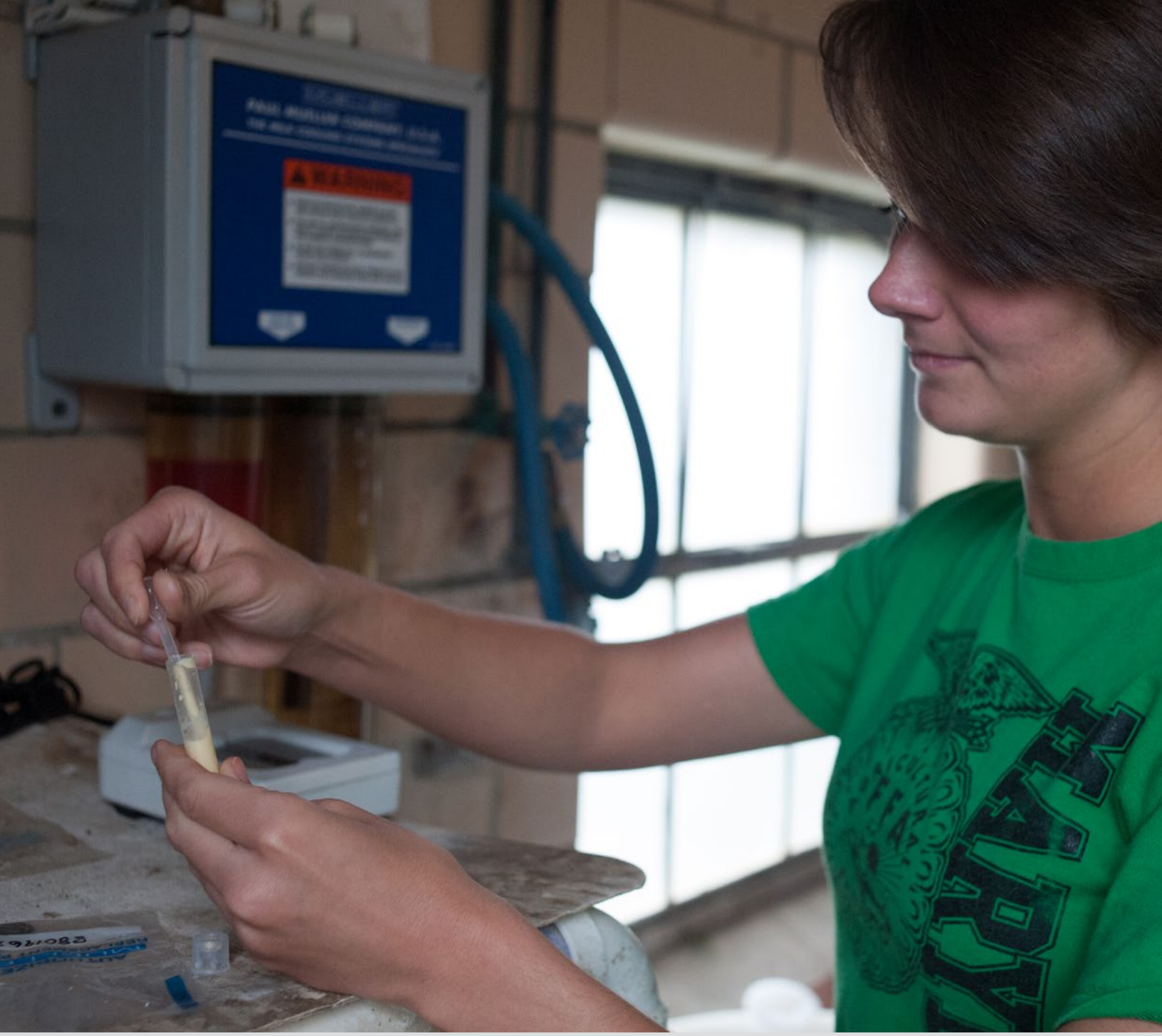


MILK QUALITY AND PRODUCTS

2017-2021

NATIONAL FFA

CAREER AND LEADERSHIP DEVELOPMENT EVENTS

IMPORTANT NOTE

Please thoroughly read the introduction section located on *FFA.org/cdeintro* for complete rules and procedures that are relevant to all National FFA Career/Leadership Development Events.

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, as well as assisting students in developing team decision-making skills.

The focus of the National FFA Milk Quality and Products Career Development Event 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

For information about milk production and related careers, see the reference section at the end of this handbook.

Objectives

This event will provide the participant with the ability to:

UTILIZE KNOWLEDGE OF MILK QUALITY

- Producing quality milk:
  - Regulations
  - Grades and classes of milk
  - Factors necessary to produce quality milk
- Cleaning and sanitizing:
  - General types of cleaners and sanitizers
  - Water hardness
  - Milkstone
  - Approved milking equipment and design
  - Proper milking procedures
- Cooling milk
- Identifying diseases transmitted to consumers via milk
- Recognizing causes of off flavors in milk

UTILIZE KNOWLEDGE OF MILK PRICING

- Marketing and marketing concepts:
  - Pricing trends
  - Economics
  - Supply and demand
- Federal milk marketing orders, economics and distribution:
  - Transportation costs
  - Cooperatives
  - Pricing

UTILIZE KNOWLEDGE OF THE COMPOSITION AND QUALITY CHARACTERISTICS OF RAW AND PASTEURIZED MILK AND MILK PRODUCTS

- Nonfat solids portion:
  - Milkfat
  - Adulterants, including water
  - Bacterial standards and testing
  - Quality testing
- Understand the causes and control of mastitis, its influences on milk quality and cheese yield and the use of mastitis detection methods in controlling the disease:
  - Causes
  - Prevention
  - Detection (California Mastitis Test and Direct Microscopic Somatic Cell Count)
  - Treatment
  - Regulatory programs
- Identify cheese varieties and characterize properties
- Identify flavor defects and evaluate milk quality
- Understand importance of dairy food safety programs
- Identify and compare dairy vs. non-dairy products

Event Rules

- 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 official FFA 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. Advisors must submit a special needs request form for participants with any allergies with certification. 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
- Materials provided by the CDE committee:
  - All paper and other supplies
  - Calculators
  - Clipboards
- Participants are **not** to bring:
  - Glass of any kind to the event
  - Cell phones, calculators or other electronic devices

FLOW OF EVENT

- Milk Flavor Identification and Evaluation: 20 minutes
- Product Identification: 20 minutes
- California Mastitis Test: 20 minutes
- Cheese Identification: 20 minutes
- Written Exam: 40 minutes
- Problem Solving: 40 minutes
- Team Activity: Varied based on activities

Team Activity

Team members will work together to determine producer milk acceptability based on some or all of the following tests.

Teams may have to perform the acceptability tests or analyze test results given. Teamwork will be assessed during the completion of the acceptability tests.

Examples of acceptability tests include:

- Recent producer history
- Percent TA (acidity)
- DMSCC (Direct Microscopic Somatic Cell Count)
- SPC (Standard Plate Count)
- PI count (Preliminary Incubation Count)
- Antibiotic screening test
- Sample temperature
- Sample freezing point
- Equipment
- Sanitation
- Food Safety

Teams will present their test findings, acceptability solution and improvement recommendations to a panel of judges. Order of participation and presentations will be based upon a random lottery draw.

TEAM ACTIVITY SCORING

- Accuracy of report results: 100 points
- Content of comments: 200 points
- Presentation (written/oral): 50 points
- Teamwork/Process: 50 points

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 defect (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°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 to 7	fair
2 to 4	poor
1	unacceptable/un-salable

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 ten 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%), lowfat milk (1.0%), reduced fat milk (2%), milk (3.25%), half and half (10.5%), butter (80%), sour cream (18%), flavored milk (6.05%-3.25%) light whipped cream (30%), heavy cream (36%)

- Non-Dairy Products: Margarine, non-dairy creamer, non-dairy sour cream, non-dairy milk, non-dairy flavored beverage and non-dairy whipped topping all of these are to be categorized as non-dairy fat.

CALIFORNIA MASTITIS TEST (40 POINTS)

- The California Mastitis Test will be scored using even numbers from 0 to 8 inclusive. (See below for the Scoring Guide for the California Mastitis Test.)
- Five samples of milk will be evaluated for abnormality, using the California Mastitis Test method.

Scoring Guide

CMT Test Score	Appearance	Participant Score	* Somatic Cell Count
Negative	Mixture liquid, no precipitate	0	0
T	Slight precipitate tends to disappear with paddle movement	2	200-300,000
1	Distinct precipitate but does not gel	4	400-500,000
2	Distinct gel formation	6	1,2000,000 – 1,500,000
3	Strong gel formation, which tends to adhere to paddle. Forms distinct central peak	8	0ver 5,000,000

*Reference

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 ten identified cheese samples. An example cheese characteristic problem can be found in the reference section of this handbook. (60 points possible).

NATIONAL FFA
CAREER AND LEADERSHIP DEVELOPMENT EVENTS

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

[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 (100 POINTS)

The problem solving test will consist of a total of 20 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.

WRITTEN EXAM (120 POINTS)

The written exam will be comprised of a total of 60 multiple choice items. The exam will be given in two parts with one part consisting of thirty (30) questions on quality milk production and a second part of thirty (30) questions on milk marketing.

TIEBREAKERS

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

TEAM

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

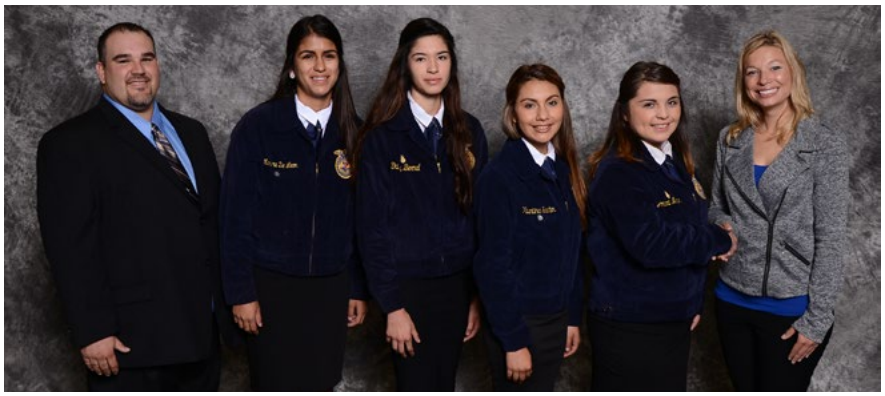
INDIVIDUAL

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

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	10 samples	120	480
Product identification	10 points/ sample	10 samples	100	400
California Mastitis Test	8 points/ sample	5 samples	40	160
Cheese type identification	10 points/ sample	10 samples	100	400
Problem Solving		20 questions	100	400
Written Exam		60 questions	120	480
		Total Possible Individual Points	580	2,320
			Team Activity	400
			TOTAL POINTS PER TEAM	**2,720**



Awards

Awards will be presented at the awards ceremony.

Awards are presented to teams as well as individuals based upon their rankings.

SPECIALTY AWARDS – CERTIFICATES

INDIVIDUAL

- Milk Flavor Identification – Top three Individuals
- Cheese Evaluation – Top three Individuals
- CMT Interpretation – Top three Individuals
- Problem Solving – Top three Individuals
- Written Exam – Top three Individuals
- Dairy/Non-Dairy Product Identification – Top three individuals

TEAM

- Team Activity/Performance – Top five teams for overall team activity and individual performance
- Coaches – Top five

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*
- 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*
- Dairy Foods: Producing the Best, Dr. Robert Marshall; Instructional Materials Laboratory *http://dass.missouri.edu/aged/resources/dairy-foods-booklet.pdf*
- 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 *http://www.idfa.org/docs/default-source/news-files/2013-pmo-final.pdf?sfvrsn=0*
  - SECTION 1. DEFINITIONS
  - SECTION 6. THE EXAMINATION OFMILK AND/ORMILK 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, items followed by an "r" refer 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*

Milk Production and Related Careers

The production of high quality raw milk requires the following:

- Clean and healthy cows.
- Equipment that is constructed appropriately from approved materials.
- Proper installation, cleaning, sanitizing and operation of the equipment.
- Rapid cooling of milk in compliance with regulatory requirements.
- Delivery of milk to the processor within 48 hours.
- Prevention of milk adulterants such as water, antibiotics, pesticides, cleaning and sanitizing chemicals, medicinal agents and any other extraneous materials.
- Application of tests for acceptability of milk.

Fresh raw milk should possess a sweet bland flavor, be free of feed flavors and contain low number of somatic cells and bacteria. Mixed milk from several cows (herd milk) is expected to contain approximately 3.5% milk fat, 3.1% protein and 4.8% lactose, the main characterizing constituents. Milk is the most important source of calcium in the diet of the average American, supplying approximately 70% of the dietary calcium.

Students considering a career related to the subject matter in this CDE may wish to consider that persons of the following groups contribute to the successful production of high quality milk and milk products:

- Dairy farmers and herd managers manage and milk cows and prepare milk for dealers
- Field representatives of the buying and/or selling organizations provide advice to producers and promote milk quality for buyers
- Milk sanitarians enforce public health regulations
- Food technologists apply chemical, physical, microbiological and sensory tests to deter- mine the quality and safety of milk and milk products

- Manufacturers and dealers of dairy equipment supply and service equipment
- Suppliers of chemicals used in cleaning and sanitizing provide chemicals and advice on proper use
- Veterinarians treat diseased animals and advise producers on disease prevention
- Milk plant operators process milk into finished product for consumers
- U. S. Food and Drug Administration manages the regulation of grade A milk
- U. S. Department of Agriculture manages the regulation of manufacturing grade milk and provides grading services to manufacturers of butter, cheese and nonfat dry milk
- Officials and technicians of the USDA Federal Milk Marketing Orders sample, test and account for milk marketed under federal orders. They also apply regulations to marketing raw milk
- State departments of agriculture and/or public health manage the public health regulations applied to milk at the state level
- State dairy extension agents provide advice to dairymen regarding production and sale of milk
- Accountants and financial advisors with knowledge of the milk industry
- Dairy food scientist
- Ag economist – knowledge of milking pricing exporting milking procedures of dairy cattle
- Dairy food nutritionist international marketing specialist with bilingual abilities
- Feed nutritionist
- Information technologist
- Milk hauler

NATIONAL FFA
CAREER AND LEADERSHIP DEVELOPMENT EVENTS

Communications Team Activity Rubric

50 points

INDICATOR	Very strong evidence of skill is present 5-4 points	Moderate evidence of skill is present 3-2 points	Strong evidence of skill is not present 1-0 points	Points Earned	Weight	Total Points
Oral Communication						
Speaking without hesitation	• Speaks very articulately without hesitation. • Never has the need for unnecessary pauses or hesitation when speaking.	• Speaks articulately but sometimes hesitates. • Occasionally has the need for a long pause or moderate hesitation when speaking.	• Speaks articulately but frequently hesitates. • Frequently hesitates or has long, awkward pauses while speaking.		X 1	
Tone	• Appropriate tone is consistent. • Speaks at the right pace to be clear. • Pronunciation of words is very clear and intent is apparent.	• Appropriate tone is usually consistent. • Speaks at the right pace most of the time but shows some nervousness. • Pronunciation of words is usually clear, sometimes vague.	• Has difficulty using an appropriate tone. • Pace is too fast; nervous. • Pronunciation of words is difficult to understand; unclear.		X 1	
Being detail -oriented	• Is able to stay fully detail-oriented. • Always provides details which support the issue; is well organized.	• Is mostly good at being detail-oriented. • Usually provides details which are supportive of the issue; displays good organizational skills.	• Has difficulty being detail-oriented. • Sometimes overlooks details that could be very beneficial to the issue; lacks organization.		X 1	
Speaking unrehearsed	• Speaks unrehearsed with comfort and ease. • Is able to speak quickly with organized thoughts and concise answers.	• Speaks unrehearsed mostly with comfort and ease but sometimes seems nervous or unsure. • Is able to speak effectively, has to stop and think and sometimes gets off focus.	• Shows nervousness or seems unprepared when speaking unrehearsed. • Seems to ramble or speaks before thinking.		X 1	

Communications Team Activity Rubric continued

INDICATOR	Very strong evidence of skill is present 5-4 points	Moderate evidence of skill is present 3-2 points	Strong evidence of skill is not present 1-0 points	Points Earned	Weight	Total Points
Connecting and articulating facts and issues	• Exemplary in connecting facts and issues and articulating how they impact the issue locally and globally. • Possesses a strong knowledge base and is able to effectively articulate information regarding related facts and current issues.	• Sufficient in connecting facts and issues and articulating how they impact the issue locally and globally. • Possesses a good knowledge base and is able to, for the most part, articulate information regarding related facts and current issues.	• Has difficulty with connecting facts and issues and articulating how they impact the issue locally and globally. • Possesses some knowledge base but is unable to articulate information regarding related facts and current issues.		X 1	
All team members participated	• All team members took an active role in the presentation.	• Three team members took an active role in the presentation.	• Two or less team members took an active role in the presentation.		X 1	
Non-Verbal Communication						
Attention (eye contact)	• Eye contact constantly used as an effective connection. • Constantly looks at the entire audience (90-100% of the time).	• Eye contact is mostly effective and consistent. • Mostly looks around the audience (60-80% of the time).	• Eye contact does not always allow connection with the speaker. • Occasionally looks at someone or some groups (less than 50% of the time).		X 1	
Mannerisms	• Does not have distracting manner-isms that affect effectiveness. • No nervous habits.	• Sometimes has distracting mannerisms that pull from the presentation. • Sometimes exhibits nervous habits or ticks.	• Has mannerisms that pull from the effectiveness of the presentation. • Displays some nervous habits; fidgets or anxious ticks.		X 1	
Gestures	• Gestures are purposeful and effective. • Hand motions are expressive and used to emphasize talking points. • Great posture (confident) with positive body language.	• Usually uses purposeful gestures. • Hands are sometimes used to express or emphasize. • Occasionally slumps; sometimes negative body language.	• Occasionally gestures are used effectively. • Hands are not used to emphasize talking points; hand motions are sometimes distracting. • ·Lacks positive body language; slumps.		X 1	
Well poised	• Is extremely well poised. • Poised and in control at all times.	• Usually is well poised. • Poised and in control most of the time; rarely loses composure.	• Isn't always well poised. • Sometimes seems to lose composure.		X 1	
					TOTAL POINTS	

NATIONAL FFA
CAREER AND LEADERSHIP DEVELOPMENT EVENTS

Teamwork Activity Rubric

50 points

INDICATOR	Very strong evidence of skill is present 5-4 points	Moderate evidence of skill is present 3-2 points	Strong evidence of skill is not present 1-0 points	Points Earned	Weight	Total Points
Managing team dynamics	• Completely committed to team dynamics, maturity and professionalism is always present. • In team conflicts, problem-solving and decision- making methods and skills are used to produce a positive compromise.	• Somewhat committed to team dynamics, maturity and professionalism is seldom present. • In team conflicts, problem-solving and decision-making methods and skills are sometimes used to produce a compromise. Sometimes involvement in this process is limited.	• Lacking team dynamics, maturity and professionalism. • When team conflict arises minimal or no attempt at a resolution is made by team members.		X 3	
Awareness of personality styles of others	• Totally conscious and respectful of differing attitudes, personalities and behaviors. • Language is free of bias, and completely shows an under-standing and respect for others' differences in learning and personality.	• Is, for the most part, respectful of others' differences in personality and behavior. • For the most part, language conveys an understanding of others' differences in learning and personality.	• Shows little tolerance for differing personalities and behaviors. • Language used may be expressed as not understanding others' differences in personality and learning styles.		X 1	
Uses positive and mature language and mannerisms	• Always uses mature language and mannerisms. • Never uses immature verbal and/or nonverbal communication. • Always has positive communications.	• Usually uses mature language and mannerisms. • Rarely uses immature verbal and/or nonverbal communication. • Usually has positive communications.	• Seldom or never uses mature language and mannerisms. • Frequently uses immature verbal and/or nonverbal communication. • Seldom has positive communications.		X 2	
Reacting to changes	• Has ability to react and transition effortlessly to change. • Shows excellent ability to adapt with unexpected change; thinks quickly; shows no sign of stress.	• Typically reacts well to changes. • Seems able to adapt to unexpected change most of the time; occasionally stresses.	• Has difficulty reacting well to changes. • Seems stressed by change.		X 1	
Handling tasks	• Handles tasks with ease, including task assignment. • Efficient in planning, managing and completing all tasks in a timely and organized fashion. • All project parts are assigned equally.	• Does a good job handling tasks with some ease, including task assignment. • Is thoughtful about the planning and sequencing of tasks, but occasional priority mistakes are made. • Some project parts are assigned equally.	• Has difficulty handling tasks, including task assignment. • Seems to have trouble deciding the order to do several tasks and struggles with completion in a timely manner. • No project parts are assigned equally.		X 3	
					TOTAL POINTS	

NATIONAL FFA
CAREER AND LEADERSHIP DEVELOPMENT EVENTS

Agriculture, Food and Natural Resources Content Standards

Measurement Assessed	Where measured in event	Academic Content Standards Addressed
AS.01.01. Performance Indicator: Evaluate the development and implications of animal origin, domestication and distribution on production practices and the environment.		
AS.01.01.01.c. Evaluate the implications of animal adaptations on production practices and the environment.	Exam	HS-LS4-3
AS.01.02.02.c. Devise and evaluate marketing plans for an animal agriculture product or service.	Exam Problem solving	HS-LS4-3
AS.02.02. Performance Indicator: Analyze procedures to ensure that animal products are safe for consumption.		
AS.02.02.02.c. Research and evaluate programs to assure the safety of animal products for consumption.	Exam	AFNR Career Cluster, Statement 1 AFNR Career Cluster – Animal Systems Pathway, Statement 3 STEM Career Cluster, Statement 1 Buying Goods and Services, Benchmarks: Grade 12, Statement 1 Buying Goods and Services, Benchmarks: Grade 12, Statement 3
AS.03.02 Performance Indicator: Analyze feed rations and assess if they meet the nutritional needs of animals.		
AS.03.02.01.c. Select appropriate feedstuffs for animals based on a variety of factors (e.g., economics, digestive system and nutritional needs, etc.).	Exam	
AS.03.02.02.c. Select and utilize animal feeds based on nutritional requirements, using rations for maximum nutrition and optimal economic production.	Exam	
BS.02.02. Performance Indicator: Implement standard operating procedures for the proper maintenance, use and sterilization of equipment in a laboratory.		
BS.02.02.02.b. Manipulate basic laboratory equipment and measurement devices (e.g., water bath, electrophoresis equipment, micropipettes, laminar flow hood, etc.).	California Mastitis Test Team activity Exam	
BS.02.02.03.b. Create a plan for sterilizing equipment in a laboratory according to standard operating procedures.	Exam Problem solving	

Agriculture, Food and Natural Resources Content Standards continued

Measurement Assessed	Where measured in event	Academic Content Standards Addressed
FPP.01.01. Performance Indicator: Analyze and manage operational and safety procedures in food products and processing facilities.		
FPP.01.01.01.b. Analyze and document attributes and procedures of current safety programs in food products and processing facilities.	Team activity Exam Problem solving	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2 AFNR Career Cluster, Statement 6 Manufacturing Career Cluster – Maintenance, Installation and Repair Pathway Statement 2 Manufacturing Career Cluster – Maintenance, Installation and Repair Pathway Statement 4 Manufacturing Career Cluster – Production Pathway 2 Manufacturing Career Cluster – Production Pathway 3
FPP.01.01.02.c. Devise strategies to maintain equipment and facilities for food products and processing systems.	Team activity Exam	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2 AFNR Career Cluster, Statement 6 Manufacturing Career Cluster – Maintenance, Installation and Repair Pathway Statement 2 Manufacturing Career Cluster – Maintenance, Installation and Repair Pathway Statement 4 Manufacturing Career Cluster – Production Pathway 2 Manufacturing Career Cluster – Production Pathway 3
FPP.01.02. Performance Indicator: Apply food safety and sanitation procedures in the handling and processing of food products to ensure food quality.		
FPP.01.02.01.c. Identify sources of contamination in food products and/or processing facilities and develop ways to eliminate contamination.	Team activity Exam Milk flavor	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
FPP.01.02.02.c. Examine, interpret and report outcomes from safe handling procedures and results from quality assurance tests.	California Mastitis Test Team activity Milk flavor	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
FPP.01.02.03.c. Interpret and evaluate results of quality assurance tests on food products and examine steps to implement corrective procedures.	California Mastitis Test Team activity Milk flavor Problem solving Exam	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
FPP.01.02.04.c. Conduct and interpret microbiological tests for food -borne pathogens.	California Mastitis Test Team activity	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2

Agriculture, Food and Natural Resources Content Standards continued

Measurement Assessed	Where measured in event	Academic Content Standards Addressed
FPP.01.03. Performance Indicator: Apply food safety procedures when storing food products to ensure food quality.		
FPP.01.03.01.c. Prepare plans that ensure implementation of proper food storage procedures.	Team activity Exam	
FPP.01.03.02.c. Evaluate the effectiveness of a current documentation procedure used within a food products and processing facility and recommend improvements.	Team activity Problem solving	
FPP.02.01. Performance Indicator: Apply principles of nutrition and biology to develop food products that provide a safe, wholesome and nutritious food supply for local and global food systems.		
FPP.02.01.01.c. Analyze the properties of food products to identify food constituents and evaluate nutritional value.	Milk flavor Exam Problem solving Cheese type identification	
FPP.02.01.02.b. Compare and contrast the nutritional needs of different human diets.	Exam	
FPP.02.02. Performance Indicator: Apply principles of microbiology and chemistry to develop food products to provide a safe, wholesome and nutritious food supply for local and global food systems.		
FPP.02.02.01.c. Design and conduct experiments to determine the chemical and physical properties of food products.	California Mastitis Test Team activity	
FPP.02.03. Performance Indicator: Apply principles of human behavior to develop food products to provide a safe, wholesome and nutritious food supply for local and global food systems.		
FPP.02.03.01.b. Examine, interpret and explain the meaning of required components on a food label.	Problem solving Product identification	
FPP.02.03.02.b. Determine consumer preference and market potential for a new food product.	Problem solving Exam	
FPP.03.01. Performance Indicator: Implement selection, evaluation and inspection techniques to ensure safe and quality food products.		
FPP.03.01.01.c. Outline procedures to assign quality and yield grades to food products according to industry standards.	Product identification Exam	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2 Buying Goods and Services, Benchmarks: Grade 12, Statement 7
FPP.03.01.02.c. Develop care and handling procedures to maintain original food quality and yield.	Team activity Problem solving Exam	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2 Buying Goods and Services, Benchmarks: Grade 12, Statement 7

Agriculture, Food and Natural Resources Content Standards continued

Measurement Assessed	Where measured in event	Academic Content Standards Addressed
FPP.03.01.04.c. Evaluate and grade food products from different classifications of food products.	Milk flavor Product identification Cheese identification	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2 Buying Goods and Services, Benchmarks: Grade 12, Statement 7
FPP.03.02. Performance Indicator: Design and apply techniques of food processing, preservation, packaging and presentation for distribution and consumption of food products.		
FPP.03.02.01.b. Compare weights and measurements of products and perform conversions between units of measure.	Problem solving Exam Team activity	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
FPP.03.02.02.c. Evaluate food quality factors on foods prepared for different markets (e.g., shelf life, shrinkage, appearance, weight, etc.).	Product identification Cheese identification Milk flavor Exam	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
FPP.03.02.04.b. Analyze the degree of desirable food qualities of foods stored in various packaging.	Problem solving Product identification Cheese identification Milk flavor	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
FPP.03.03. Performance Indicator: Create food distribution plans and procedures to ensure safe delivery of food products.		
FPP.03.03.01.c. Devise a strategy to determine ways for food distribution to reduce environmental impacts. PI, Exam and PS	Product identification Exam Problem solving	AFNR Career Cluster, Statement 7 AFNR Career Cluster – Food Products and Processing Pathway, Statement 3 Manufacturing Career Cluster – Logistics and Inventory Control, Pathway 2 Manufacturing Career Cluster – Manufacturing Product Process Development Pathway, Statement 1 Manufacturing Career Cluster – Manufacturing Product Process Development Pathway, Statement 2 Transportation, Distribution and Logistics Career Cluster, Statement 3 CCSS.ELA-Literacy.W.9-10.2 CCSS.ELA-Literacy.W.11-12.2 HS-ETS1-2
FPP.03.03.02.c. Make recommendations to improve safety procedures used in food distribution scenarios to ensure a safe product is being delivered to consumers.	Exam Team activity Problem solving	AFNR Career Cluster, Statement 7 AFNR Career Cluster – Food Products and Processing Pathway, Statement 3 Manufacturing Career Cluster – Logistics and Inventory Control, Pathway 2 Manufacturing Career Cluster – Manufacturing Product Process Development Pathway, Statement 1 Manufacturing Career Cluster – Manufacturing Product Process Development Pathway, Statement 2 Transportation, Distribution and Logistics Career Cluster, Statement 3 CCSS.ELA-Literacy.W.9-10.2 CCSS.ELA-Literacy.W.11-12.2 HS-ETS1-2

Agriculture, Food and Natural Resources Content Standards continued

Measurement Assessed	Where measured in event	Academic Content Standards Addressed
FPP.03.03.03.b. Assess how market demand for food products influences the distribution of food products.	Exam Problem solving	AFNR Career Cluster, Statement 7 AFNR Career Cluster – Food Products and Processing Pathway, Statement 3 Manufacturing Career Cluster – Logistics and Inventory Control, Pathway 2 Manufacturing Career Cluster – Manufacturing Product Process Development Pathway, Statement 1 Manufacturing Career Cluster – Manufacturing Product Process Development Pathway, Statement 2 Transportation, Distribution and Logistics Career Cluster, Statement 3 CCSS.ELA-Literacy.W.9-10.2 CCSS.ELA-Literacy.W.11-12.2 HS-ETS1-2
FPP.04.01. Performance Indicator: Examine the scope of the food industry by evaluating local and global policies, trends and customs for food production.		
FPP.04.01.01.b. Analyze the similarities and differences amongst policies and legislation that affect the food products and processing system in the U.S. or around the world.	Team activity Exam	HS-ETS1-3 Buying Goods and Services, Benchmarks: Grade 12, Statement 1 Buying Goods and Services, Benchmarks: Grade 12, Statement 2
FPP.04.01.02.a. Examine the impact of consumer trends on food products and processing practices (e.g., health and nutrition, organic, information about food products, local food movements, etc.).	Exam	HS-ETS1-3 Buying Goods and Services, Benchmarks: Grade 12, Statement 1 Buying Goods and Services, Benchmarks: Grade 12, Statement 2
FPP.04.02. Performance Indicator: Evaluate the significance and implications of changes and trends in the food products and processing industry in the local and global food systems.		
FPP.04.02.01.b. Analyze and document significant changes and trends in the food products and processing industry.	Problem solving Team activity Exam	Buying Goods and Services, Benchmarks: Grade 12, Statement 1
FPP.04.02.02.b. Assess the issues of safety and environmental concerns about foods and food processing (e.g., GMOs, irradiation, microorganisms, contamination, etc.).	Problem solving Team activity Exam	Buying Goods and Services, Benchmarks: Grade 12, Statement 1
FPP.04.02.03.b. Evaluate desirable and undesirable outcomes of emerging technologies used in the food products and processing systems.	Team activity Problem solving	Buying Goods and Services, Benchmarks: Grade 12, Statement 1
FPP.04.03. Performance Indicator: Identify and explain the purpose of industry organizations, groups and regulatory agencies that influence the local and global food systems.		
FPP.04.03.01.b. Evaluate the changes in the food products and processing industry brought about by industry organizations or regulatory agencies.	Exam Problem solving	Transportation, Distribution and Logistics Career Cluster – Transportation Systems/Infrastructure Planning, Management and Regulation Pathway, Statement 4 Buying Goods and Services, Benchmarks: Grade 12, Statement 7

Agriculture, Food and Natural Resources Content Standards continued

Measurement Assessed	Where measured in event	Academic Content Standards Addressed
FPP.04.03.02.c. Construct plans that ensure implementation of industry standards for food products and processing facilities.	Team activity	Transportation, Distribution and Logistics Career Cluster – Transportation Systems/Infrastructure Planning, Management and Regulation Pathway, Statement 4 Buying Goods and Services, Benchmarks: Grade 12, Statement 7
CS.01.01. Performance Indicator: Examine issues and trends that impact AFNR systems on local, state, national and global levels.		
CS.01.01.02.c. Evaluate emerging trends and the opportunities they may create within the AFNR systems.	Exam Problem solving	
CS.02.01.01.c. Evaluate geographic data and select necessary data sets to solve problems within AFNR systems.	Exam Problem solving	
CS.02.02. Performance Indicator: Examine the components of the AFNR systems and their impact on the local, state, national and global society and economy.		
CS.02.02.03.c. Evaluate how positive or negative changes in the local, state, national or global economy impacts AFNR systems.	Exam	
CS.03.01. Performance Indicator: Identify required regulations to maintain and improve safety, health and environmental management systems.		
CS.03.01.01.c. Evaluate how AFNR organizations/businesses promote improved health, safety and environmental management.	Exam	
CS.03.04. Performance Indicator: Use appropriate protective equipment and demonstrate safe and proper use of AFNR tools and equipment.		
CS.03.04.03.b. Assess and demonstrate appropriate operation, storage and maintenance techniques for AFNR tools and equipment.	Exam	
CRP.01.01. Performance Indicator: Model personal responsibility in the workplace and community.		
CRP.01.01.01.b. Analyze and predict how personal responsibility impacts the workplace and community.	Team activity	
CRP.01.01.02.b. Assess personal level of responsibility and examine opportunities for improvement.	Team activity	
CRP.02.01. Performance Indicator: Use strategic thinking to connect and apply academic learning, knowledge and skills to solve problems in the workplace and community.		
CRP.02.01.01.a. Distinguish opportunities to apply academic learning to solve problems in the workplace (e.g., identify how to: increase productivity, reduce costs, lower inputs, etc.).	Team activity	

Agriculture, Food and Natural Resources Content Standards continued

Measurement Assessed	Where measured in event	Academic Content Standards Addressed
CRP.02.01.01.b. Assess workplace problems and identify the most appropriate academic knowledge and skills to apply.	Team activity	
CRP.02.01.01.c. Apply academic knowledge and skills to solve problems in the workplace and reflect upon the results achieved.	Team activity	
CRP.02.02. Performance Indicator: Use strategic thinking to connect and apply technical concepts to solve problems in the workplace and community.		
CRP.02.02.01.c. Apply technical concepts to solve problems in the workplace and reflect upon the results achieved.	Team activity	
CRP.02.02.02.c. Apply technical concepts to solve problems in the community and reflect upon results achieved.	Team activity	
CRP.04.01. Performance Indicator: Speak using strategies that ensure clarity, logic, purpose and professionalism in formal and informal settings.		
CRP.04.01.01.a. Identify and categorize strategies for ensuring clarity, logic, purpose and professionalism in verbal and non-verbal communication (e.g., vocal tone, organization of thoughts, eye contact, preparation, etc.).	Team activity	
CRP.04.01.01.c. Evaluate other's verbal and non-verbal communications (e.g., speeches, presentations, oral reports, etc.) and propose recommendations for improvement in clarity, logic, purpose and professionalism.	Team activity	
CRP.04.01.02.a. Examine and assess personal ability to speak with clarity, logic, purpose and professionalism in formal and informal settings (e.g., speeches, interviews, presentations, oral reports, etc.).	Team activity	
CRP.04.01.02.b. Apply strategies for speaking with clarity, logic, purpose and professionalism in a variety of situations in formal and informal settings.	Team activity	
CRP.05.01. Performance Indicator: Assess, identify and synthesize the information and resources needed to make decisions that positively impact the workplace and community.		
CRP.05.01.01.c. Evaluate workplace and community decision-making processes and devise strategies for improvement.	Team activity	
CRP.05.01.02.c. Evaluate workplace and community situations and recommend the information and resources needed to support good decisions.	Team activity	

Agriculture, Food and Natural Resources Content Standards continued

Measurement Assessed	Where measured in event	Academic Content Standards Addressed
CRP.05.01.03.a. Classify the types of information (e.g., data, research, procedures, regulations, etc.) and resources (e.g., human, financial, technology, time, etc.) that may be used to make workplace and community decisions.	Team activity	
CRP.05.01.03.b. Analyze workplace and community decisions and assess the information and resources used to make those decisions.	Team activity	
CRP.05.01.03.c. Synthesize information and resources and apply to workplace and community situations to make positive decisions.	Team activity	
CRP.05.02. Performance Indicator: Make, defend and evaluate decisions at work and in the community using information about the potential environmental, social and economic impacts.		
CRP.05.02.01.c. Evaluate and defend decisions applied in the workplace and community situations.	Team activity	
CRP.05.02.02.c. Evaluate workplace and community situations and propose decisions to be made based upon the positive impact made on environment, social and economic areas.	Team activity	
CRP.06.01. Performance Indicator: Synthesize information, knowledge and experience to generate original ideas and challenge assumptions in the workplace and community.		
CRP.06.01.02.c. Devise strategies (e.g., ask questions, brainstorm ideas, present facts and information etc.) to challenge common assumptions in workplace and community situations.	Team activity	
CRP.06.02. Performance Indicator: Assess a variety of workplace and community situations to identify ways to add value and improve the efficiency of processes and procedures.		
CRP.06.02.01.c. Evaluate past workplace and community situations and determine how processes and procedures impacted outcomes.	Team activity	
CRP.07.02. Performance Indicator: Evaluate the validity of sources and data used when considering the adoption of new technologies, practices and ideas in the workplace and community.		
CRP.07.02.01.c. Propose valid and reliable data sources to use when considering the adoption of new technologies, practices and ideas.	Team activity	
CRP.07.02.02.c. Create and defend proposals for new technologies, practices and ideas using valid and reliable data sources.	Team activity	

Agriculture, Food and Natural Resources Content Standards continued

Measurement Assessed	Where measured in event	Academic Content Standards Addressed
CRP.08.01. Performance Indicator: Apply reason and logic to evaluate workplace and community situations from multiple perspectives.		
CRP.08.01.01.c. Evaluate how applying critical thinking skills can impact workplace and community situations.	Team activity	
CRP.08.01.02.c. Devise strategies to apply reason, logic and input from multiple perspectives to solve workplace and community problems.	Team activity	
CRP.08.02. Performance Indicator: Investigate, prioritize and select solutions to solve problems in the workplace and community.		
CRP.08.02.01.c. Devise strategies to evaluate the effectiveness of solutions for resolving workplace and community problems.	Team activity	
CRP.08.02.02.c. Evaluate and select solutions with greatest potential for success to solve workplace and community problems.	Team activity	
CRP.11.01. Performance Indicator: Research, select and use new technologies, tools and applications to maximize productivity in the workplace and community.		
CRP.11.01.02.c. Evaluate effectiveness and make recommendations for using new technologies, tools and applications in the workplace and community.		
CRP.12.01. Performance Indicator: Contribute to team-oriented projects and builds consensus to accomplish results using cultural global competence in the workplace and community.		
CRP.12.01.02.a. Identify and summarize techniques to build consensus in a team situation.	Team activity	
CRP.12.01.02.b. Apply consensus building techniques to accomplish results in team-oriented situations.	Team activity	
CRP.12.01.02.c. Devise and implement methods to obtain feedback from team members on their experiences after completing workplace and community projects.	Exam	
CRP.12.01.03.c. Evaluate personal level of cultural and global competence and implement plans for growth and improvement in workplace and community situations.	Problem solving	
CRP.12.02. Performance Indicator: Create and implement strategies to engage team members to work toward team and organizational goals in a variety of workplace and community situations (e.g., meetings, presentations, etc.).	Exam	

Agriculture, Food and Natural Resources Content Standards continued

Measurement Assessed	Where measured in event	Academic Content Standards Addressed
CRP.12.02.02.a. Examine and summarize workplace and community situations where it is important to engage team members to meet team and organizational goals (e.g., meetings, presentations, etc.).	Team activity	
CRP.12.02.02.b. Select strategies to engage team members and apply in a variety of situations.	Team activity	
CRP.12.02.02.c. Evaluate the effectiveness of strategies to engage team members in a variety of workplace and community situations.	Team activity	

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