# Milk Quality & Products CDE (March 2025)

## Purpose

*The purpose of the National FFA Milk Quality and Products Career Development Event is to promote practical learning activities in milk quality and dairy products while assisting students in developing team decision-making skills.*

The focus of the National FFA Milk Quality and Products CDE is raw milk quality, dairy products, federal milk marketing orders and attributes of selected milk products. The five general areas that contribute to milk quality and consumer demand are

- Milk production.
- Milk and dairy product quality and safety.
- Milk processing or manufacturing.
- Raw milk marketing.
- Facility operations:
- Safety/sanitation.
- Labor.

## Event Rules

The complete rules, policies and procedures relevant to all National FFA Career and Leadership Development Events may be found in the Guide to CDE and LDE Policies and Procedures.

- Teams will consist of four members.
- Team ranking is determined by combining the scores of all team participants.
- It is highly recommended that all participants be in FFA Official Dress for this event.
- Participants will report for instructions to the event superintendent at the time and place shown in the current year's team orientation packet.
- Participants are not to use strong deodorant, perfume, chewing gum or other detractors to the taste and smell senses.
- Any participant in possession of an electronic device in the event area is subject to disqualification. (Calculators will be provided.)
- **Allergy Information**: Food products used in this event may contain or come in contact with potential allergens. Any participant in need of a reasonable ADA accommodation(s) for their participation in the Milk Quality and Products CDE should complete the online Request for Accommodation Form (ADA and other). This form must be received 30 business days prior to the start of the event. All requests will remain confidential, and the participant will be contacted by a national FFA staff member to gather additional information and/or discuss the reasonable accommodation(s) or assistance being requested. For questions regarding the ADA and/or other Accommodation Process, please email ADARequests@ffa.org The event committee will make all reasonable efforts to accommodate students with food allergies.

# Event Format

## EQUIPMENT

- Materials to be provided by the student:
  - Two no. 2 pencils.
  - Bottled water and/or palate cleanser.
  - Calculator — Should be battery operated, non-programmable and non-scientific (basic five function only). No other calculators can be used during the event.
  - Clean clipboards, free of notes.
- Materials provided by the CDE committee:
  - All paper and other supplies.
- Participants are **not** to bring these items:
  - Glass of any kind to the event.
  - Cell phones, or other electronic devices.

## FLOW OF EVENT

- Milk Flavor Identification and Evaluation: 20 minutes
- Product Identification: 20 minutes
- Cheese Identification (Type & Characteristic): 20 minutes
- Written Exam: 40 minutes
- Problem Solving: 40 min

## INDIVIDUAL ACTIVITIES

*Milk Flavor Identification and Evaluation (120 Points — 6 points for flavor ID, 6 points for intensity score)*

- Ten milk samples will be scored on flavor defects (taste and odor) using the computerized scorecard. Check only the most serious defect in a sample even if more than one flavor is detected (all samples of milk are prepared from pasteurized whole vitamin D milk intended for table use). Milk samples will be tempered to 60 degrees F. Only those cups provided at the event may be used. (Six points per correct answer.)
- Participants are to use whole numbers when scoring "Defect Intensity." If no defect is noted, participants should check "No defect" and score as a ten (See Scoring Guide below). (Six points per correct answer.) Palate cleansers (e.g., apples, apple juice or soda crackers) will be allowed for refreshing.

**SCORING GUIDE**

Refer to the current scorecard being used at the national level.

*Scores may range from 1 to 10 on a quality basis:*

| | |
|---|---|
| **10** | **Excellent (no defect)** |
| **8 to 9** | Good |
| **5-7** | Fair |
| **2-4** | Poor |
| **1** | Unacceptable/unsalable |

**EXAMPLE: MILK FLAVOR**

| | Scores* | | |
|---|---|---|---|
| **Defects** | **Slight** | **Definite** | **Pronounced** |
| Acid | 3 | 2 | 1 |
| Bitter | 5 | 3 | 1 |
| Feed | 9 | 8 | 5 |
| Flat/Watery | 9 | 8 | 7 |
| Foreign | 5 | 3 | 1 |
| Garlic/Onion | 5 | 3 | 1 |
| Malty | 5 | 3 | 1 |
| No defect | 10 | 10 | 10 |
| Oxidized | 6 | 4 | 1 |
| Rancid | 4 | 2 | 1 |
| Salty | 8 | 6 | 4 |

**Suggested scores are given for three intensities of flavor. All numbers within the range may be used. Intermediate numbers may also be used; for example, a bitter sample of milk may score four.*

## *Product Identification — Dairy versus Non-Dairy (100 points — 6 points identification, 4 points fat content)*

- A total of 10 samples consisting of dairy and non-dairy products will be identified and assigned a milk-fat content score.
- The following products may be included among the samples:
    - Dairy Products: nonfat (skim) milk (.05%), low fat milk (1.0%), reduced fat milk (2%), milk (3.25%), half and half (10.5%), butter (80%), sour cream (18%), flavored milk (0.05%–3.25%) light whipped cream (30%), heavy cream (36%).
    - Non-Dairy Products: margarine, non-dairy creamer, non-dairy sour cream, non-dairy flavored beverage and non-dairy whipped topping. All of these are to be categorized as non-dairy fat. Number 11 on the scantron" non dairy milk" will not be used any beverage should be considered a non- dairy beverage

## *Cheese Identification (100 Points)*

- Ten cheese samples for identification will be selected from those listed. Cubes of the cheeses will be available for tasting. **Note:** More than one sample of a given cheese may be used. A score of four points is given for each variety correctly identified. Uncolored cheeses may be used. (40 points possible)
- In addition to identifying cheese samples, participants will classify characteristics of identified cheeses using the following matrix. Participants will have six characteristics to select based on the 10 identified cheese samples. An example cheese characteristic problem can be found in the Reference section of this handbook. (60 points possible).

# 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 | Grease |
| Gouda/Edam | 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 |
| Swiss | 41 | 43 | no | yes | bacteria | Switzerland |

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

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

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

**CHEESE CHARACTERIZATION EXAMPLE PROBLEM**

The six items in the "characteristics" column are based on the information found in the Cheese Characterization Matrix in this handbook.

Cheese samples are from the cheese identification activity. Participants will select all characteristics that apply to each sample. Answers will be recorded on the event-specific scan form. Characteristics in the problem can change each year.

| | Sample Numbers | | | | |
|---|---|---|---|---|---|
| **Characteristics** | **1 (Cheddar)** | **2 (Cream)** | **3 (Swiss)** | **4 (Mozzarella)** | **5 (Bleu)** |
| A. Maximum moisture = 39% | X | | | | |
| B. Minimum fat in the solids = 33% | | X | | | |
| C. Receives "pasta filata treatment" | | | | X | |
| D. Salted in brine | | | | X | |
| E. Ripened by molds | | | | | X |
| F. Originated in England | X | | | | |

### *Problem Solving (72 Points)*

The problem-solving test will consist of a total of 12 critical-thinking, multiple-choice questions. Topics may include, but are not limited to

- Decisions about the quality and acceptability of milk.
- Calculations of the value of milk and components of milk.
- Decisions about components of milk and milk products (including processing procedures).
- Decisions about the use of chemicals in cleaning and sanitizing operations.

*Problem Solving will reference the last five years of available Milk Quality & Products CDE Tests. These tests can be found on FFA.Org*

### *Written exam (120 Points)*

The written exam will be comprised of a total of 40 multiple-choice items. The exam will be given in two parts with one part consisting of thirty (20) questions on quality milk production and a second part of thirty (20) questions on milk marketing.

*Exam Questions will come from the last five years of available Milk Quality & Products CDE Tests. These tests can be found on FFA.Org*

## Scoring

The event will be worth 2,720 total points based on positive-type scoring.

| Activity | Points/Sample | Samples | Individual Points | Team Points |
|---|---|---|---|---|
| Milk flavor identification and evaluation | 12 points/sample<br>(6 points for flavor defect<br>6 points for intensity)<br>20 Min | 10 samples | 120 | 480 |
| Product identification | 10 points/sample<br>(6 points for identification<br>4 points for milk fat)<br>20 Min | 10 samples | 100 | 400 |
| Cheese type identification | 10 points/sample<br>(4 points per type<br>6 points for characteristics)<br>20 Min | 10 samples | 100 | 400 |
| Problem solving | 40 Min | 12 questions | 72 | 400 |
| Written exam | 40 Min | 40 questions | 120 | 480 |
| | | *Total Possible Individual Points* | 540 | 2,160 |
| | | | **TOTAL POINTS PER TEAM** | 2,160 |

### TIEBREAKERS

If ties occur, the following events, in this order, will be used to determine award recipients:

*Team*

1. Milk identification total score of all team members.
2. Cheese identification score for all team scores.

*Individual*

1. Milk identification.
2. Cheese identification.
3. Product identification
4. Problem solving.

## Awards

Awards will be presented at an awards ceremony to individuals and teams based upon their rankings. Awards are sponsored by cooperating industry sponsors as a special project and/or by the general fund of the National FFA Foundation.

## References

● *This list of references is not intended to be all-inclusive.* Other sources may be utilized, and teachers are encouraged to make use of the very best instructional materials available. The following list contains references that may prove helpful during event preparation.

● National FFA National Career Development Event Questions and Answers, FFA.org, Event Resources, Past exams and practicums

● Hoard's Dairyman, P.O. Box 801, Fort Atkinson, Wisconsin 53538. Phone (414) 563-5551. Issues used are from November of previous year to May of current year.

● California Mastitis Test published by the University of Missouri-Columbia Extension Division, Columbia, Missouri 65211. (Single copy free, write for price quote for multiple copies).

● California Mastitis Test kit can be ordered from NASCO. Toll free 1-800-558-9595 or toll call, 1-414-563-2446. NASCO, 901 Janesville Avenue, Fort Atkinson, WI 53538.

● Dairy Business http://dairybusiness.com/ 7. Agricultural Marketing Service, http://www.ams.usda.gov/AMSv1.0/DairyLandingPage Issues used are from November of previous year to May of current year.

● Dairy Foods: Producing the Best, Dr. Robert Marshall; Instructional Materials Laboratory, https://ffa.box.com/Dairy Foods booklet

● The Dairy Practices Council: Guidelines, www.dairypc.org

- #21 – Raw Milk Quality Tests
- #24 – Troubleshooting High Bacteria Counts of Raw Milk
- #38 – Preventing Off Flavors in Milk
- #71 - Prevention of and Testing for Added Water in Milk
- #98 – Milking Procedures for Dairy Cattle

● Pasteurized Milk Ordinance, https://www.fda.gov/media/114169/download

- SECTION 1. DEFINITIONS
- SECTION 6. THE EXAMINATION OF MILK AND/OR MILK PRODUCTS
- SECTION 7. STANDARDS FOR GRADE "A" MILK AND/OR MILK PRODUCTS
- ITEM 15p. PROTECTION FROM CONTAMINATION
  - APPENDIX E. EXAMPLES OF 3-OUT-OF-5 COMPLIANCE ENFORCEMENT PROCEDURES
  - APPENDIX G. CHEMICAL AND BACTERIOLOGICAL TESTS
  - APPENDIX K. HACCP PROGRAM
  - APPENDIX N. DRUG RESIDUE TESTING AND FARM SURVEILLANCE
  - **NOTE:** In the document, items followed by a "P" referred to the Pasteurized side while items followed by an "R" referring to the Raw side.

● Code of Federal Regulations Title 21, Part 133 – Cheeses and Related Cheese Products, http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?CFRPart=133

● Code of Federal Regulations Title 21, Part 131 – Milk and Cream, http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?CFRPart=131

● Swab Procurement: Hygiena PRO-Clean Rapid Protein Residue Test. 25 of the swabs come in a sealed aluminum foil envelope. https://www.hygiena.com/food-and-beverage-sales/united-states.html. Web site that a teacher can resource to obtain the sanitation swabs (Hygiena PRO-Clean Rapid Protein Residue Test), obtain a product brochure, and watch a video demonstration on use of the swabs. Updated for 2019. https://www.hygiena.com/pro-clean-food-and-beverage.html Another possibility is to contact a local dairy processing plant laboratory and ask the lab tech if they would either have some available or be able to order them for the school.

# Milk Quality and Products
## Form #479-6

Incorrect Marks ✓ ✗ ▬ •  Correct Mark ●

**Team Name**

This sheet is for demonstration and practice only. You must use a real scan sheet for actual competition.

**Team #**

**Code**

**Last Name**

**First Name**

**Written Exam A / Milk Production**

| | | | | | |
|---|---|---|---|---|---|
| 1 | A | B | C | D | E |
| 2 | A | B | C | D | E |
| 3 | A | B | C | D | E |
| 4 | A | B | C | D | E |
| 5 | A | B | C | D | E |
| 6 | A | B | C | D | E |
| 7 | A | B | C | D | E |
| 8 | A | B | C | D | E |
| 9 | A | B | C | D | E |
| 10 | A | B | C | D | E |
| 11 | A | B | C | D | E |
| 12 | A | B | C | D | E |
| 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 |
| 21 | A | B | C | D | E |
| 22 | A | B | C | D | E |
| 23 | A | B | C | D | E |
| 24 | A | B | C | D | E |
| 25 | A | B | C | D | E |
| 26 | A | B | C | D | E |
| 27 | A | B | C | D | E |
| 28 | A | B | C | D | F |
| 29 | A | B | C | D | E |
| 30 | A | B | C | D | E |

**Written Exam B / Milk Marketing**

| | | | | | |
|---|---|---|---|---|---|
| 31 | A | B | C | D | E |
| 32 | A | B | C | D | E |
| 33 | A | B | C | D | E |
| 34 | A | B | C | D | E |
| 35 | A | B | C | D | E |
| 36 | A | B | C | D | E |
| 37 | A | B | C | D | E |
| 38 | A | B | C | D | E |
| 39 | A | B | C | D | E |
| 40 | A | B | C | D | E |
| 41 | A | B | C | D | E |
| 42 | A | B | C | D | E |
| 43 | A | B | C | D | E |
| 44 | A | B | C | D | E |
| 45 | A | B | C | D | E |
| 46 | A | B | C | D | E |
| 47 | A | B | C | D | E |
| 48 | A | B | C | D | E |
| 49 | A | B | C | D | E |
| 50 | A | B | C | D | E |
| 51 | A | B | C | D | E |
| 52 | A | B | C | D | E |
| 53 | A | B | C | D | E |
| 54 | A | B | C | D | E |
| 55 | A | B | C | D | E |
| 56 | A | B | C | D | E |
| 57 | A | B | C | D | E |
| 58 | A | B | C | D | E |
| 59 | A | B | C | D | E |
| 60 | A | B | C | D | E |

**Problem Solving**

| | | | | | |
|---|---|---|---|---|---|
| 1 | A | B | C | D | E |
| 2 | A | B | C | D | E |
| 3 | A | B | C | D | E |
| 4 | A | B | C | D | E |
| 5 | A | B | C | D | E |
| 6 | A | B | C | D | E |
| 7 | A | B | C | D | E |
| 8 | A | B | C | D | E |
| 9 | A | B | C | D | E |
| 10 | A | B | C | D | E |
| 11 | A | B | C | D | E |
| 12 | A | B | C | D | E |
| 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 |

**Dairy / Non-Dairy Identification and Fat Content**

| I. Identification (Sample Number) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 Butter | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 2 Flavored Milk | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 3 Half and Half | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 4 Heavy Cream | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 5 Light Whipped Cream | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 6 Milk | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 7 Sour Cream | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 8 Margarine | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 9 Non Dairy Creamer | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 10 Non Dairy Flavored Beverage | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 11 Non Dairy Milk | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 12 Non Dairy Sour Cream | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 13 Non Dairy Whipped Topping | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **II. Fat Content** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| 1 0.05% - 0.5% | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 2 1% - 2% | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 3 3.25% - 3.5% | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 4 10.5% | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 6 18% | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 6 30% | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 7 36% | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 8 80% | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 9 Non Dairy Variable Fat | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

## Identification and Characteristics of Cheeses

Sample Number

| I. Identification | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 Blue/Bleu | | | | | | | | | | |
| 2 Brie | | | | | | | | | | |
| 3 Cheddar Mild | | | | | | | | | | |
| 4 Cheddar Sharp | | | | | | | | | | |
| 5 Cream/Neufchatel | | | | | | | | | | |
| 6 Edam/Gouda | | | | | | | | | | |
| 7 Monterey Jack | | | | | | | | | | |
| 8 Mozzarella | | | | | | | | | | |
| 9 Processed American | | | | | | | | | | |
| 10 Provolone | | | | | | | | | | |
| 11 Swiss | | | | | | | | | | |
| 12 Colby | | | | | | | | | | |
| 13 Feta | | | | | | | | | | |
| 14 Havarti | | | | | | | | | | |
| 15 Gruyere | | | | | | | | | | |
| 16 Muenster | | | | | | | | | | |
| 17 Parmesan | | | | | | | | | | |
| 18 Queso Fresco | | | | | | | | | | |
| 19 Ricotta | | | | | | | | | | |
| 20 Romano | | | | | | | | | | |

| II. Characteristics | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| A | | | | | | | | | | |
| B | | | | | | | | | | |
| C | | | | | | | | | | |
| D | | | | | | | | | | |
| E | | | | | | | | | | |
| F | | | | | | | | | | |

## CMT

Sample Number

| Score | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 0 | | | | | |
| 2 | | | | | |
| 4 | | | | | |
| 6 | | | | | |
| 8 | | | | | |

## Natural / Imitation

Sample Number

| Food Identification | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 Natural | | | | | | | | | | |
| 2 Imitation | | | | | | | | | | |

## Milk Flavor

Sample Number

| I. Defect | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 Acid | | | | | | | | | | |
| 2 Bitter | | | | | | | | | | |
| 3 Feed | | | | | | | | | | |
| 4 Flat-watery | | | | | | | | | | |
| 5 Foreign | | | | | | | | | | |
| 6 Garlic or onion | | | | | | | | | | |
| 7 Malty | | | | | | | | | | |
| 8 No defect | | | | | | | | | | |
| 9 Oxidized | | | | | | | | | | |
| 10 Rancid | | | | | | | | | | |
| 11 Salty | | | | | | | | | | |

| II. Score | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

Official Recipe for Preparing Off-Flavors of Milk
West Virginia FFA Association

- **One may achieve various intensities by diluting the sample with high-quality <u>pasteurized/homogenized milk</u> intended for table use.**
- **<u>The goal is to get students to be able to detect the slightest variation from normal fresh pasteurized/homogenized milk with no defect.</u>**
- **For tasting, samples should be tempered at 60°F (16°C).**

| | | |
|---|---|---|
| **Acid** | Add 1 to 1.5 ounces of fresh cultured buttermilk to a quart of fresh pasteurized/homogenized milk. | Prepared 24 to 48 hours prior to use. |
| **Bitter** | Add 1 (NoDoz®) or similar brand caffeine tablet to about 1 oz. of water and let it dissolve for 30 minutes. Then you add the "caffeine solution" to a quart of fresh pasteurized/homogenized milk. | **Note:** One may increase the (NoDoz®) or similar brand caffeine tablets in the solution to begin with or add the "caffeine solution" to a smaller volume of water to help students get the taste. |
| **Feed** | Add 1/2 ounce (1 tablespoon or 15.0 ml) of molasses and mix with one quart of pasteurized/homogenized milk. | **Important: There are ways to do this with roughages, but for the sake of simplicity we are using molasses.** |
| **Flat/Watery** | Add 4 to 6 ounces of distilled water to a quart of fresh pasteurized/homogenized milk. | Good quality tap water will work but may have some additional flavors. You may wish to use approximately 10% volume for the quart of milk. |
| **Foreign** | Add 1-teaspoon (5 to 6 ml of 2-fold or double) vanilla extract per quart of milk. | |
| **Garlic/Onion** | Add about 0.2 grams of garlic or onion salt or 3 drops of garlic or onion extract to a quart of pasteurized/homogenized milk. | **Optional:** Use garlic powder or cut up onion. If cut up onion is used, filter through a coffee filter or cheesecloth and allow sitting for 30 minutes. |
| **Malty** | Add ½ ounce (15 grams) Grape Nuts® or Grape Nuts Flakes® breakfast cereal to 3 ounces (about 100 ml) of milk <u>and</u> allow to sit for 20 to 30 minutes to create a stock solution. This stock solution should then be strained through cheesecloth, a coffee filter, etc. (in a funnel) into another container. *Add 1 ounce of the stock solution to a quart of milk.* | Add 1 to 1.5 teaspoons (5 – 7 ml) of unflavored malted milk powder (available at some grocery stores) to a quart of pasteurized/homogenized milk. |
| **Oxidized** | Expose one quart of pasteurized/homogenized milk in a clear glass or plastic (polyethylene) milk container to direct sunlight for 30 minutes to one hour. **Note:** <u>This is the most common form of oxidized milk found in homogenized milk.</u> **Do not use a container that is colored (yellow)** and keep the milk cool by placing in ice. Samples prepared in this way will probably develop the generic (metal-induced) off flavor within 36 to 48 hours after light exposure. | Metal-induced oxidized samples may be prepared by preparing 100 ml of 1 percent $CuSO_4.5H_2O$ as a "stock copper solution" and keep refrigerated. Add 0.5 to 1 ml of the "stock copper solution" to a quart of pasteurized/homogenized milk. **Note:** Prepare 24 to 48 hours prior to use. |
| **Rancid** | Add ½ ounce (15 grams) of blue cheese to a quart of pasteurized/homogenized milk and allow it to sit for 30 minutes. | Filter for the final sample using coffee filter or cheesecloth and funnel. |
| **Salty** | Add common table salt to a quart of fresh pasteurized/homogenized milk. | Determine the degree of saltiness by the amount of salt added to the milk. |
| **NO DEFECT** | Use fresh pasteurized/homogenized milk that has not been exposed to any of the treatments named. | |