



# FOOD SCIENCE AND TECHNOLOGY

2017-2021



NATIONAL FFA  
CAREER AND LEADERSHIP  
DEVELOPMENT EVENTS

### IMPORTANT NOTE

Please thoroughly read the introduction section located on [FFA.org/cdeintro](https://www.ffa.org/cdeintro) for complete rules and procedures that are relevant to all National FFA Career/Leadership Development Events.



### **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.*

## 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.
- It is highly recommended that participants wear FFA Official Dress 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 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)

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.

Each team will be provided with packaging materials, ingredients and necessary ingredient information in order to develop, label and package a product. 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.

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 time involved for each team will be 80 minutes. 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.

**FOOD SAFETY/SANITATION TEAM ACTIVITY (100 POINTS POSSIBLE PER TEAM)**

- Each team will be given a situation (e.g., photos, videos, written scenarios, live demonstrations or a combination). The team will work to together to evaluate the situation and complete a safety/sanitation report evaluation which will include observations, degree of concern, recommendations/corrective actions. Students will be evaluated on teamwork as well as their safety/sanitation report.

Rubric and scoring criteria can be found on the 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 be listed from the textbooks and websites specified in the reference section.

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

### PROBLEM SOLVING/MATH PRACTICUM (25 POINTS POSSIBLE PER INDIVIDUAL)

- 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



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

### **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 (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**

- 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)

- |                      |                    |
|----------------------|--------------------|
| 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

ACTIVITIES	Individual Points	Team Points
Team Product Development Project		400
Team Activity Preparation		20
Team Food Safety/Sanitation		80
Math/Problem Solving	25	100
Food Safety and Quality	50	200
Sensory Evaluation	40	160
Written Exam	150	600
<b>MAXIMUM POINTS</b>	<b>265</b>	<b>1,560</b>

### TIEBREAKERS

#### TEAM:

1. Team Product Development
2. Team Food Safety/Sanitation
3. Individual Test (combined score)

#### INDIVIDUAL:

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



## Awards

*Awards will be presented to individuals and teams based upon their rankings at an awards Ceremony.*

Awards are sponsored by a cooperating industry sponsor(s) 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. 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

- 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>



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# Team Product Development Project Scorecard

400 points

CHAPTER \_\_\_\_\_ STATE \_\_\_\_\_ TEAM NUMBER \_\_\_\_\_

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

Team Product Development Project Scorecard continued

<b>Product</b> <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>	20	
<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>		
• How well did product match concept/product development scenario	30	
• Category	5	
• Platform	5	
<b>Quality of Presentation</b>		
• Equitable participation of team members	5	
• Organization	5	
• Use of time allowed	5	
• Professionalism	5	
• Presence & enthusiasm	5	
• Mannerisms	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>	



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# 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
<b>Effective listening</b>	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.		
<b>Oral communication</b>	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.		
<b>Demonstrated cooperation</b>	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.		
<b>Participated in the team preparation</b>	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.		
				<b>TOTAL</b>	





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# Food Safety Sanitation Report Form

20 points

PLANT \_\_\_\_\_ DATE \_\_\_\_\_

LOCATION \_\_\_\_\_

INSPECTION TEAM MEMBERS STATE \_\_\_\_\_ TEAM NUMBER \_\_\_\_\_

PLANT CONTACT \_\_\_\_\_

CONTACT INFOMATION \_\_\_\_\_

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>		

Food Safety Sanitation Report Form 20 points continued

CATEGORY (20 points)	Observation (20 points)	Degree of Concern (20 points)	Recommendation or Corrective Action (20 points)



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# Customer Inquiry Rubric

25 points

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



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# Agriculture, Food and Natural Resource Content Standards

**ABS.01.03. Performance Indicator: Devise and apply management skills to organize and run an AFNR business in an efficient, legal and ethical manner.**

**ABS.01.03.02.a.** Identify and explain appropriate local, state, federal, international and industry regulations that impact the management and operation of AFNR businesses.

Objective Test

CCSS.ELA-LITERACY.SL.9-10.6  
CCSS.ELA-LITERACY.SL.11-12.6  
CCSS.ELA-LITERACY.L.9-10.6  
CCSS.ELA-LITERACY.L.11-12.6  
CCSS.ELA-LITERACY.RST.9-10.4  
CCSS.ELA-LITERACY.RST.11-12.4

**ABS.01.03.02.c.** Devise management or operational strategies to address and adhere to local, state, federal, international and industry regulations.

Team Activity

CCSS.ELA-LITERACY.SL.9-10.6  
CCSS.ELA-LITERACY.SL.11-12.6  
CCSS.ELA-LITERACY.L.9-10.6  
CCSS.ELA-LITERACY.L.11-12.6  
CCSS.ELA-LITERACY.RST.9-10.4  
CCSS.ELA-LITERACY.RST.11-12.4

**ABS.02.02. Performance Indicator: Assemble, interpret and analyze financial information and reports to monitor AFNR business performance and support decision-making (e.g., income statements, balance sheets, cash-flow analysis, inventory reports, break-even analysis, return on investment, taxes, etc.).**

**ABS.02.02.02.b.** Use accounting information to prepare financial reports associated with inventory in AFNR businesses (e.g., cost of goods sold, margins on goods, etc.).

Team Activity  
Math/Problem Solving

CCSS.ELA-LITERACY.W.9-10.9  
CCSS.ELA-LITERACY.W.11-12.9  
CCSS.ELA-LITERACY.RH.9-10.7  
CCSS.ELA-LITERACY.RH.11-12.7  
CCSS.MATH.CONTENT.HSS.ID.C.7  
CCSS.MATH.CONTENT.HSS.IC.B.6  
CCSS.MATH.CONTENT.HSN.Q.A.1  
Savings: Benchmarks: Grade 12, Statements 3  
Savings: Benchmarks: Grade 12, Statements 4  
Savings: Benchmarks: Grade 12, Statements 6  
Savings: Benchmarks: Grade 12, Statements 7  
Financial Investing: Benchmarks: Grade 12, Statement 2

**ABS.04.01. Performance Indicator: Analyze characteristics and planning requirements associated with developing business plans for different types of AFNR businesses.**

**ABS.04.01.03.c.** Prepare business plans for an AFNR business.

Team Activity

CCSS.ELA-LITERACY.L.9-10.6  
CCSS.ELA-LITERACY.L.11-12.6  
CCSS.ELA-LITERACY.RST.9-10.4  
CCSS.ELA-LITERACY.RST.11-12.4  
CCSS.ELA-LITERACY.W.9-10.2  
CCSS.ELA-LITERACY.W.11-12.2  
CCSS.ELA-LITERACY.W.9-10.9  
CCSS.ELA-LITERACY.W.11-12.9

*Agriculture, Food and Natural Resource Content Standards continued*

<b>ABS.04.02. Performance Indicator: Develop production and operational plans for an AFNR business.</b>		
<b>ABS.04.02.02.a.</b> Devise strategies to illustrate the production process of an AFNR business to produce a specific agricultural product.	Team Activity	AFNR Career Cluster – Agribusiness Systems Pathway, Statement 3 CCSS.ELA-LITERACY.ELA-W.9-10.2 CCSS.ELA-LITERACY.W.11-12.2 CCSS.ELA-LITERACY.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4
<b>ABS.04.02.02.b.</b> Identify and assess alternative production systems for a specific agricultural product.	Team Activity	AFNR Career Cluster – Agribusiness Systems Pathway, Statement 3 CCSS.ELA-LITERACY.ELA-W.9-10.2 CCSS.ELA-LITERACY.W.11-12.2 CCSS.ELA-LITERACY.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4
<b>ABS.04.02.02.c.</b> Create strategies to improve the production process of an agricultural product for an AFNR facility (e.g., SWOT- strengths, weaknesses, opportunities and threats, supply chain management, etc.).	Team Activity	AFNR Career Cluster – Agribusiness Systems Pathway, Statement 3 CCSS.ELA-LITERACY.ELA-W.9-10.2 CCSS.ELA-LITERACY.W.11-12.2 CCSS.ELA-LITERACY.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4
<b>ABS.05.02. Performance Indicator: Assess and apply sales principles and skills to accomplish AFNR business objectives.</b>		
<b>ABS.05.02.01.a.</b> Identify and explain components of the sales process for AFNR businesses (e.g., understanding needs, develop solutions, close sale, etc.).	Team Activity	CCSS.ELA-LITERACY.SL.9-10.6 CCSS.ELA-LITERACY.SL.11-12.6 CCSS.ELA-LITERACY.RH.9-10.7 CCSS.ELA-LITERACY.RH.11-12.7 Buying Goods & Services: Benchmarks: Grade 12, Statements 1 Buying Goods & Services: Benchmarks: Grade 12, Statements 3 Buying Goods & Services: Benchmarks: Grade 12, Statements 4 Buying Goods & Services: Benchmarks: Grade 12, Statements 5
<b>ABS.05.02.01.b.</b> Apply the sales process to AFNR businesses and communicate ways of accomplishing the businesses' goals and objectives.	Team Activity	CCSS.ELA-LITERACY.SL.9-10.6 CCSS.ELA-LITERACY.SL.11-12.6 CCSS.ELA-LITERACY.RH.9-10.7 CCSS.ELA-LITERACY.RH.11-12.7 Buying Goods & Services: Benchmarks: Grade 12, Statements 1 Buying Goods & Services: Benchmarks: Grade 12, Statements 3 Buying Goods & Services: Benchmarks: Grade 12, Statements 4 Buying Goods & Services: Benchmarks: Grade 12, Statements 5

*Agriculture, Food and Natural Resource Content Standards continued*

<b>ABS.05.03. Performance Indicator: Assess marketing principles and develop marketing plans to accomplish AFNR business objectives.</b>		
<b>ABS.05.03.01.a.</b> Identify and explain marketing principles used in AFNR businesses (4 P's-product, place, price, promotion; attention, interest, desire, action, etc.).	Team Activity Objective Test	AFNR Career Cluster – Agribusiness Systems Pathway, Statement 4
<b>ABS.05.03.01.b.</b> Assess alternative marketing strategies as related to marketing principles for AFNR businesses (e.g. value-adding, branding, niche marketing, etc.).	Team Activity	CCSS.ELA-LITERACY.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4 CCSS.ELA-LITERACY.W.9-10.2 CCSS.ELA-LITERACY.W.11-12.2 CCSS.ELA-LITERACY.RH.9-10.7 CCSS.ELA-LITERACY.RH.11-12.7 CCSS.ELA-LITERACY.SL.9-10.6 CCSS.ELA-LITERACY.SL.11-12.6 Buying Goods & Services: Benchmarks: Grade 12, Statements 1 Buying Goods & Services: Benchmarks: Grade 12, Statements 3 Buying Goods & Services: Benchmarks: Grade 12, Statements 4 Buying Goods & Services: Benchmarks: Grade 12, Statements 7
<b>ABS.05.03.02.b.</b> Compare and contrast the strategies of marketing for products and services used in AFNR businesses (e.g., direct marketing, commodities, etc.).	Team Activity	CCSS.ELA-LITERACY.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4 CCSS.ELA-LITERACY.W.9-10.2 CCSS.ELA-LITERACY.W.11-12.2 CCSS.ELA-LITERACY.RH.9-10.7 CCSS.ELA-LITERACY.RH.11-12.7 CCSS.ELA-LITERACY.SL.9-10.6 CCSS.ELA-LITERACY.SL.11-12.6 Buying Goods & Services: Benchmarks: Grade 12, Statements 1 Buying Goods & Services: Benchmarks: Grade 12, Statements 3 Buying Goods & Services: Benchmarks: Grade 12, Statements 4 Buying Goods & Services: Benchmarks: Grade 12, Statements 7

Agriculture, Food and Natural Resource Content Standards continued

<p><b>ABS.05.03.03.a.</b> Research and define the purpose, components and developmental processes of marketing plans for AFNR businesses.</p>	<p>Team Activity</p>	<p>CCSS.ELA-LITERACY.L.9-10.6                  CCSS.ELA-LITERACY.L.11-12.6                  CCSS.ELA-LITERACY.RST.9-10.4                  CCSS.ELA-LITERACY.RST.11-12.4                  CCSS.ELA-LITERACY.W.9-10.2                  CCSS.ELA-LITERACY.W.11-12.2                  CCSS.ELA-LITERACY.RH.9-10.7                  CCSS.ELA-LITERACY.RH.11-12.7                  CCSS.ELA-LITERACY.SL.9-10.6                  CCSS.ELA-LITERACY.SL.11-12.6                  Buying Goods &amp; Services: Benchmarks: Grade 12, Statements 1                  Buying Goods &amp; Services: Benchmarks: Grade 12, Statements 3                  Buying Goods &amp; Services: Benchmarks: Grade 12, Statements 4                  Buying Goods &amp; Services: Benchmarks: Grade 12, Statements 7</p>
<p><b>BS.01.01. Performance Indicator: Investigate and explain the relationship between past, current and emerging applications of biotechnology in agriculture (e.g., major innovators, historical developments, potential applications of biotechnology, etc.).</b></p>		
<p><b>BS.01.01.01.a.</b> Research and summarize the evolution of biotechnology in agriculture.</p>	<p>Objective Test</p>	<p>CCSS.ELA-Literacy.RI.9-10.1                  CCSS.ELA-Literacy.RI.11-12.1                  CCSS.ELA-Literacy.RI.9-10.6                  CCSS.ELA-Literacy.RI.11-12.6                  CCSS.ELA-Literacy.WI.9-10.2                  CCSS.ELA-Literacy.WI.11-12.2</p>
<p><b>BS.01.02. Performance Indicator: Evaluate the scope and implications of regulatory agencies on applications of biotechnology in agriculture and protection of public interests (e.g., health, safety, environmental issues, etc.).</b></p>		
<p><b>BS.01.02.01.a.</b> Compare and contrast differences between regulatory systems worldwide.</p>	<p>Objective Test</p>	<p>CCSS.ELA-Literacy.RI.9-10.5                  CCSS.ELA-Literacy.RI.11-12.5                  CCSS.ELA-Literacy.RI.9-10.6                  CCSS.ELA-Literacy.RI.11-12.6</p>
<p><b>BS.02.02. Performance Indicator: Implement standard operating procedures for the proper maintenance, use and sterilization of equipment in a laboratory.</b></p>		
<p><b>BS.02.02.01.a.</b> Research and implement standard operating procedures for laboratory equipment.</p>	<p>Team Activity</p>	
<p><b>BS.02.02.02.b.</b> Manipulate basic laboratory equipment and measurement devices (e.g., water bath, electrophoresis equipment, micropipettes, laminar flow hood, etc.).</p>	<p>Team Activity</p>	
<p><b>BS.02.04. Performance Indicator: Safely manage and dispose of biological materials, chemicals and wastes according to standard operating procedures.</b></p>		
<p><b>BS.02.04.01.a.</b> Research types of personal protective equipment and summarize how to properly utilize the equipment.</p>	<p>Team Activity Objective Test</p>	<p>CCSS.ELA-Literacy.RST.9-10.4                  CCSS.ELA-Literacy.RST.11-12.4</p>

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<p><b>BS.02.04.01.b.</b> Assess the need for personal protective equipment and select the appropriate equipment to wear when working with biological and chemical materials.</p>	<p>Food Safety and Quality Practicums</p>	<p>CCSS.ELA-Literacy.RST.9-10.4 CCSS.ELA-Literacy.RST.11-12.4</p>
<p><b>BS.02.05. Performance Indicator: Examine and perform scientific procedures using microbes, DNA, RNA and proteins in a laboratory.</b></p>		
<p><b>BS.02.05.05.a.</b> Synthesize the relationship between proteins, enzymes and antibodies.</p>	<p>Objective Test</p>	<p>CCSS.ELA-Literacy.RST.9-10.3 CCSS.ELA-Literacy.RST.11-12.3</p>
<p><b>BS.03.02. Performance Indicator: Apply biotechnology principles, techniques and processes to enhance the production of food through the use of microorganisms and enzymes.</b></p>		
<p><b>BS.03.02.02.a.</b> Examine enzymes, the changes they cause and the physical and chemical parameters that affect enzymatic reactions (e.g., food, cellulosic bioenergy, etc.).</p>	<p>Objective Test</p>	<p>HS-LS3-1</p>
<p><b>BS.03.02.03.a.</b> Identify and categorize foods produced through biotechnology (e.g., fermentation, etc.).</p>	<p>Objective Test</p>	
<p><b>BS.03.03. Performance Indicator: Apply biotechnology principles, techniques and processes to protect the environment and maximize use of natural resources (e.g., biomass, bioprospecting, industrial biotechnology, etc.).</b></p>		
<p><b>BS.03.03.02.a.</b> Define and summarize industrial biotechnology and categorize the benefits and risks associated with its use in manufacturing (e.g., fabrics, plastics, etc.). Objective Test</p>	<p>Objective Test</p>	
<p><b>BS.03.05. Performance Indicator: Apply biotechnology principles, techniques and processes to produce biofuels (e.g., fermentation, transesterification, methanogenesis, etc.).</b></p>		
<p><b>BS.03.05.03.a.</b> Research and explain the process of fermentation.</p>	<p>Objective Test</p>	<p>AFNR Career Cluster, Statement 5 CCSS.ELA-Literacy.RI.9-10.1 CCSS.ELA-Literacy.RI.11-12.1 CCSS.ELA-Literacy.RST.9-10.3 CCSS.ELA-Literacy.RST.11-12.3</p>
<p><b>FPP.01.01. Performance Indicator: Analyze and manage operational and safety procedures in food products and processing facilities.</b></p>		
<p><b>FPP.01.01.01.a.</b> Research purposes and objectives of safety programs in food products and processing facilities (e.g., Sanitation Standard Operating Procedures (SSOP); Good Manufacturing Practices (GMP); worker safety, etc.).</p>	<p>Objective Text Team Activity</p>	<p>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</p>



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<p><b>FPP.01.01.01.b.</b> Analyze and document attributes and procedures of current safety programs in food products and processing facilities.</p>	<p>Food Safety and Quality Practicums</p>	<p>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</p>
<p><b>FPP.01.01.01.c.</b> Construct plans that ensure implementation of safety programs for food products and processing facilities.</p>	<p>Team Activity Food Safety and Quality Practicums</p>	<p>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</p>
<p><b>FPP.01.01.02.a.</b> Research and categorize types of equipment used in food products and processing systems.</p>	<p>Objective Test</p>	<p>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</p>
<p><b>FPP.01.01.02.b.</b> Assess equipment and facility maintenance used in food products and processing systems (e.g., specifications for machines, sanitation procedures, repair protocol, etc.).</p>	<p>Team Activity</p>	<p>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</p>
<p><b>FPP.01.01.02.c.</b> Devise strategies to maintain equipment and facilities for food products and processing systems.</p>	<p>Team Activity Food Safety and Quality Practicums</p>	<p>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</p>

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<b>FPP.01.02. Performance Indicator: Apply food safety and sanitation procedures in the handling and processing of food products to ensure food quality.</b>		
<b>FPP.01.02.01.a.</b> Examine contamination hazards associated with food products and processing (e.g., physical, chemical and biological).	Objective Test Team Activity Food Safety and Quality Practicums	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
<b>FPP.01.02.01.b.</b> Outline procedures to eliminate possible contamination hazards associated with food products and processing.	Objective Test Team Activity Food Safety and Quality Practicums	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
<b>FPP.01.02.01.c.</b> Identify sources of contamination in food products and/or processing facilities and develop ways to eliminate contamination.	Objective Test Team Activity Food Safety and Quality Practicums	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
<b>FPP.01.02.02.a.</b> Research and summarize procedures of safe handling protocols (e.g., Hazard Analysis and Critical Control Points Plan (HACCP); Critical Control Point procedures (CCP); Good Agricultural Practices Plan (GAP), etc.).	Objective Test	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
<b>FPP.01.02.02.b.</b> Construct plans that ensure implementation of safe handling procedures on food products.	Team Activity	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
<b>FPP.01.02.02.c.</b> Examine, interpret and report outcomes from safe handling procedures and results from quality assurance tests.	Food Safety and Quality Practicums	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
<b>FPP.01.02.03.a.</b> Research purposes and objectives of quality assurance tests on food products (e.g., produce safety regulation, safe food transport, food contaminants, etc.).	Objective Test	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
<b>FPP.01.02.03.c.</b> Interpret and evaluate results of quality assurance tests on food products and examine steps to implement corrective procedures.	Food Safety and Quality Practicums	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
<b>FPP.01.02.04.a.</b> Describe the effects food-borne pathogens have on food products and humans. Objective Test	Objective Test	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
<b>FPP.01.02.04.c.</b> Conduct and interpret microbiological tests for food-borne pathogens.	Team Activity	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2
<b>FPP.01.03. Performance Indicator: Apply food safety procedures when storing food products to ensure food quality.</b>		
<b>FPP.01.03.01.a.</b> Identify and summarize purposes of food storage procedures (e.g., first in/first out, temperature regulation, monitoring, etc.).	Objective Test	

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FPP.01.03.01.b. Analyze characteristics of food products and determine appropriate storage procedures.	Food Safety and Quality Practicums	
FPP.01.03.01.c. Prepare plans that ensure implementation of proper food storage procedures.	Food Safety and Quality Practicums Team Activity	
FPP.01.03.02.a. Assess procedures of electronic and paper-based documentation methods in food products and processing systems.	Food Safety and Quality Practicums Team Activity	
FPP.01.03.02.b. Demonstrate and explain methods of documentation procedures within food products and processing systems.	Team Activity	
FPP.01.03.02.c. Evaluate the effectiveness of a current documentation procedure used within a food products and processing facility and recommend improvements. Prod Spec	Team Activity	
<b>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.</b>		
FPP.02.01.01.a. Research and summarize properties of common food constituents (e.g., proteins, carbohydrates, fats, vitamins, minerals).	Objective Test	
FPP.02.01.01.b. Compare and contrast the relative value of food constituents relative to food product qualities (e.g., taste, appearance, etc.).	Sensory Evaluation Practicums Objective Test Team Activity	
FPP.02.01.01.c. Analyze the properties of food products to identify food constituents and evaluate nutritional value.	Objective Test Team Activity	
FPP.02.01.02.b. Compare and contrast the nutritional needs of different human diets.	Objective Test	
<b>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.</b>		
FPP.02.02.01.a. Examine the basic chemical makeup of different types of food.	Objective Test	
FPP.02.02.01.b. Explain how the chemical and physical properties of foods influence nutritional value and eating quality.	Objective Test Sensory Evaluation Practicums	
FPP.02.02.01.c. Design and conduct experiments to determine the chemical and physical properties of food products.	Sensory Evaluation Practicums	
FPP.02.02.02.a. List common food additives and identify their properties (e.g., preservatives, antioxidants, buffers, stabilizers, colors, flavors, etc.).	Objective Test	

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FPP.02.02.02.b. Describe the purpose of common food additives and how they influence the chemistry of food.	Objective Test	
FPP.02.02.03.a. Research the application of biochemistry in the development of new food products (e.g., value added food products, genetically engineered food products, etc.).	Objective Test	
FPP.02.02.03.a. Analyze how food products and processing facilities use biochemistry concepts to develop new food products.	Objective Test	
<b>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.</b>		
FPP.02.03.01.a. Examine the importance of food labeling to the consumer.	Objective Test Team Activity	
FPP.02.03.01.b. Examine, interpret and explain the meaning of required components on a food label.	Objective Test Team Activity	
FPP.02.03.01.c. Determine a strategy to prepare and label foods according to the established standards of regulatory agencies.	Objective Test Team Activity	
FPP.02.03.02.a. Research factors in planning and developing a new food product (e.g., regulation, creativity, economics, etc.).	Objective Test Team Activity	
FPP.02.03.02.b. Determine consumer preference and market potential for a new food product.	Team Activity	
FPP.02.03.02.c. Design new food products that meet a variety of goals (e.g., consumer preferences, market, nutritional needs, regulatory requirements, etc.).	Team Activity	
<b>FPP.03.01. Performance Indicator: Implement selection, evaluation and inspection techniques to ensure safe and quality food products.</b>		
FPP.03.01.01.a. Summarize characteristics of quality and yield grades of food products.	Objective Test	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.03.01.01.b. Analyze factors that affect quality and yield grades of food products.	Objective 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 Buying Goods and Services, Benchmarks: Grade 12, Statement 7

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<b>FPP.03.01.02.a.</b> Summarize procedures to select raw food products based on yield grades and quality grades.	Objective Test	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
<b>FPP.03.01.02.b.</b> Assemble procedures to perform quality-control inspections of raw food products for processing.	Objective 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 Buying Goods and Services, Benchmarks: Grade 12, Statement 7
<b>FPP.03.01.02.c.</b> Develop care and handling procedures to maintain original food quality and yield.	Team Activity	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
<b>FPP.03.01.03.a.</b> Identify and describe protocols for inspection and harvesting techniques for animal food products (e.g., pre-mortem and post-mortem inspections, Food Safety Inspection Service guidelines (FSIS), etc.).	Objective Test	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
<b>FPP.03.01.03.b.</b> Examine and evaluate inspection and harvesting of animals using regulatory agency approved or industry-approved techniques.	Objective Test	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
<b>FPP.03.01.04.a.</b> Identify and describe foods derived from different classifications of food products (e.g., meat, egg, poultry, fish, dairy, fruits, vegetables, grains, legumes, oilseeds, etc.).	Objective Test	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
<b>FPP.03.01.04.b.</b> Examine and summarize desirable qualities of food products derived from different classifications of food products.	Objective 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 Buying Goods and Services, Benchmarks: Grade 12, Statement 7
<b>FPP.03.01.04.c.</b> Evaluate and grade food products from different classifications of food products.	Sensory Evaluation Practicums Team Activity	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
<b>FPP.03.02. Performance Indicator: Design and apply techniques of food processing, preservation, packaging and presentation for distribution and consumption of food products.</b>		
<b>FPP.03.02.01.a.</b> Identify and explain English and metric measurements used in the food products and processing industry.	Objective Test Math/Problem Solving	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3

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<b>FPP.03.02.01.b.</b> Compare weights and measurements of products and perform conversions between units of measure.	Team Activity Math/Problem Solving	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
<b>FPP.03.02.01.c.</b> Design plans to formulate and package food products using a variety of weights and measures.	Team Activity	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
<b>FPP.03.02.02.a.</b> Differentiate between methods and materials used for processing food for different markets (e.g., fresh food products, ready to eat food products, etc.).	Objective Test Team Activity	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
<b>FPP.03.02.02.b.</b> Outline appropriate methods and prepare foods for sale and distribution for different markets.	Team Activity	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
<b>FPP.03.02.02.c.</b> Evaluate food quality factors on foods prepared for different markets (e.g., shelf life, shrinkage, appearance, weight, etc.).	Sensory Evaluation Practicums Food Safety and Quality Practicums Team Activity	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
<b>FPP.03.02.03.a.</b> Identify methods of food preservation and give examples of foods preserved by each method.	Objective Test	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
<b>FPP.03.02.03.b.</b> Analyze and document food preservation processes and methods on a variety of food products.	Team Activity	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
<b>FPP.03.02.03.c.</b> Devise strategies to preserve different foods using various methods and techniques. Prod Spec,	Team Activity	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
<b>FPP.03.02.04.a.</b> Summarize types of materials and methods used in food packaging and presentation.	Objective Test	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
<b>FPP.03.02.04.b.</b> Analyze the degree of desirable food qualities of foods stored in various packaging	Team Activity Food Safety and Quality Practicums	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
<b>FPP.03.02.04.c.</b> Construct and implement methods of selecting packaging materials to store a variety of food products.	Team Activity	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3
<b>FPP.03.03. Performance Indicator: Create food distribution plans and procedures to ensure safe delivery of food products.</b>		
<b>FPP.03.03.01.a.</b> Assess the environmental impact of distributing food locally and globally.	Objective Test	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

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<p><b>FPP.03.03.02.a.</b> Examine the various paths food products take to get from food processing centers to consumers.</p>	<p>Objective Test</p>	<p>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</p>
<p><b>FPP.03.03.02.b.</b> Interpret safety procedures used in food distribution to ensure a safe product is being delivered to consumers.</p>	<p>Team Activity</p>	<p>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</p>
<p><b>FPP.03.03.02.c.</b> Make recommendations to improve safety procedures used in food distribution scenarios to ensure a safe product is being delivered to consumers.</p>	<p>Food Safety and Quality Practicums</p>	<p>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</p>

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<p><b>FPP.03.03.03.a.</b> Research and summarize different types of market demands for food products (e.g., local food, organic, non-GMO, etc.).</p>	<p>Objective Test</p>	<p>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</p>
<p><b>FPP.03.03.03.b.</b> Assess how market demand for food products influences the distribution of food products.</p>	<p>Team Activity</p>	<p>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</p>
<p><b>FPP.03.03.03.c.</b> Propose distribution plans for food products that meet specific market demands.</p>	<p>Team Activity</p>	<p>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</p>
<p><b>FPP.04.01. Performance Indicator: Examine the scope of the food industry by evaluating local and global policies, trends and customs for food production.</b></p>		
<p><b>FPP.04.01.01.a.</b> Research and summarize examples of policy and legislation that affect food products and processing systems in the United States and around the world (e.g., labeling, GMOs, biosecurity, etc.).</p>	<p>Objective Test</p>	<p>HS-ETS1-3 Buying Goods and Services, Benchmarks: Grade 12, Statement 1 Buying Goods and Services, Benchmarks: Grade 12, Statement 2</p>



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<b>FPP.04.01.02.a.</b> 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.).	Objective Test	HS-ETS1-3 Buying Goods and Services, Benchmarks: Grade 12, Statement 1 Buying Goods and Services, Benchmarks: Grade 12, Statement 2
<b>FPP.04.01.02.b.</b> Construct and implement methods to obtain data on food consumer trends in a specific market.	Team Activity	HS-ETS1-3 Buying Goods and Services, Benchmarks: Grade 12, Statement 1 Buying Goods and Services, Benchmarks: Grade 12, Statement 2
<b>FPP.04.01.02.c.</b> Devise a strategy to create food products that meet a specific consumer trend in a specific market.	Team Activity	HS-ETS1-3 Buying Goods and Services, Benchmarks: Grade 12, Statement 1 Buying Goods and Services, Benchmarks: Grade 12, Statement 2
<b>FPP.04.01.03.a.</b> Compare and contrast cultural differences regarding food products and processing practices.	Objective Test	HS-ETS1-3 Buying Goods and Services, Benchmarks: Grade 12, Statement 1 Buying Goods and Services, Benchmarks: Grade 12, Statement 2
<b>FPP.04.01.03.c.</b> Propose culturally sensitive food processing and distribution practices.	Team Activity	HS-ETS1-3 Buying Goods and Services, Benchmarks: Grade 12, Statement 1 Buying Goods and Services, Benchmarks: Grade 12, Statement 2
<b>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.</b>		
<b>FPP.04.02.01.a.</b> Describe and explain the components of the food products and processing industry (e.g., processing, distribution, byproducts, etc.).	Objective Test	Buying Goods and Services, Benchmarks: Grade 12, Statement 1
<b>FPP.04.02.01.b.</b> Analyze and document significant changes and trends in the food products and processing industry.	Objective Test	Buying Goods and Services, Benchmarks: Grade 12, Statement 1
<b>FPP.04.02.01.c.</b> Predict and defend upcoming changes and trends in the food products and processing industry.	Team Activity	Buying Goods and Services, Benchmarks: Grade 12, Statement 1
<b>FPP.04.02.02.a.</b> Identify and explain environmental and safety concerns about the food supply.	Objective Test	Buying Goods and Services, Benchmarks: Grade 12, Statement 1
<b>FPP.04.02.02.c.</b> Examine and respond to consumer concerns about the environment and safety of the food supply using accurate information regarding food products and processing systems and practices.	Food Safety and Quality Practicum	Buying Goods and Services, Benchmarks: Grade 12, Statement 1
<b>FPP.04.02.03.a.</b> Research current and emerging technologies related to food products and processing (e.g., high pressure processing of foods, automation, biotechnology, etc.).	Objective Test	Buying Goods and Services, Benchmarks: Grade 12, Statement 1

Agriculture, Food and Natural Resource Content Standards continued

<b>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.</b>		
FPP.04.03.01.a. Examine and summarize the purposes of organizations that influence or regulate the food products and processing industry.	Objective Test	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
FPP.04.03.02.a. Examine the importance and usage of regulatory oversight of food safety and security in food products and processing (e.g., internationally, nationally, state and local).	Objective Test	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
<b>CS.01.01. Performance Indicator: Examine issues and trends that impact AFNR systems on local, state, national and global levels.</b>		
CS.01.01.02.c. Evaluate emerging trends and the opportunities they may create within the AFNR systems.	Team Activity	
<b>CS.01.03. Performance Indicator: Identify public policies and their impact on AFNR systems.</b>		
CS.1.03.02.a. Identify influential historical and current public policies that impact AFNR systems.	Objective Test	
<b>CS.02.01. Performance Indicator: Research geographic and economic data related to AFNR systems.</b>		
CS.02.01.02.b. Analyze a set of economic data and analyze how it impacts an AFNR system.	Math/Problem Solving	
CS.02.01.02.c. Devise a strategy to solve a problem in an AFNR system using a set of economic data.	Team Activity	
<b>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.</b>		
CS.02.02.01.a. Identify and summarize the components within AFNR systems (e.g., Animal Systems: health, nutrition, genetics, etc.; Natural Resources Systems: soil, water, etc.).	Objective Test	
CS.02.02.02.a. Define and summarize societies on local, state, national and global levels and describe how they relate to AFNR systems.	Objective Test	
CS.02.02.03.a. Examine and summarize the components of the agricultural economy (e.g., environmental, crops, livestock, etc.).	Objective Test	
<b>CS.03.01. Performance Indicator: Identify required regulations to maintain and improve safety, health and environmental management systems.</b>		
CS.03.01.01.a. Research regulatory, safety and health standards (e.g., SDS, bioterrorism, etc.)	Objective Test	

*Agriculture, Food and Natural Resource Content Standards continued*

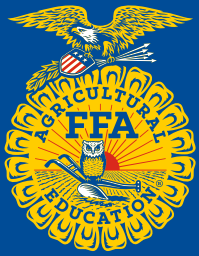
CS.03.01.01.b. Assess health, safety and environmental procedures to comply with regulatory and safety standards. Team Activity, FQTP	Food Safety and Quality Practicums Objective Test	
CS.03.01.02.a. Summarize the importance of safety, health and environmental management in the workplace.	Objective Test	
CS.03.01.02.c. Construct and implement methods to evaluate compliance with required safety, health and environmental management regulations.	Food Safety and Quality Practicums Objective Test	
<b>CS.03.03. Performance Indicator: Apply health and safety practices to AFNR worksites.</b>		
CS.03.03.01.c. Create a health and safety policy plan for AFNR business.	Team Activity	
<b>CS.03.04. Performance Indicator: Use appropriate protective equipment and demonstrate safe and proper use of AFNR tools and equipment.</b>		
CS.03.04.02.a. Identify standard tools, equipment and safety procedures related to AFNR tasks.	Objective Test	
CS.03.04.03.b. Assess and demonstrate appropriate operation, storage and maintenance techniques for AFNR tools and equipment.	Food Safety and Quality Practicums	
<b>CS.05.01. Performance Indicator: Evaluate the steps and requirements to pursue a career opportunity in each of the AFNR career pathways (e.g., goals, degrees, certifications, resumes, cover letter, portfolios, interviews, etc.).</b>		
CS.05.01.01.a. Identify and summarize the steps to pursue a career in an AFNR pathway (e.g., self-assessment, set goals, etc.).	Objective Test	
<b>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.</b>		
CRP.02.01.01.c. Apply academic knowledge and skills to solve problems in the workplace and reflect upon the results achieved.	Food Safety and Quality Practicums Team Activity Math/Problem Solving	
<b>CRP.02.02. Performance Indicator: Use strategic thinking to connect and apply technical concepts to solve problems in the workplace and community.</b>		
CRP.02.02.01.c. Apply technical concepts to solve problems in the workplace and reflect upon the results achieved.	Food Safety and Quality Practicums Team Activity Math/Problem Solving Objective Test	
<b>CRP.04.02. Performance Indicator: Produce clear, reasoned and coherent written communication in formal and informal settings.</b>		
CRP.04.02.02.b. Apply techniques for ensuring clarity, logic and coherence to edit written communications (e.g., emails, reports, presentations, technical documents, etc.).	Team Activity	

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CRP.04.02.02.c. Compose clear and coherent written documents (e.g., agendas, audio-visuals, drafts, forms, etc.) for formal and informal settings.	Team Activity	
<b>CRP.04.03. Performance Indicator: Model active listening strategies when interacting with others in formal and informal settings.</b>		
CRP.04.03.01.b. Apply active listening strategies (e.g., be attentive, observe non-verbal cues, ask clarifying questions, etc.).	Food Safety and Quality Practicums	
<b>CRP.05.01. Performance Indicator: Assess, identify and synthesize the information and resources needed to make decisions that positively impact the workplace and community.</b>		
CRP.05.01.03.c. Synthesize information and resources and apply to workplace and community situations to make positive decisions.	Food Safety and Quality Practicums Team Activity	
<b>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.</b>		
CRP.05.02.01.c. Evaluate and defend decisions applied in the workplace and community situations.	Team Activity	
<b>CRP.06.01. Performance Indicator: Synthesize information, knowledge and experience to generate original ideas and challenge assumptions in the workplace and community.</b>		
CRP.06.01.01.c. Evaluate workplace and community situations and devise strategies to apply original ideas.	Team Activity	
<b>CRP.06.03. Performance Indicator: Create and execute a plan of action to act upon new ideas and introduce innovations to workplace and community organizations.</b>		
CRP.06.03.01.c. Design a plan of action to introduce a new idea or innovation into the workplace and community.	Team Activity	
CRP.06.03.02.c. Evaluate and execute strategies for using stakeholder input and feedback to improve a plan of action for introducing a new idea or innovation into the workplace or community.	Team Activity	
<b>CRP.07.01. Performance Indicator: Select and implement reliable research processes and methods to generate data for decision-making in the workplace and community.</b>		
CRP.07.01.01.a. Identify and summarize reliable research processes and methods used to generate data for decision-making.	Team Activity	
<b>CRP.08.01. Performance Indicator: Apply reason and logic to evaluate workplace and community situations from multiple perspectives.</b>		
CRP.08.01.01.b. Apply steps for critical thinking to a variety of workplace and community situations.	Sensory Evaluation Practicums Food Safety and Quality Practicums Team Activity Math/Problem Solving	

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<b>CRP.09.03. Performance Indicator: Demonstrate behaviors that contribute to a positive morale and culture in the workplace and community (e.g., positively influencing others, effectively communicating, etc.).</b>		
CRP.09.03.02.c. Model respectful and purposeful behaviors that contribute to positive morale and culture in the workplace and community (e.g., effectively communicating, recognizing accomplishments of others, etc.).	Team Activity	
<b>CRP.10.02. Performance Indicator: Examine career advancement requirements (e.g., education, certification, training, etc.) and create goals for continuous growth in a chosen career.</b>		
CRP.10.02.01.a. Categorize career advancement requirements for potential careers (e.g., degrees, certification, training, etc.).	Objective Test	
<b>CRP.11.01. Performance Indicator: Research, select and use new technologies, tools and applications to maximize productivity in the workplace and community.</b>		
CRP.11.01.01.c. Construct effective communications to explain the features, benefits and risks of new technologies, tools and applications in the workplace and community.	Team Activity	
CRP.11.01.02.b. Select, apply and use new technologies, tools and applications in workplace and community situations to maximize productivity.	Team Activity	
<b>CRP.11.02. Performance Indicator: Evaluate personal and organizational risks of technology use and take actions to prevent or minimize risks in the workplace and community.</b>		
CRP.11.02.02.a. Synthesize tools and processes to prevent or minimize risks of technology use in community and work settings (e.g., risk management tools, benefit risks, etc.).	Food Safety and Quality Practicums Team Activity	
<b>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.</b>		
CRP.12.01.02.b. Apply consensus building techniques to accomplish results in team-oriented situations.	Food Safety and Quality Practicums Team Activity	
<b>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.).</b>		
CRP.12.02.01.b. Assess team dynamics and match strategies to increase team member engagement.	Food Safety and Quality Practicums Team Activity	



# NATIONAL FFA ORGANIZATION

## FFA MISSION

FFA makes a positive difference in the lives of students by developing their potential for premier leadership, personal growth and career success through agricultural education.

## THE AGRICULTURAL EDUCATION MISSION

Agricultural education prepares students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber and natural resources systems.

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