

**Tennessee FFA Association**

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**Food Science  
and Technology  
Handbook**

**2017-2021**

## Purpose

*The Tennessee 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.*

## Objectives

The Food Science and Technology Career Development Event provides the opportunity for the participant to:

- Gain an awareness of career and professional opportunities in the field of food science and technology.
- Experience group participation and leadership responsibilities in a competitive food science and technology program.
- Develop technical competence and personal initiative in a food science and technology occupation.

## Event Rules

- Team make-up—the team will consist of four members with all four members' scores being totaled for the team score.
- FFA Official Dress is NOT required for this event.
- 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.
  - Any participant in possession of an electronic device, except a calculator, in the event area is subject to disqualification.
- 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.

Each participant must provide:

- A clear, transparent clipboard that is clean and free of notes.
- Two sharpened No. 2 pencils.

- Electronic calculator—Calculators used in this event must 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.

## TEAM ACTIVITIES

### TEAM PRODUCT DEVELOPMENT PROJECT (400 POINTS POSSIBLE PER TEAM)

Two weeks before the event date, 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.

The team will be responsible for understanding and using the following concepts to develop a presentation addressing the following:

- Cost of goods sold
- Nutrition
- Target audience
- Quality control
- Marketing and sales
- Product
- Processing
- Packaging
- Food safety
- Formulation concepts
- Quality of presentation

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.

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.

Total number of points possible for this activity will be 400 points.

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.

### **Categories**

- Cereal
- Snacks
- Meals
- Side dishes
- Beverages
- Supplements
- Condiments
- Desserts

### **Platform**

- Frozen
- Refrigerated
- Shelf-stable
- Convenience
- Ready to eat
- Heat and serve

### **Market (domestic and international)**

- Retail
- Wholesale
- Food service
- Convenience store

Information about the product will be provided in the superintendent letter in the team orientation information.

**Example of scenario product from past events:**

Category	Platform	Market	Actual Product
Side dish	Ready to prepare	Retail or big box	Whole grain, low sodium side dish
Beverage	Shelf-stable	Retail	Shelf-stable specialty coffee
Side dish	Refrigerated	Retail	Side salad for baby boomers
Snack	Shelf-stable	Retail	Non-nut snack bar
Breakfast	Ready to eat	Retail	Single serve cereal for kids

Evaluation criteria and points for team product development activity can be found on the team product development scorecard.

**INDIVIDUAL ACTIVITIES****OBJECTIVE TEST (150 POINTS POSSIBLE PER INDIVIDUAL)**

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 come from the previous five year's National Food Science Objective Tests which can be found on FFA.ORG. A test bank will be maintained on the Downloads page of tnffa.org and updated annually.

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 three points, for a total of 150 points.

## PRACTICUMS

### FOOD SAFETY AND QUALITY PRACTICUMS (50 POINTS)

#### Customer Inquiry (25 points)

- Each participant will be given five scenarios representing general consumer inquiries. Participants must determine if the consumer inquiry reflects a quality or safety issue (two points per scenario) and determine if it is a biological, chemical or physical concern or hazard (three points per scenario). This is for a total of 25 points.

#### Product Specification Compliance (25 points)

- Students will be given sample sets (actual products and/or data sets) and will be responsible for determining compliance with the provided specification requirements. This may include, but is not limited to, determining if the product(s) 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)

### SENSORY EVALUATION PRACTICUMS (40 POINTS)

#### 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 five points.

## 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)

- |              |                      |                    |
|--------------|----------------------|--------------------|
| 1. Apple     | 12. Ginger           | 23. Peach          |
| 2. Banana    | 13. Grape            | 24. Peppermint     |
| 3. Basil     | 14. Lemon            | 25. Raspberry      |
| 4. Butter    | 15. Licorice (anise) | 26. Sage           |
| 5. Cherry    | 16. Lime             | 27. Smoke (liquid) |
| 6. Chocolate | 17. Maple            | 28. Strawberry     |
| 7. Cinnamon  | 18. Molasses         | 29. Vanilla        |
| 8. Clove     | 19. Nutmeg           | 30. Watermelon     |
| 9. Coconut   | 20. Onion            | 31. Wintergreen    |
| 10. Coffee   | 21. Orange           |                    |
| 11. Garlic   | 22. Oregano          |                    |

## Scoring

ACTIVITIES	Individual Points	Team Points
<b>Team Product Development Project</b>		400
<b>Food Safety and Quality</b>	50	200
<b>Sensory Evaluation</b>	40	160
<b>Written Exam</b>	150	600
<b>MAXIMUM POINTS</b>	<b>240</b>	<b>1,360</b>

## TIEBREAKERS

### TEAM:

1. Team Product Development
2. Individual Test (combined score)

### INDIVIDUAL:

1. Written Exam
3. Food Safety and Quality
4. Sensory Evaluation

## 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. Make sure to use discretion when selecting website references by only using reputable, proven sites. The following list contains references that may prove helpful during event preparation. The most current edition of resources will be used.

- Past CDE materials and other resources are available by logging in to [FFAorg](#)

## EXAM REFERENCES

- Previous five years National exams located at FFA.ORG
- 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, [www.FDA.org](http://www.FDA.org)



## GENERAL REFERENCES

- Penn State Kitchen Chemistry: Experiments, resources and materials for educators and students, <http://foodscience.psu.edu/public/kitchen-chemistry>
- Food Safety Education, [http://www.fsis.usda.gov/food\\_safety\\_education/for\\_kids\\_&\\_teens/index.asp](http://www.fsis.usda.gov/food_safety_education/for_kids_&_teens/index.asp)
- Partnership for Food Safety Education, <http://www.fightbac.org>
- FoodSafety.gov, <http://www.foodsafety.gov>

# Team Product Development Project Scorecard

400 points

CHAPTER	STATE	TEAM NUMBER	Possible Score	Team Score
<b>Package Display Components</b>				
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	
<b>PACKAGE DESIGN SUBTOTAL</b>			<b>100</b>	
<b>Product Development Oral Presentation</b>				
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				
Product			20	

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

# Food Safety Sanitation Report Form

## 20 points

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PLANT DATE

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LOCATION

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INSPECTION TEAM MEMBERS STATE TEAM NUMBER

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PLANT CONTACT

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CONTACT INFORMATION

CATEGORY AND OBSERVATION	Degree of Concern Critical, Major, Minor	Recommendation or Corrective Action
<ol style="list-style-type: none"> <li>1. General maintenance of physical facilities.</li> <li>2. Cleaning and sanitizing of equipment and utensils.</li> <li>3. Storage and handling of clean equipment and utensils.</li> <li>4. Pest control.</li> <li>5. Proper use and storage of cleaning compounds, sanitizers, and pesticides.</li> <li>6. Employee training.</li> <li>7. Plant design.</li> <li>8. Quality assurance assessment.</li> </ol>		

<b>CATEGORY</b> (20 points)	Observation (20 points)	Degree of Concern (20 points)	Recommendation or Corrective Action (20 points)

# Customer Inquiry Rubric

25 points

	Points Possible	Points Earned
<p><b>Scenario # 1:</b> This issue represented in this scenario is a:</p> <p><input type="checkbox"/> Food Quality Issue   <input type="checkbox"/> Food Safety Issue</p>	2	
<p>Is the concern or hazard primarily (<i>Check only one</i>):</p> <p><input type="checkbox"/> Biological                      <input type="checkbox"/> Physical  <input type="checkbox"/> Chemical</p>	3	
<p><b>Scenario # 2:</b> This issue represented in this scenario is a:</p> <p><input type="checkbox"/> Food Quality Issue  <input type="checkbox"/> Food Safety Issue</p>	2	
<p>Is the concern or hazard primarily (<i>Check only one</i>):</p> <p><input type="checkbox"/> Biological                      <input type="checkbox"/> Physical  <input type="checkbox"/> Chemical</p>	3	
<p><b>Scenario # 3:</b> This issue represented in this scenario is a:</p> <p><input type="checkbox"/> Food Quality Issue   <input type="checkbox"/> Food Safety Issue</p>	2	
<p>Is the concern or hazard primarily (<i>Check only one</i>):</p> <p><input type="checkbox"/> Biological                      <input type="checkbox"/> Physical  <input type="checkbox"/> Chemical</p>	3	
<p><b>Scenario # 4:</b> This issue represented in this scenario is a:</p> <p><input type="checkbox"/> Food Quality Issue   <input type="checkbox"/> Food Safety Issue</p>	2	
<p>Is the concern or hazard primarily (<i>Check only one</i>):</p> <p><input type="checkbox"/> Biological                      <input type="checkbox"/> Physical  <input type="checkbox"/> Chemical</p>	3	
<p><b>Scenario # 5:</b> This issue represented in this scenario is a:</p> <p><input type="checkbox"/> Food Quality Issue   <input type="checkbox"/> Food Safety Issue</p>	2	
<p>Is the concern or hazard primarily (<i>Check only one</i>):</p> <p><input type="checkbox"/> Biological                      <input type="checkbox"/> Physical  <input type="checkbox"/> Chemical</p>	3	
<b>TOTAL</b>	<b>25</b>	