

MILK QUALITY AND PRODUCTS

Participants in the Milk Quality and Products Career Development Event (CDE) demonstrate their knowledge about the quality production, processing, distribution, promotion and marketing of milk and dairy foods.

RULES AND REGULATIONS

1. **A team may consist of 5 eligible members.** The score of the 3 high individuals will be used to determine the team score.
2. Each contestant, at the start of the judging period, will be given CDE scorecard on which they shall record their score, in the proper place, and indicate defects in keeping with the information given in these instructions.
3. The event will consist of the following:
 - 50 multiple choice questions (25 each on milk production and marketing)
 - 8 milk samples to be evaluated using California Mastitis Test Method
 - 10 cheese samples to be identified (both variety and characteristics)
 - 10 milk samples to be scored on flavor
 - 4 problem solving questions

Point breakdown is as follows

Milk Flavor	120
CMT	32
Cheese ID	100
Artificial/Real	20
Problem Solving	20
General Knowledge Exam	<u>100</u>
Total	<u>392</u>

Problem solving area to be divided into two parts:

Part I - Identification of real vs. artificial dairy foods/products.

Examples: (May also include products other than those shown)

- a. margarine vs. butter
- b. whipped cream vs. whipped non-dairy topping
- c. coffee whitener vs. half and half
- d. cheese vs. non-dairy cheeses (process American vs. process imitation)

Part II - Concepts to be tested; knowledge of:

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

4. Cheese samples for identification will be selected from those listed on the score sheet. Cubes of the cheeses will be available for tasting.
5. Milk samples will be scored using. Prior to the CDE, the official judge will score one or more samples of milk and explain scoring to the contestants. All samples of milk are prepared from pasteurized milk intended for table use and will score 0 to 9. (See Scoring Guide.) Milk samples will be tempered to 60°F.
6. Contestants are to use whole numbers when scoring "Flavor" of milk. Check only the one most serious defect in a sample even if more than one flavor is detected. If no defect is noted, check "no defect." (See Scoring Guide.)

7. Problem Solving may be scored on Scanning Card III or as directed by CDE superintendent.
8. Utensils for sampling will be provided - cups, spoons, etc.
9. The score made by each contestant is the number of points deducted; therefore, the lower the score, the higher the rating.
10. The group leader will initial the correct response on the student's marks on the scorecard if a change is necessary.

The Cheese Characteristic Identification section of the CDE will be based off of the following matrix:

Cheese Characteristics Matrix

A description of major varieties of cheeses popular among American consumers.

VARIETY	Moisture (%) (Maximum) ¹	Fat (%) (Minimum) ²	Pasta Filata ³	Brine/surface Salted	Ripened by	Origin
Blue/Bleu	46	50	no	yes	mold	France
Brie	52.5	20	no	no	bacteria and mold	France
Cheddar Mild	39	50	no	no	bacteria	England
Cheddar Sharp	39	50	no	no	bacteria	England
Colby	40	50	no	no	bacteria	US
Cream	55	33	no	no	unripened	US
Feta	60	42	no	yes	bacteria	Greece
Gouda	45	48	no	yes	bacteria	Netherlands
Havarti	54	30	no	no	bacteria	Denmark
Gruyere	39	45	no	yes	bacteria	Switzerland
Monterey Jack	44	50	no	no	bacteria	US
Mozzarella	60	45	yes	yes	bacteria	Italy
Muenster	46	50	no	no	bacteria	France
Parmesan	32	32	no	yes	bacteria	Italy
Processed American	40	50	no	no	bacteria	US
Provolone	45	45	yes	yes	bacteria	Italy
Queso Fresco	59	18	no	no	unripened	Mexico
Ricotta	73	4	no	no	unripened	Italy
Romano	34	38	no	yes	bacteria	Italy
Swiss	41	43	no	yes	bacteria	Switzerland

¹Some cheeses have a range in moisture permitted, but these are the highest permitted amounts.

²Some cheese standards use percentage by weight of total solids (e.g., cheddar) while others use percentage by weight of the cheese (e.g., cream).

³Curd is stretched in hot water to align the protein molecules and provide stretch to the curd

SCORING INFORMATION

Scores may range from 0 to 9. A no defect will be given a 10.

On a quality basis: 10 = No defect; 9 = excellent; 7-8 = good; 4-6 = fair; 1-3 = poor; and 0 = unacceptable

MILK

SCORES*			
OFF FLAVOR	S	D	P
Bitter	5	3	1
Feed	9	8	5
Flat/Watery	9	8	7
Foreign	5	3	1
Garlic/Onion	5	3	1
High Acid	3	1	---**
Malty	5	3	1
Metallic/Oxidized	6	4	1
Rancid	4	1	---
Salty	8	6	4
Unclean	3	1	---

* Suggested scores are given for three intensities of flavor: S - slight; D - definite, and P - pronounced. Intermediate numbers may also be used, for example, a bitter sample of milk may score 4.

** Where a dish is entered, a product with that intensity of "off flavor" would be unsalable.

CALIFORNIA MASTITIS TEST

CMT Score	Test Appearance	Contestant Score
Negative	Mixture liquid, no precipitate.	0
T	Slight precipitate, tends 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

Score Even Numbers Only for CMT Test.

GRADING OF CONTESTANT'S SCORECARD

CONTESTANT'S SCORECARD SHOULD BE GRADED AS FOLLOWS

SCORE: Contestant's scores on each item on the scorecard are to be given a grade expressed by the difference between their score except as indicated below, and the official score. For example, if a contestant scores "flavor" 7 and the judges score it 5, the contestant shall receive a grade of 2 points.

If, however, a contestant recognizes that the item scores perfect but fails to indicate that score on their scorecard or write in any score outside the range of scores for the item or indicates the score by a dash (-), they shall receive a grade equivalent to the maximum cut for that item. For example, the normal range of score on flavor of milk, 0-9, represents a maximum cut of 9 points. The contestant's grade, therefore, shall be 9 when they fail to write in the numerical score for that item. This rule holds out regardless of the official score.

DEFECTS: The grading of defects, which is independent of the grading scores, is based on the contestant's proficiency in recognizing the same quality merits and defects of the various samples as noted by the official judge. Each defect indicated by the contestant shall be involved in the grading. The contestant's grade on defects for a single item shall be:

1. **Perfect:** 10, when the contestant (a) checks precisely the same defect(s) as the official and checks only those made by the official, or (b) recognizes with the official that the item is without defects, and indicates this in the no defect column.
2. **The Maximum:** 2 points, when the contestant (a) fails to check any of the defects noted by the official judge; (b) checks defect(s) when the sample was judged by the official as being without defect(s); (c) fails to check defect(s) when the official judge scores the sample within the defect range (although the contestant may have scored the sample without defects) or; (d) fails to check defects when his/her score indicated he/she should have (although the official scored the sample without defects).

GRADES: A contestant's grade on a sample shall be the sum of their grades on "score" and "defects" of the sample. Their grade shall be the sum of their grades on the samples to be judged.

A team grade shall be the sum of the grades of its members.

As grades in this CDE mean "points lost," the contestant with the lowest grade shall be the winner and the team with the lowest grade shall be the winning team.

STANDINGS: Contestant standings in each product shall be obtained by arranging the grades of all contestants in that product in order from the lowest to the highest. Team standings shall be obtained the same way.

BREAKING TIES: In case of ties between individuals or teams, the ties shall be broken in favor of the contestant or team having the lowest "grade" on flavor score; if there is still a tie, it shall be broken in favor of the one having the lowest grade on flavor defects and then, if necessary, on other items in the order in which they appear on the scorecard.

SOME HELPFUL SUGGESTIONS

1. Sense of taste and smell have always been used by man to guide him in the selection of food.
 - A. Only desirable foods are grown.
2. Organoleptic examination.
 - A. The use of taste and smell to examine.
 1. Smell - up to one billionth of a strong solution.
 2. Taste - requires one million times as much of the same solution.
 - B. Olfaction - sense of smell.
 1. Senses are located in upper most regions of nasal cavity.
 - a. No smelling along sides of nose.
 2. Odor must be sniffed or whiffed strongly.
 - a. Stop regular respiration during sniffing.
 - b. No smell while exhaling.
 - C. Location of taste buds on tongue.
 1. Sour - along sides of tongue.
 2. Salt - along sides and tip.
 3. Sweet - at the tip.
 4. Bitter - at the base of the tongue.
 - D. Flavor - composed of odor, taste, and feel of substance in the mouth.
3. Why some fail in judging dairy products.
 - A. Some individuals lack ability to detect flavors.
 - B. Some individuals have a preconceived and incorrect idea as to flavor.
 - C. Individuals vary in sensitivity.
 - D. Poor memory, lack of interest, poor mental attitude.
 - E. Counteracting forces - personal feeling, health, etc.
4. General considerations in judging.
 - A. Best not to judge within two hours of eating.
 1. Don't eat strongly flavored foods.
5. General procedure of judging.
 - A. Try to work up taste bud action. This creates saliva for the mouth.
 1. Saliva is necessary to help taste products.
 - B. Rinse mouth out after any disagreeable flavor.
 1. Water carries away saliva; use water sparingly and of the same temperature as the milk.
 - C. If you score two samples the same, re-check the first sample to check yourself.
 - D. Never swallow any of the product. This destroys your ability to taste future samples.

- E. Use only about 1-2 tablespoons of the product - just enough to smell and taste.
- F. Wait 2-3 minutes between samples - relax.
- G. It is very important to observe the aroma first.
- H. Don't be too critical - don't look for objectionable flavors.

SOME SUGGESTIONS FOR INSTRUCTORS IN MAKING UP JUDGING SAMPLES

1. 9 or 10 - most commercial retail milk sold over the counter.
2. Salt about 8-9 - add about 50 grains salt; just tip the salt shaker over a little.
3. Bitter 1 - Use quinine - comes in little capsules. With dry hands put a very small amount in about two cups of milk and shake.
4. Garlic or onion 1 - a couple of grains of garlic salt in two cups of milk.
5. Oxidize 1-4 - put about five pennies in two cups of milk and set in sunlight; shake to allow sun to attach fatty acids then transfer to clean bottle.
6. Foreign 1-4 - add a drop or two of Listerine Mouthwash or Clorox.
7. Malt 1-4 - add 1/4 teaspoon malt to two glasses milk.
8. Flat 8-9 - add 50 ml. water to two glasses of milk.
9. High acid 5-7 - add about 10 ml. buttermilk to two glasses milk.
10. Rancid 1-4 - one glass raw milk and one glass store milk. Keep in a warm place for about an hour. You must use raw milk for this.

DETECTING UNDESIRABLE FLAVORS IN MILK

1. Bitter - no odor given off. Bitter taste comes to mouth slowly and persists after expectoration.
2. Foreign - may smell or may not until tasted. Differs according to source of flavor.
3. Feed - readily detected by smell, often pleasant smell. Mouth cleans up immediately.
4. Flat watery - no smell. Simulated by watered milk or skim milk.
5. Garlic or onion - flavor and odor of two sources. Odor and flavor result from eating local weed.
6. High acid - detect by smell and taste. Sometimes disagreeable odor first with very little or no flavor change. Leaves a peeling, clean effect in mouth after expectorating.
7. Malty - detect by smell or taste. Often a walnut or maple or grapenut effect.
8. Metallic/oxidized - flavor defect - flat metallic sensation. Detect by slight odor. Characterized by a "quick" taste reaction. Notice especially by flavor. Never in homogenized milk. Not persistent after expectoration.
9. Rancid - strong disagreeable odor. Detect by smell or taste. Taste is disagreeable and often a soapy taste, may be like spoiled nut meats.
10. Salty - no smell. Gives a cleansing feeling to mouth. Taste on sides and top of tongue.
11. Unclean - very pronounced flavor. Easily detected by smell and taste. Feeling of weedy production in dirty conditions. Persistent taste.

Bitter flavor may result from different causes, the most common probably being bacterial action and the eating of certain feeds by the cows. A slight bitterness may not always be detected immediately, but the judge should be able to get the defect as an aftertaste. If the judge concludes that bitterness results from feed, this defect should be checked instead of bitter, or in addition to it.

Feed flavors and odors are very common, especially when the cows eat green feed previous to milking. Alfalfa, clover, grass, and many other feeds will give distinct flavors and odors to milk if fed during the five hour period before milking. Weeds such as wild onion, garlic, mustard, alfilaria, and stinkweed cause strong flavors. Investigation by the United States Department of Agriculture, Bureau of Dairy Industry, has shown that garlic flavor and odor may be present in milk when the cow breathes the odor from garlic tops without consuming them. When the tops are not available, this result may be duplicated by using bulbs. Garlic-flavored milk has been placed in the judging contests at the National Dairy Show at St. Louis for the past few years. The milk may also absorb odors if it is exposed to them.

Flat flavor, somewhat resembling that of skim milk, occurs when milk is low in milk fat or milk sugar. Milk which is poor in total solids is often lacking in body, a condition contributing to a flat flavor. Milk diluted with a small amount of water may also be considered flat if the defect "watered" does not appear on the scorecard. Flatness cannot be detected in the odor.

Foreign flavors may be numerous, although this defect is not often used. Cresol or chlorine disinfectants used in the dairy or milk house may cause the defect, although the defect "disinfectant" is used on some scorecard. Milk handled in rooms in which fresh paint, tobacco smoke, gasoline, or oil are present, may absorb a foreign flavor or odor.

High-acid milk is usually in the first stages of sourness, lactic-acid-forming bacteria having changed some of the milk sugar to lactic acid. As the acidity develops, the casein is precipitated, a condition also known as coagulation or curdling, causing the milk to be unmarketable. A good judge should be able to recognize the high acid milk by the odor. Strong feed flavors and odors sometimes suggest a high acid condition, and only tasting can determine which defect is present. A high acid milk is usually scored 5-7.

Rancid flavor results from chemical changes of the milk fat, probably with the formation of butyric acid. This defect frequently occurs in milk with high fat content when lipase, a fat splitting enzyme, is present. Rancidity is usually not noticeable in freshly drawn milk, but develops as the milk is held. Cows with udder disturbances, heavy producing cows advanced in the lactation period, and in some instances those having cystic ovaries may produce milk that becomes rancid a few hours after being drawn.

Salty milk is uncommon, unless the sample is obtained from a cow in an advanced stage of lactation. It resembles normal milk with a small amount of table salt added. The usual procedure in student contests is to use normal samples of milk instead of preparing them by adding salt or other materials.

Unclean milk has an offensive odor and flavor, suggesting that it has been produced under unsanitary conditions. Bacterial contamination, caused by improperly cleaned and sterilized utensils, is probably the chief cause. Lack of proper cooling intensifies the defect.

PROCEDURES FOR PREPARING SAMPLES OF THE COMMON OFF FLAVORS OF FLUID MILK

No. Off-flavor	Procedure (Quantities for 600 ml sample)
1.	Acid (sour) Add 25 ml fresh cultured buttermilk to 575 ml fresh past./homog. milk. Vary 5-10 ml to alter intensity. Should prepare 24-48 hours ahead.
2.	Cooked Heat 600 ml fresh past./homog. milk to 80_ (176_ F) and hold for 1 minute and cool.
3.	Feed Add approx. 2-3 g of alfalfa hay to about 100 ml of fresh past./homog. milk and (alfalfa) hold for approximately 20 minutes. Then strain the milk through cheesecloth (in a funnel) into another container. Next, for each 575 ml of milk: Add 20 ml of this "alfalfa" milk for - <u>slight</u> Add 30-35 ml of this "alfalfa" milk for - <u>definite</u> Note: Other roughage, such as grass or corn silage may be used to prepare feed off-flavors in a similar manner.
4.	Flat Skim Milk
5.	Garlic/onion Add 0.15 g garlic or onion salt <u>or</u> 2 drops garlic or onion extract to 600 ml past./homog. milk (<u>definite</u> intensity).
6.	Malty Add 15 g Grape Nuts or Grape Nuts Flakes breakfast cereal to 100 ml milk and hold for 20-30 minutes. Strain through cheese cloth, then add 13 ml of the "stock" to 590 ml past./homog. milk (<u>definite</u> intensity).
7. (metal induced)	Oxidized Prepare 100 ml of 1 percent CuSO ₄ solution and keep refrigerated. Add the following amounts of "stock copper" solution to 600 ml. past./homog. milk: <u>Slight</u> - 0.75 ml 1% CuSO ₄ <u>Definite</u> - 1.2 ml 1% CuSO ₄ <u>Pronounced</u> - 1.8 ml 1% CuSO ₄ <u>Note:</u> Highly advisable to prepare 24-48 hours ahead of use.
8. (light induced)	Oxidized Add 600 ml past./homog. milk to a clear glass or plastic milk container. Expose milk to bright, direct sunlight for the following exposure times: <u>Slight</u> - 8 to 9 minutes <u>Definite</u> - 10 to 11 minutes <u>Pronounced</u> - 12 to 15 minutes <u>Note:</u> Plan to use such prepared samples for only 1 or 2 days; the generic oxidized off-flavor may develop within 36-48 hours after exposure.
9.	Rancid Agitate 100 ml raw milk with 100 ml past./homog. milk in a Waring blender or similar mixer (or milkshake maker) for 2 minutes. Extend to 600 ml total volume with past./homog. milk. <u>Notes:</u> (a) Prepare at least 24-36 hours ahead, if possible. (b) This prepared sample should be pasteurized prior to presentation to tasters. Heat to 70_C (158_F) for 5-10 minutes and cool.
10.	Lacks freshness (a) Add 10-15 g nonfat dry milk powder to 600 ml past./homog. milk. Select past./homog. milk samples that are approaching end of a 10-15 day "pull date." Frequently, 2 percent lowfat milks, when compared to whole milk, will exhibit the "lacks freshness" off-flavor.
11.	Unclean (a) Select past./homog. milk samples that have exceeded "pull date" by several days.

Milk Quality and Products

Member Name: _____ Member Number: _____

Sample 1

Sample 2

Sample 3

Sample 4

		Sample 1	Sample 2	Sample 3	Sample 4
California Mastitis Test (CMT) 8 Points per sample	Contestants Score				
	Official Score				
	Grade Difference				

Real VS Imitation

Member Name: _____ Member Number: _____

For each of the 5 products, please identify if it is the dairy based version or an imitation. Please circle the correct response.

- | | | | |
|----------|-------------------|-------------|------------------|
| 1 | Spread | Real | Imitation |
| 2 | Cheese | Real | Imitation |
| 3 | Creamer | Real | Imitation |
| 4 | Sour Cream | Real | Imitation |
| 5 | Beverage | Real | Imitation |