

Food Science CDE

(rev. Oct 2021)

Purpose

The food science and technology career development event is designed to promote learning activities in food science and technology related to the food industry and to assist students in developing practical knowledge of principles used in a team decision-making process.

Eligibility

This event is open to all high school FFA chapters and FFA members in good standing. Members that have participated in a previous national event or previous state winning teams in this area are ineligible.

This event will be held during the June CDE Week.

Event Procedures

- A. Team make-up- The team will consist of four members with all four members' scores being totaled for the team score.
- B. It is highly recommended that participants wear FFA Official Dress for this event.
- C. The food science and technology career development event will consist of four activities: a team product development project, an objective test, a food safety and quality practicum and a sensory evaluation practicum.
- D. All team members will participate in all of the activities. There will be a possible 1,460 total points per team. The team product development project will be worth 400 points per team, the NEW team scenario will be worth 100 points per team, the objective test will be worth 150 points per individual and each of the two practicums will be worth 90 points per individual.
- E. *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.
- F. Observers will not be permitted in the event area while the event is in progress.
- H. All participants will be given an identification number by which they will be designated throughout the event.
- I. Each participant must provide:
 1. A clipboard that is clean and free of notes.
 2. Two sharpened No. 2 pencils.
 3. Electronic calculator- Calculators used in this event should be non-programmable and non-graphing. Calculators should have only basic functions such as addition, subtraction, multiplication, division, equals, percent, square root, +/- key. No other calculators are allowed to be used during the event including cell phones.
 4. Teams and/or individuals will not be permitted to use electronic media during the event. This includes but is not limited to cell phones, mp3 players, cameras, etc.

J. Participants will not be allowed to possess any personal electronic devices (i.e. cell phones, smart watches, air pods, etc) other than those approved by event officials. Participants who possess personal electronic devices without prior approval of the event officials will be disqualified from the event.

Event Format

A. Team Product Development Project

1. Each team will receive a product development scenario describing the need for a new or redesigned product that appeals to a potential market segment. The team's task will be to design a new food product or reformulate an existing product based on information contained within the product development scenario.
2. The team will be responsible for understanding and using the following concepts:
 - a. Cost of goods sold
 - b. Nutrition
 - c. Target audience
 - d. Quality control
 - e. Marketing and sales
 - f. Processing
 - g. Packaging
 - h. Food safety
 - i. Formulation concepts
 - j. Quality of presentation
3. Each team will be provided with the written scenario, poster board/construction paper, and necessary ingredient information in order to develop, label and package a product.
4. The team will have 60 minutes to respond to the product development scenario and reformulate or develop a product, calculate a nutritional label, develop the ingredient statement and information panel and develop the front or principle display panel to reflect the new product.
5. After this time period, each team member will contribute to a ten minute oral presentation delivered to a panel of judges. No electronic media will be used in the presentation.
6. Following the presentation there will be a ten minute question and answer period with the judges in which each team member is expected to contribute. All materials will be collected after the presentation.
7. Total time involved for each team will be 80 minutes. Total number of points possible for this activity will be 400 points.
8. Product development scenarios will describe a category, platform and market. These may include but are not limited to the following categories, platforms and markets listed below.
 - a. Categories
 - i. Cereal
 - ii. Snacks
 - iii. Meals
 - iv. Side dishes
 - v. Beverages
 - vi. Supplements
 - vii. Condiments
 - viii. Desserts
 - b. Platform
 - i. Frozen
 - ii. Refrigerated

- iii. Shelf-stable
 - iv. Convenience
 - v. Ready to eat
 - vi. Heat and serve
- c. Market (domestic and international)
 - i. Retail
 - ii. Wholesale
 - iii. Food service
 - iv. Convenience store
- 9. Example of scenario product from past events:
 - a. Ready to eat breakfast cereal for retail
 - b. Refrigerated frozen cookie dough for wholesale
 - c. Yogurt parfait for convenience store
 - d. Refrigerated, heat and serve pizza for retail
 - e. Shelf stable, dried fruit snack mix for retail
- 10. Evaluation criteria and points for team activity can be found on the team product development project scorecard at the end of this chapter.
- 11. Students will be provided with the necessary food and packaging choices to create their product for display and for reference during their team activity presentation.
- 12. Team Activity Platform will be shared with Advisors one month prior to the event.

B. Food Safety/Sanitation Team Activity

Each team will be given a situation (photos, videos, written scenarios, etc.) The team will work together to evaluate the situation and complete a safety/sanitation report evaluation which will include observations, degree of concern, recommendations/corrective actions. **(80 points)** Students will be evaluated on teamwork as well as their safety/sanitation report. **(20 points)** Scoring criteria can be found on the team activity preparation rubric.

C. Individual Activities

1. Objective Test
 - a. The objective questions administered during the food science and technology examination will be designed to determine each team member's understanding of the basic principles of food science and technology. The test will be comprised of questions taken from the last three (3) years of National FFA CDE Exams, which are primarily based on the list of references at the end of this chapter.
 - b. Team members will work individually to answer each of the 50 questions. Each person will have 60 minutes to complete the examination. Each question will be worth 3 points, for a total of **150 points**.
2. Practicums—Each team member will complete all parts of individual practicums, except for those noted as odd/even year events.
 - a. **Food Safety and Quality Practicum- 50 points**
 - i. *Customer Inquiry*- Each participant will be given five scenarios representing general consumer inquiries. Participants must determine if the consumer inquiry reflects a quality or safety issue and determine if it is a biological, chemical or physical

concern or hazard. (25 points)

ii. Product Specification Compliance (ODD YEARS)

Students will be given sample sets (actual products and/or data sets) and will be responsible for determining compliance with the provide specification requirements. This may include, but is not limited to determining if the product is within the net weight standards, product sizing requirements, pH, color analysis, viscosity measurement, fill level tolerances, packaging specification compliance, etc. Participants will be asked five questions regarding potential compliance violations presented within the sample set. **(25 points)**

b. Problem Solving/Math Practicum

i. Participants will answer a series of five mathematical calculations based on common food science themes. Questions may include nutrition calculations, ingredient quantity, cost benefit analysis, estimation of cost/margin of goods sold, conversions, processing conditions, etc.

Example Question: The perfect glass of sweet tea is 20 percent sugar. Jim is making a one-gallon container of sweet tea. How many cups of sugar should he add?

a. 2.4 cups

b. 3.2 cups

c. 3.4 cups

d. 4 cups

c. Sensory Evaluation Practicum– 40 points

i. Triangle Tests– Four different triangle tests will be conducted. Participants are expected to identify the different samples through flavor, aroma, visual cues, and/or textural differences. Answers will be given on the sheet provided. No list will be provided for this segment of the practicum. Each test is worth 5 points. **(20 points)**

ii. Aromas– Each participant will be asked to identify four different aromas from vials provided at each station and record the answer on the sheet provided. A list of potential aromas will be provided to each person. Each sample is worth 5 points. **(20 points)**

Aromas

- | | |
|----------------------|--------------------|
| 10. Apple | 26. Maple |
| 11. Banana | 27. Molasses |
| 12. Basil | 28. Nutmeg |
| 13. Butter | 29. Onion |
| 14. Cherry | 30. Orange |
| 15. Chocolate | 31. Oregano |
| 16. Cinnamon | 32. Peach |
| 17. Clove | 33. Peppermint |
| 18. Coconut | 34. Raspberry |
| 19. Coffee | 35. Sage |
| 20. Garlic | 36. Smoke (liquid) |
| 21. Ginger | 37. Strawberry |
| 22. Grape | 38. Vanilla |
| 23. Lemon | 39. Watermelon |
| 24. Licorice (anise) | 40. Wintergreen |
| 25. Lime | |

Scoring

Section	Time Allowed	Section Points	Total Points
Individual Activities			
Objective Test	60 minutes		150
<u>Practicums:</u>			
1. Food Safety and Quality Practicum	60 minutes		
a. Customer Inquiry		25	
b. *Product Specification Compliance		25 (*odd years)	
2. **Math/Problem Solving Practicum		25 (**even years)	
3. Sensory Evaluation Practicum			
a. Triangle Tests		20	
b. Aromas		20	
Total Individual Points			240
Team Activities			
1. Team Product Development Project	80 minutes		400
Package Design		100	
Product Development		250	
Response to Judges' Questions		50	
2. Food Safety/Sanitation Team Activity	TBD		100
Individual Points (240 pts x 4 members)			<u>960</u>
TOTAL TEAM POINTS			1,460

Tiebreakers

- A. Team:** Should a tie occur in the overall team placing, the tie will be broken by the highest team product development project score. If this score does not break the tie, then the highest number of total points earned from the objective test (adding all four team member scores) will break the tie. If a third tiebreaker is needed, the total points earned by the team in the food safety and quality practicum will be used.
- B. Individual:** To identify the high individual for this event in case of a tie, the highest objective test score will be used as the first tiebreaker, followed by the highest food safety and quality practicum score as the second tiebreaker.

Awards

Awards will be presented to individuals and/or teams based upon their rankings at the State Fair FFA Awards Breakfast. The first place team will represent Delaware at National Convention.

References

•Past CDE materials and other resources are available by logging in to FFA.org.

EXAM REFERENCES

- Principles of Food Science.4th edition.2015.Janet Ward and Larry Ward. The Goodheart-Willcox Company, INC.
 - Principles of Food Sanitation.5th Edition.2006.Norman G. Marriott and Robert B. Gravani, Springer Science + Business Media, Inc.
 - Institute of Food Technology website, <http://www.ift.org>
 - USDA Food Safety and Inspection Service website, <http://www.fsis.usda.gov>
 - US Food and Drug Administration, <http://www.FDA.gov>
- MATH/ PROBLEM SOLVINGREFERENCE

The event will utilize the USDA Food Safety Inspection Service Processing Inspectors' Calculations Handbook (revised 1995) as the resource for the development of problem-solving problems relating to the following sections: Conversions (e.g. metric, US equivalents, grams, ounces, percent, ppm, Celsius, Fahrenheit); Pearson's Square; Percent of an ingredient in a formula; Yield; Shrink loss; Volume of a container; Calorie calculations; Total energy calculations. The resource can be found at this link: https://www.fsis.usda.gov/sites/default/files/media_file/2020-07/7620.3.pdf

GENERAL REFERENCES

- Penn State Kitchen Chemistry: Experiments, resources and materials for educators and students, <http://foodscience.psu.edu/public/kitchen-chemistry>
- Food Safety Education, <https://www.fsis.usda.gov/wps/portal/food-safety-education/teach-others/download-materials/for-kids-and-teens/for-kids-and-teens>
- Partnership for Food Safety Education, <http://www.fightbac.org>
- FoodSafety.gov, <http://www.foodsafety.gov>
- Good Manufacturing Practices, <https://www.fda.gov/food/current-good-manufacturing-practices-cgmps/good-manufacturing-practices-gmps-21st-century-food-processing>
- Inspection Service Processing Inspectors' Calculations Handbook (revised 1995): <http://www.aamp.com/foodsafety/documents/Directive7620-3.pdf>
- The New and Improved Nutrition Facts Label -Key Changes, [https://www.fda.gov/media/99331/downloadlink:https://](https://www.fda.gov/media/99331/downloadlink:https://www.fsis.usda.gov/sites/default/files/media_file/2020-)

www.fsis.usda.gov/sites/default/files/media_file/2020-

Food Science - Form #713-3

Team Name

Incorrect Marks Correct Mark



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

Team #	Last Name	First Name
0 0 0 0		
1 1 1 1	A A A A A A A A A A A A	A A A A A A A A
2 2 2 2	B B B B B B B B B B B B	B B B B B B B B
3 3 3 3	C C C C C C C C C C C C	C C C C C C C C
4 4 4 4	D D D D D D D D D D D D	D D D D D D D D
5 5 5 5	E E E E E E E E E E E E	E E E E E E E E
6 6 6 6	F F F F F F F F F F F F	F F F F F F F F
7 7 7 7	G G G G G G G G G G G G	G G G G G G G G
8 8 8 8	H H H H H H H H H H H H	H H H H H H H H
9 9 9 9	I I I I I I I I I I I I	I I I I I I I I
	J J J J J J J J J J J J	J J J J J J J J
	K K K K K K K K K K K K	K K K K K K K K
	L L L L L L L L L L L L	L L L L L L L L
	M M M M M M M M M M M M	M M M M M M M M
	N N N N N N N N N N N N	N N N N N N N N
	O O O O O O O O O O O O	O O O O O O O O
	P P P P P P P P P P P P	P P P P P P P P
	Q Q Q Q Q Q Q Q Q Q Q Q	Q Q Q Q Q Q Q Q
	R R R R R R R R R R R R	R R R R R R R R
	S S S S S S S S S S S S	S S S S S S S S
	T T T T T T T T T T T T	T T T T T T T T
	U U U U U U U U U U U U	U U U U U U U U
	V V V V V V V V V V V V	V V V V V V V V
	W W W W W W W W W W W W	W W W W W W W W
	X X X X X X X X X X X X	X X X X X X X X
	Y Y Y Y Y Y Y Y Y Y Y Y	Y Y Y Y Y Y Y Y
	Z Z Z Z Z Z Z Z Z Z Z Z	Z Z Z Z Z Z Z Z

Code

0 0
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9

Objective Test	
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 E
29	A B C D E
30	A B C D E
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

Triangle Tests

1	2	3	4
0 0 0	0 0 0	0 0 0	0 0 0
1 1 1	1 1 1	1 1 1	1 1 1
2 2 2	2 2 2	2 2 2	2 2 2
3 3 3	3 3 3	3 3 3	3 3 3
4 4 4	4 4 4	4 4 4	4 4 4
5 5 5	5 5 5	5 5 5	5 5 5
6 6 6	6 6 6	6 6 6	6 6 6
7 7 7	7 7 7	7 7 7	7 7 7
8 8 8	8 8 8	8 8 8	8 8 8
9 9 9	9 9 9	9 9 9	9 9 9

Aromas

1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0
1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
2 2	2 2	2 2	2 2	2 2	2 2	2 2	2 2	2 2
3 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3
4 4	4 4	4 4	4 4	4 4	4 4	4 4	4 4	4 4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9

Problem Solving / Math Practicum

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

Food Safety and Quality Practicum

Customer Inquiry			
Scenario	The issue represented in this scenario is a:		Is the concern or hazard primarily:
	Food Quality Issue	Food Safety Issue	
1	Q	S	B C P
2	Q	S	B C P
3	Q	S	B C P
4	Q	S	B C P
5	Q	S	B C P

Product Specification Compliance

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



NATIONAL FFA
CAREER AND LEADERSHIP
DEVELOPMENT EVENTS

Team Product Development Project Scorecard

400 points

CHAPTER _____

STATE _____

TEAM NUMBER _____

	Possible Score	Team Score
Package Display Components		
Use and development of nutrition label		
• Required information present	10	
• Correct calculations	10	
• Correct organization	10	
Use and development of the ingredient statement		
• Present	10	
• Correct order and all ingredients included	10	
• Location on package	10	
Use of principle display panel to convey information		
• All required components	15	
• Correct information	15	
• Location on package	10	
PACKAGE DESIGN SUBTOTAL	100	
Product Development Oral Presentation		
Cost of goods sold		
• Costing	20	
• Accuracy		
Nutrition		
• Communicate nutritional quality of product	20	
• Apply nutritional quality to health benefits		
Target audience		
• Identification of key consumer	20	
Quality control		
• Key quality attribute of consistent product	20	
• Examples: flavor, color, texture, net weight, size, etc.		
Marketing and sales		
• Communicated with future users	20	
• Promotions		
• Market location		

Food Science and Technology

Team Product Development Project Scorecard continued

Product <ul style="list-style-type: none"> • Appearance • Texture • Shelf-life • Interaction of ingredients • Creativity 	20	
Processing <ul style="list-style-type: none"> • Description of how to make product • Equipment • Flow diagram, unit operations • People 	20	
Packaging <ul style="list-style-type: none"> • Materials used • Appropriate for use of product • Creativity 	20	
Food Safety <ul style="list-style-type: none"> • Discussed potential hazards/concerns associated with products 	20	
Formulation Concepts		
• How well did product match concept/product development scenario	30	
• Category	5	
• Platform	5	
Quality of Presentation		
• Equitable participation of team members	5	
• Organization	5	
• Use of time allowed	5	
• Professionalism	5	
• Presence & enthusiasm	5	
• Mannerisms	5	
Product Development Oral Presentation Subtotal	250	
Response to Judges' Questions		
Team Participation in Question Response <ul style="list-style-type: none"> • All team members contributed 	25	
Quality of Response Accuracy Ability to answer Originality Knowledge	25	
Response to Judges' Questions Subtotal	50	
TOTAL POINTS	400	



NATIONAL FFA
CAREER AND LEADERSHIP
DEVELOPMENT EVENTS

Team Activity Preparation Rubric

20 points

INDICATOR	Very strong evidence of skill 5-4 points	Moderate evidence of skill 3-2 points	Weak evidence of skill 1-0 points	Points Earned	Total Score
Effective listening	Clearly evident that all team members are listening.	Listening occurs but distraction is evident.	Not listening to each other and/or talking over each other.		
Oral communication	Clearly evident that all team members are discussing the topic.	Communication occurs but side conversations are occurring or two to three members dominating.	One member dominating conversation.		
Demonstrated cooperation	Clearly all team members completing tasks, sharing written and oral solutions. Clearly all team members respected the input of other team members.	Tasks primarily completed by two to three members, other members assist occasionally. Most team members respected the input of other team members.	Tasks primarily completed by one member, other members contributing only slightly. The team members did not respect the input of other team members.		
Participated in the team preparation	Clearly all team members are engaged, attentive, and making notes for the full term of event. Clearly all team members demonstrate efficient use of his/her time in comprising the plan.	Members are engaged and attentive with two to three making notes, participation fades over time. Most team members demonstrate efficient use of his/her time in comprising the plan.	One to two members form the primary team, other members participate occasionally early, fade over time. One to two team members demonstrate efficient use of his/her time in comprising the plan.		
TOTAL					

****for use with NEW team activity**

Food Safety Sanitation Report Form **80 POINTS**

Plant

Date

Location

Inspection Team Members' State

Team Number

Plant Contact

Contact Information

CATEGORY	OBSERVATION AND CONCERN	Recommendation or Corrective Action
1. General maintenance of physical facilities		
2. Cleaning and sanitizing of equipment and utensils		
3. Storage and handling of clean equipment and utensils		

Category	Observation and Concern	Recommendation or Corrective Action
4. Pest control		
5. Proper use and storage of cleaning compounds, sanitizers, and pesticides		
6. Employee Training		
7. Plant Design		
8. Quality Assurance Assessment		

Inspection Team Representative Signature _____