producer receives for milk may be influenced by
- Quality premiums
 - Volume premiums
 - Basic Formula Prices
 - Protein and Butterfat differentials
 - All of the above
16. Dairy Producers may use which of the following tools to help reduce price risk associated with unstable milk prices:
- BFP Futures
 - Forward contracting
 - Cheese Futures
 - BFP Options
 - All of the above
17. Milk prices paid to dairy producers are reduced by a small deduction used for advertising. The program supported by this funding is called:
- Milk PEP
 - Federal Milk Market Orders
 - American Dairy Association
 - Northeast Dairy Compact
 - United States Department of Agriculture

18. What is the lag time between when the price used for class I is calculated, and when the prices used for other classes are calculated?
- The same month (no lag)
 - 1 month
 - 6 weeks
 - 3 months
 - 16 weeks
19. Fluid milk produced in some states receives a premium based on geographic distance from Minnesota and Wisconsin. This premium is called:
- Over-order premium
 - Location Specific Differential
 - Basic Formula Price
 - Class I utilization
 - The Hoosier Pool
20. The "milk-fat differential" is:
- the price paid for each 0.1% of milk fat over 3.5%
 - the difference in fat globule size among dairy breeds
 - the value of fat for manufactured products
 - the charge processors make for standardizing fat
 - the price difference between a carton of milk and a stick of butter
21. Milk value received by the dairy producer is determined by:
- Arbitrary standards set by the market system administrator.
 - Manufacturing grade pricing only
 - The milk cooperatives in cooperation with the market system administrator.
 - How the milk is used
 - None of the above
22. Frozen yogurt would be an example of a Class _____ type milk use.
- I
 - II
 - III
 - A
 - B
23. Which of the following does not affect Federal Order Milk Prices?
- Fat content
 - Protein content
 - Somatic Cell Count
 - Added water
 - Pounds of milk shipped

PRODUCTION QUESTIONS

1. To protect the milk quality at the farm, the dairyman is legally required to hold the milk at what temperature? (highest limit)
 - a. 32°F
 - b. 35°F
 - c. 50°F
 - d. 45°F
 - e. 40°F

2. To assure a safe and quality milk, it may not be held at the farm for more than _____ hours.
 - a. 24
 - b. 36
 - c. 72
 - d. 48
 - e. none of these

3. The highest bacteria cell count allowed for Grade A milk at the farm may not exceed ___ per ml.
 - a. 50,000
 - b. 100,000
 - c. 20,000
 - d. 500,000
 - e. 250,000

4. The oxidized off-flavor sometimes found in a milk supply is usually associated with:
 - a. a mastitis problem
 - b. an unclean barn environment
 - c. exposure of the milk to light
 - d. the feed
 - e. none of these

5. The rancid off-flavor of the milk occurs when:
 - a. the cow has mastitis
 - b. the cow has been given medication
 - c. has been exposed to sunlight
 - d. it has received excessive agitation above 50°F
 - e. none of these

6. Which of the following milk off flavors should be detected by smelling?
- a. high acid
 - b. salty
 - c. onion
 - d. bitter
 - e. none of the
7. Which of the following milk off-flavors can only be detected by tasting?
- a. onion
 - b. unclean
 - c. high acid
 - d. rancid
 - e. none of these
8. To prevent the rancid off-flavor, the dairyperson could:
- a. keep the equipment clean
 - b. eliminate air leaks in the milking equipment
 - c. maintain an adequately ventilated barn
 - d. Protect the milk from exposure to light
 - e. none of these
9. To prevent the barny off-flavor, the dairyperson should:
- a. ventilate the barn adequately
 - b. maintain clean and properly clipped cows
 - c. keep the barn environment clean
 - d. all of these
 - e. none of these
10. The salty off-flavor is associated with what cause?
- a. the feed
 - b. mastitis
 - c. poorly cooled milk
 - d. the sanitation condition of the milking equipment
 - e. the use of fly sprays in the milk house
11. To prevent high acid milk from occurring the dairy person should
- a. milk only those cows that are free of mastitis
 - b. eliminate weeds from the cow's feed
 - c. eliminate air leaks from the milking equipment
 - d. make sure the dairy milking equipment is clean and sanitized
 - e. none of the above

12. The bitter off-flavor is associated with what cause?

- a. strong pasture feeds just before milking
- b. high risers in the pipelines
- c. poor ventilation in the barn
- d. cows eating bitter weeds
- e. all of the above

13. When treating a lactating cow for a case of mastitis, what is the maximum antibiotic withdrawal time permitted before the cow may enter the milking herd?

- a. 48 hours
- b. 72 hours
- c. 96 hours
- d. 24 hours
- e. 120 hours

14. The primary reason for properly cooling milk is to prevent:

- a. bacteria growth
- b. the malty flavor
- c. rancidity development
- d. all of the above
- e. none of these

15. Good milk flavor is important because

- a. it is a measure of quality to the consumer
- b. it affects acceptability to the consumer
- c. it has a pleasing and refreshing taste when cold
- d. it can affect all dairy products flavor characteristics
- e. all of the above

16. Teat medications, sanitizers, barn and crop sprays contribute to what off-flavor defect?

- a. unclean
- b. foreign
- c. cowy
- d. high acid
- e. barny

17. The use of the sediment pad helps to identify what quality problem area?

- a. poorly cooled milk
- b. poorly cleaned milking equipment
- c. poorly cleaned and clipped teats and udders
- d. poorly maintained barn environment
- e. all of the above

18. Milkstone sometimes found on the milking equipment is caused by:

- a. dried milk on the equipment
- b. dried up water droplets from a hard mineral water supply
- c. dried up water droplets from a soft type mineral water supply
- d. none of the above
- e. all of these

19. The malty off-flavor, while rare to occur, usually is caused by:

- a. equipment which is contaminated by malty flavor forming bacteria and aided by poorly cooled milk
- b. malt included in the feed
- c. mastitis milk
- d. an energy shortage in the cow's ration
- e. poorly cleaned and clipped cows

20. Mastitis is:

- a. a disease/infection of the foot
- b. a disease/infection of the lungs
- c. a disease/infection of the teat
- d. a disease/infection of the stomach
- e. a disease/infection of the udder

21. Leucocytes (white blood cells) are counted as a part of the quality standards for Grade A milk. Of what value is this determination?

- a. Leucocyte numbers can predict the flavor quality of the milk
- b. To determine the sanitary (cleanliness) conditions of the farm
- c. To determine the level of abnormal milk being produced by unhealthy cows at the farm
- d. To determine the influence the food ration is having on the dairy herd's milk production
- e. none of the above

22. Somatic cell counts associated with the Grade A raw milk can not be higher than:

- a. 1,000,000
- b. 1,500,000
- c. 300,000
- d. 750,000
- e. 400,000

23. Which of the following conditions contribute(s) most to the occurrence of mastitis in the dairy herd?

- a. heat
- b. ponded water
- c. poor bedding
- d. malfunctioning milking equipment
- e. all of the above

24. What is the main reason for antibiotics getting into the Grade A milk supply?

- a. the veterinarian
- b. the person milking the cow
- c. the person feeding the cow
- d. failure to mark, visibly, treated cows
- e. all of the above

25. When is an oil suspended antibiotic given to the dairy cow?

- a. during the lactation period
- b. when the cow is sick
- c. when there is a severe infection
- d. never
- e. when the cow enters the end of her lactation period at dry-off time

CONSUMER QUESTIONS

1. Bacteria are added to pasteurized cream to produce sour cream. This bacteria produces an acid characteristic of sour cream. Indicate the acid:
 - a. lactic acid
 - b. glutamic acid
 - c. hydrochloric acid
 - d. acetic acid

2. The physiologic function of protein is:
 - a. providing energy
 - b. supporting growth and maintenance of body cells
 - c. providing coenzyme in cellular function
 - d. aiding visual process at night

3. In cultured milk, such as buttermilk and yogurt, part of the lactose has been converted to:
 - a. whey
 - b. lactic acid
 - c. glutamic acid
 - d. casein

4. One of the most significant factors controlling the properties of cheese is:
 - a. homogenization
 - b. pasteurization
 - c. moisture
 - d. curd particles

5. The natural sugar in milk is:
 - a. sucrose
 - b. lactose
 - c. maltose
 - d. fructose

6. Pasteurization is a process that:
 - a. breaks milk fat particle into small globules
 - b. raises the temperature of milk for a specified time to destroy the bacteria
 - c. adds nutrients to the milk
 - d. dilutes the lactose in milk

7. Homogenization is a process that:
- breaks milk fat particles into small globules
 - raises the temperatures of milk for a few seconds to destroy the bacteria
 - is required by federal law for all milks
 - adds nutrients to the milk such as vitamin A and D
8. Teenagers should drink _____ of milk daily on a 2000 calorie diet.
- 3 cups
 - 2 cups
 - 4 cups
 - 1 pint
9. Cheeses are made from:
- whole milk
 - skim milk
 - milk enriched with cream
 - all of the above
10. Cheese is a good source of:
- protein, iron and vitamin C
 - protein, calcium and riboflavin
 - iron, calcium and thiamin
 - calcium, vitamin D and iron
11. Most milks are fortified with vitamin D. Vitamin D is important in the diet because:
- it is important for cell metabolism
 - it aids in the absorption of calcium
 - it aids in the utilization of ascorbic acid
 - it aids in digestion
12. Calcium is a vital and necessary mineral in the diet. Indicate the physiological function of calcium.
- promotes and maintains growth of teeth and bones
 - promotes and maintains growth of all cells
 - promotes and maintains healthy mucous membranes
 - aids in the digestion process
13. An important part of cheese production is:
- curd formation
 - treatment of the curd
 - curing or ripening
 - all of the above

14. Light cream or coffee cream contains not less than _____ percent milk fat.

- a. eight
- b. ten
- c. eighteen
- d. twenty-six

15. Flavorings added to milk...

- a. decrease calcium absorption
- b. change the vitamin content of milk
- c. cause milk to curdle
- d. none of the above

16. The nutrients found in ice cream are:

- a. protein, calcium and riboflavin
- b. protein, iron and vitamin C
- c. iron, calcium and thiamin
- d. calcium, vitamin D and iron

17. A cup of milk contains the same amount of calcium as _____ of ice cream.

- a. $\frac{1}{2}$ cup
- b. $\frac{3}{4}$ cup
- c. 1 cup
- d. $1\frac{3}{4}$ cup

18. Cottage cheese is made from:

- a. cream
- b. whole milk
- c. skim milk
- d. sour cream

19. Storing milk at 40°F will:

- a. help maintain its freshness and flavor for 10 to 20 days
- b. result in milk of uniform composition and palatability
- c. improve the nutritive value of milk
- d. all of the above

20. Stabilizers are added to ice cream to:

- a. prevent formation of large, coarse ice crystals in the ice cream
- b. improve the whipping quality of ice cream
- c. add richness
- d. improve nutritional value

21. Osteoporosis is...

- a. a heart irregularity
- b. another name for arthritis
- c. a bone-thinning disease
- d. another name for fractured hip

22. The physiologic function of riboflavin is:

- a. promotes growth
- b. aids in daytime visual process
- c. promotes healthy skin and eyes
- d. all of the above

23. Osteoporosis is the result of:

- a. poor calcium intake over many years
- b. inadequate exercise
- c. drinking less than six glasses of water daily
- d. excess intake of protein and phosphorus

24. One cup of milk contains _____ calcium.

- a. 100 mg
- b. 200 mg
- c. 300 mg
- d. 150 mg

25. Fat free ice cream contains:

- a. Low levels of total food solids.
- b. No milk fat.
- c. No sugar.
- d. Less milk fat only.

26. The 2005 Dietary Guidelines for Americans and Food Guidance System recommends eating how much milk or milk products per day on a 2,000 calorie diet?

- a. 3 cups
- b. 2 cups
- c. 4 cups
- d. 1 pint

Sample Dairy Foods Quiz Answers

Updated 12/2011

Part I of Contest Milk Production	
Question	Answer
1	D
2	D
3	B
4	C
5	D
6	C
7	C
8	B
9	D
10	B
11	D
12	D
13	C
14	A
15	E
16	B
17	C
18	B
19	A
20	E
21	C
22	D
23	E
24	D
25	E

Part II of Contest Milk Marketing	
Question	Answer
1	A
2	D
3	A
4	C
5	B
6	D
7	C
8	C
9	A
10	C
11	E
12	D
13	B
14	C
15	C
16	A
17	C
18	C
19	E
20	E
21	E
22	C
23	C
24	B
25	A
26	D
27	B
28	D

Part I of 4-H Contest Consumer/Dairy Products	
Question	Answer
1	A
2	B
3	B
4	C
5	B
6	B
7	A
8	A
9	D
10	B
11	B
12	A
13	D
14	B
15	D
16	A
17	D
18	C
19	A
20	A
21	C
22	A
23	A
24	C
25	B
26	A

Milk Quality and Products Form #476-5

Incorrect Marks Correct Mark



Team Name / Additional Info	

Team #	State	Last Name	First Name
0 0 0 0			
1 1 1 1	A A	A A A A A A A A A A A A A A A A A A	A A A A A A A A A A A A A A A A A A
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	M M	M M M M M M M M M M M M M M M M M M	M M M M M M M M M M M M M M M M M M
	N N	N N N N N N N N N N N N N N N N N N	N N N N N N N N N N N N N N N N N N
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	P P	P P P P P P P P P P P P P P P P P P	P P P P P P P P P P P P P P P P P P
	Q Q	Q Q Q Q Q Q Q Q Q Q Q Q Q Q Q Q Q Q	Q Q Q Q Q Q Q Q Q Q Q Q Q Q Q Q Q Q
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Code
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2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9

Milk Flavor	
Score	Sample Number
1	1 2 3 4 5 6 7 8 9 10
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4	
5	
6	
7	
8	
9	
10	
	1 2 3 4 5 6 7 8 9 10
Defects	Sample Number
1 Acid	1 2 3 4 5 6 7 8 9 10
2 Bitter	
3 Feed	
4 Flat-watery	
5 Foreign	
6 Garlic or onion	
7 Malty	
8 No defect	
9 Oxidized	
10 Rancid	
11 Salty	
	1 2 3 4 5 6 7 8 9 10

Team Activity			
Adequacy of Report Results	Content of Comments	Presentation	Teamwork
0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
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4 4 4 4	4 4 4 4	4 4 4 4	4 4 4 4
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7 7 7 7	7 7 7 7	7 7 7 7	7 7 7 7
8 8 8 8	8 8 8 8	8 8 8 8	8 8 8 8
9 9 9 9	9 9 9 9	9 9 9 9	9 9 9 9

Problem Solving	
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13	A B C D E
14	A B C D E
15	A B C D E
16	A B C D E
17	A B C D E
18	A B C D E
19	A B C D E
20	A B C D E

Fat Content Identification	
Varieties	Sample Number
1 Nonfat milk (<0.5%)	1 2 3 4 5
2 Reduced fat milk (2%)	
3 Milk (3.3%)	
4 Half & Half (10.5%)	
5 Coffee cream (18%)	
6 Whipping cream (30%)	
	1 2 3 4 5

CMT	
Score	Sample Number
0	1 2 3 4 5 6 7 8
2	
4	
6	
8	
	1 2 3 4 5 6 7 8

Identification of Cheeses										
Varieties	Sample Number					Sample Number				
	1	2	3	4	5	6	7	8	9	10
1 Bleu	<input type="checkbox"/>									
2 Brick	<input type="checkbox"/>									
3 Brie	<input type="checkbox"/>									
4 Cheddar (Mild)	<input type="checkbox"/>									
5 Cheddar (Sharp)	<input type="checkbox"/>									
6 Cream	<input type="checkbox"/>									
7 Edam	<input type="checkbox"/>									
8 Monterey Jack	<input type="checkbox"/>									
9 Mozzarella	<input type="checkbox"/>									
10 Neufchatel	<input type="checkbox"/>									
11 Parmesan	<input type="checkbox"/>									
12 Processed American	<input type="checkbox"/>									
13 Provolone	<input type="checkbox"/>									
14 Swiss	<input type="checkbox"/>									
	1	2	3	4	5	6	7	8	9	10

Mark one answer in each column!

Written Exam Milk Production	
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30	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E

Characteristics of Cheeses										
Characteristic	Sample Number					Sample Number				
	1	2	3	4	5	6	7	8	9	10
A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A
B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B
C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C
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F	<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F
	1	2	3	4	5	6	7	8	9	10

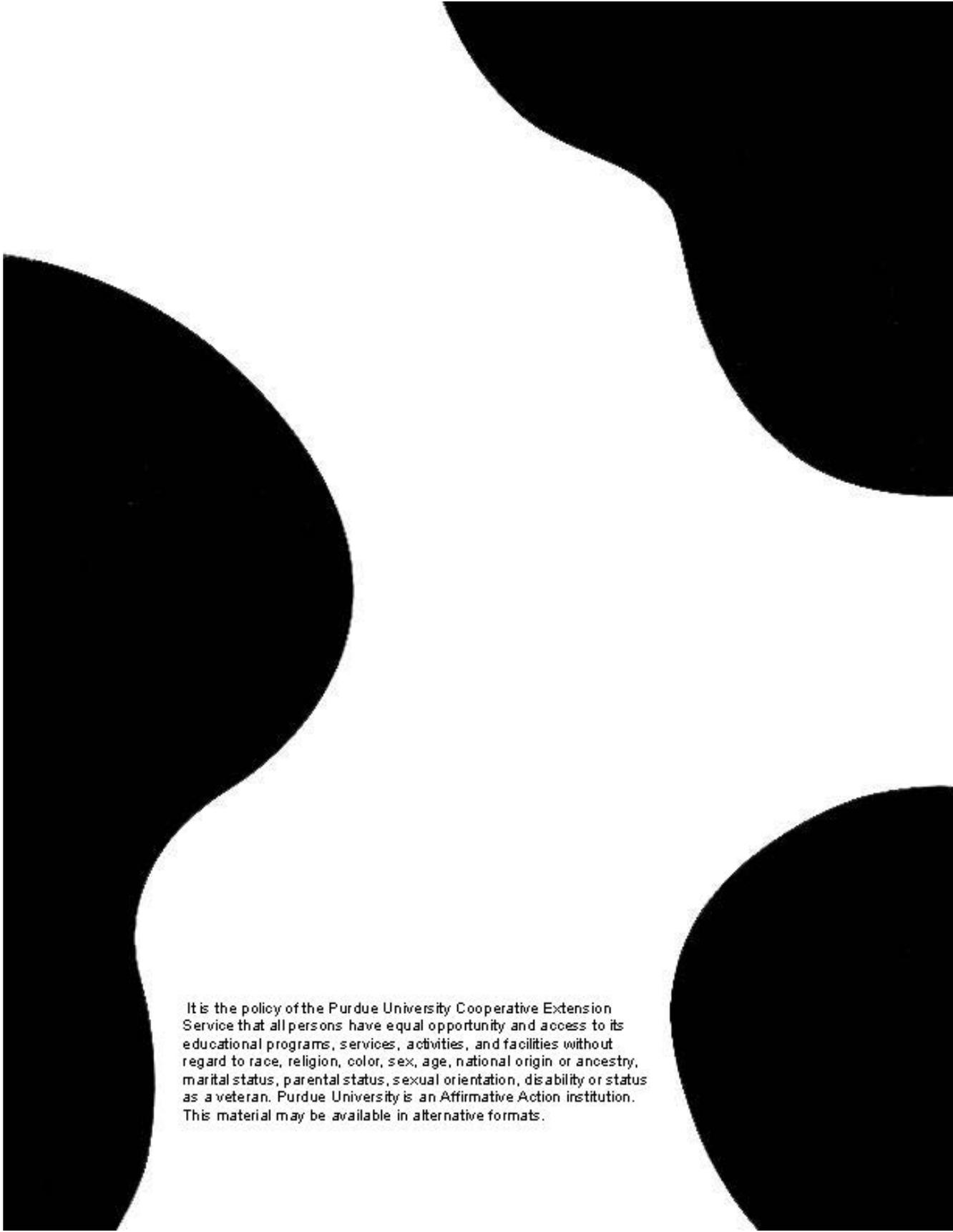
Mark all that apply!

Written Exam Milk Marketing	
31	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E
32	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E
33	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E
34	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E
35	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E
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37	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E
38	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E
39	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E
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42	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E
43	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E
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58	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E
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60	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E

Natural / Imitation Dairy Identification										
Food Identification	Sample Number					Sample Number				
	1	2	3	4	5	6	7	8	9	10
Natural	<input type="checkbox"/> N									
Imitation	<input type="checkbox"/> I									

Mark one answer in each column!

Identification 2										
1	2	3	4	5	6	7	8	9	10	
<input type="checkbox"/> 0										
<input type="checkbox"/> 1										
<input type="checkbox"/> 2										
<input type="checkbox"/> 3										
<input type="checkbox"/> 4										
<input type="checkbox"/> 5										
<input type="checkbox"/> 6										
<input type="checkbox"/> 7										
<input type="checkbox"/> 8										
<input type="checkbox"/> 9										

The page features four large, solid black shapes that resemble stylized, rounded corners or abstract organic forms. Two are positioned on the left side, one at the top and one at the bottom, and two are on the right side, also at the top and bottom. They are arranged symmetrically around the central text area.

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