

**2017 Iowa FFA Food Science CDE  
General Knowledge Exam**

**Multiple Choice**

*Identify the choice that best completes the statement or answers the question.*

- \_\_\_ 1. Food is a \_\_\_ commodity.  
a. global  
b. national  
c. local  
d. state
- \_\_\_ 2. The United States is the largest exporter of which two items?  
a. milk and sugar  
b. oranges and apples  
c. potatoes and carrots  
d. cereal grains and soybeans
- \_\_\_ 3. The periodic table arranges elements by the number of \_\_\_ in their outermost energy levels.  
a. neutrons  
b. atoms  
c. protons  
d. electrons
- \_\_\_ 4. Covalent bonds are formed by the sharing of a pair of \_\_\_\_\_.  
a. atoms  
b. neurons  
c. electrons  
d. protons
- \_\_\_ 5. What is the symbol for salt?  
a. NaCl  
b. C<sub>6</sub>H<sub>12</sub>C<sub>6</sub>  
c. H<sub>2</sub>O  
d. CO<sub>2</sub>
- \_\_\_ 6. Hydrogen bonds are formed when a hydrogen atom is shared between two \_\_\_\_\_.  
a. molecules  
b. atoms  
c. elements  
d. neutrons
- \_\_\_ 7. Which types of chemical bonds are the weakest?  
a. covalent  
b. Van der Waals  
c. ionic  
d. none of the above
- \_\_\_ 8. Organic chemistry involves molecules that contain which element?  
a. carbon  
b. nitrogen  
c. oxygen  
d. calcium
- \_\_\_ 9. Carbohydrates are composed of \_\_\_ and \_\_\_\_\_.  
a. carbon, water  
b. hydrogen, oxygen  
c. zinc, aluminum  
d. gold, calcium
- \_\_\_ 10. Which of the following is the source of carbohydrates?  
a. plant  
b. human  
c. animal  
d. insect
- \_\_\_ 11. Vitamin \_\_\_ functions in normal blood clotting.  
a. C  
b. A  
c. D  
d. K
- \_\_\_ 12. Sucrose is commonly referred to as \_\_\_\_\_.  
a. salt  
b. carbohydrate  
c. sugar  
d. glucose

- \_\_\_ 13. \_\_\_ is the most common polysaccharide added to food products.
- a. Water
  - b. Salt
  - c. Glucose
  - d. Starch
- \_\_\_ 14. Identify the complex carbohydrate that cannot be digested.
- a. fiber
  - b. cellulose
  - c. sugar
  - d. fat
- \_\_\_ 15. \_\_\_ makes up 14 to 17 percent of the skeleton.
- a. Magnesium
  - b. Iron
  - c. Phosphorus
  - d. Sodium
- \_\_\_ 16. \_\_\_ functions in carbohydrate metabolism.
- a. Zinc
  - b. Thiamin
  - c. Riboflavin
  - d. Vitamin B
- \_\_\_ 17. How many cups of water do humans require per day?
- a. 1 to 3
  - b. 10 to 12
  - c. 5 to 9
  - d. 7 to 11
- \_\_\_ 18. Which micromineral is essential for the production of the thyroid hormones?
- a. calcium
  - b. iodine
  - c. fluorine
  - d. magnesium
- \_\_\_ 19. RDA stands for Recommended \_\_\_ Allowances.
- a. Dose
  - b. Dietary
  - c. Dairy
  - d. D-vitamin
- \_\_\_ 20. \_\_\_ percent of the adult body is made up of water.
- a. Fifty-five
  - b. Sixty-five
  - c. Seventy-five
  - d. Eighty-five
- \_\_\_ 21. An adult should drink \_\_\_ glasses of water per day.
- a. 6 to 8
  - b. 7 to 9
  - c. 5 to 7
  - d. 8 to 10
- \_\_\_ 22. Carbohydrates and proteins provide about \_\_\_ calories per gram.
- a. 5
  - b. 2
  - c. 4
  - d. 6
- \_\_\_ 23. Fat contributes about \_\_\_ calories per gram.
- a. 9
  - b. 10
  - c. 8
  - d. 7
- \_\_\_ 24. Alcohol supplies about \_\_\_ calories per gram.
- a. 6
  - b. 7
  - c. 5
  - d. 4
- \_\_\_ 25. Fiber is important in \_\_\_ function.
- a. bowel
  - b. stomach
  - c. muscle
  - d. skeletal

- \_\_\_ 26. The most important food appearance factor is \_\_\_\_.
- a. color
  - b. size
  - c. shape
  - d. packaging
- \_\_\_ 27. Naturally occurring \_\_\_\_ play a role in food coloring.
- a. enzymes
  - b. sugars
  - c. pigments
  - d. carbohydrates
- \_\_\_ 28. \_\_\_\_ or spectrophotometers can be used for measuring transparent foods.
- a. Thermometers
  - b. Meters
  - c. Liquid
  - d. Colorimeters
- \_\_\_ 29. Fruits and vegetables are graded based on their \_\_\_\_ and \_\_\_\_.
- a. size, shape
  - b. color, size
  - c. smell, shape
  - d. smell, color
- \_\_\_ 30. \_\_\_\_ standards help ensure food quality.
- a. National
  - b. Quality
  - c. Packing
  - d. Legal
- \_\_\_ 31. \_\_\_\_ can be achieved on the basis of density or size and shape.
- a. Separation
  - b. Quality
  - c. Clarification
  - d. Flavor
- \_\_\_ 32. A \_\_\_\_ pump consists of a reciprocating or rotating cavity between two lobes or gears and a rotor.
- a. positive
  - b. centrifugal
  - c. negative
  - d. hand
- \_\_\_ 33. \_\_\_\_ and \_\_\_\_ are already solid and lend themselves to sun or tray drying.
- a. Cheese, meats
  - b. Fruits, vegetables
  - c. Cheese, vegetables
  - d. Fruits, meats
- \_\_\_ 34. The most common drying method is \_\_\_\_ drying.
- a. freeze-
  - b. sun or tray drying
  - c. spray
  - d. oven
- \_\_\_ 35. \_\_\_\_ are the largest of the microorganisms but are still single cells, and some produce spores.
- a. Yeast
  - b. Bacteria
  - c. Molds
  - d. Ameba
- \_\_\_ 36. Microbes that prefer cold temperatures are \_\_\_\_.
- a. mesophilic
  - b. thermophilic
  - c. psychrophilic
  - d. obligative
- \_\_\_ 37. Bacteria or molds that require atmospheric oxygen are \_\_\_\_.
- a. anaerobic
  - b. aerobic
  - c. mesophilic
  - d. thermophilic
- \_\_\_ 38. Most bacteria are killed at \_\_\_\_° to \_\_\_\_°F, but spores are not.
- a. 150, 175
  - b. 180, 200
  - c. 160, 200
  - d. 175, 200



**2017**  
**Answer Key**

**MULTIPLE CHOICE**

- |            |            |
|------------|------------|
| 1. ANS: A  | 26. ANS: A |
| 2. ANS: D  | 27. ANS: C |
| 3. ANS: D  | 28. ANS: D |
| 4. ANS: C  | 29. ANS: A |
| 5. ANS: A  | 30. ANS: B |
| 6. ANS: A  | 31. ANS: A |
| 7. ANS: B  | 32. ANS: A |
| 8. ANS: A  | 33. ANS: B |
| 9. ANS: A  | 34. ANS: C |
| 10. ANS: A | 35. ANS: A |
| 11. ANS: D | 36. ANS: C |
| 12. ANS: C | 37. ANS: B |
| 13. ANS: D | 38. ANS: B |
| 14. ANS: A | 39. ANS: D |
| 15. ANS: C | 40. ANS: A |
| 16. ANS: B | 41. ANS: A |
| 17. ANS: D | 42. ANS: C |
| 18. ANS: B | 43. ANS: B |
| 19. ANS: B | 44. ANS: A |
| 20. ANS: B | 45. ANS: B |
| 21. ANS: A | 46. ANS: A |
| 22. ANS: C | 47. ANS: B |
| 23. ANS: A | 48. ANS: D |
| 24. ANS: B | 49. ANS: C |
| 25. ANS: A | 50. ANS: B |

**2017 Iowa FFA Food Science CDE**  
**Food Safety and Quality Section**  
**Response to Consumer Complaint**

The Consumer Affairs Department at Cyclone Dairy has received the following letter from a customer. Please respond to the consumer’s complaint. Your response should contain the answers presented by the consumer. Please be concise and courteous in your response. Your response will be scored based on the identification of problem, identification of correct solution, completeness and correctness of your response, courteousness, conciseness (limit to 1 page), and appropriate grammar and correct spelling.

*June 5, 2017*

*Dear Sirs:*

*I am a loyal customer of Cyclone Dairy and love all your dairy products. Three weeks ago, I purchased several cartons of yogurt. The yogurt I ate right after I purchased it had a smooth creamy texture and great flavor. Yesterday I was going to have some yogurt for lunch. When I opened the container, there was a small amount of watery liquid on the surface of the yogurt. I smelled the yogurt and it had a typical yogurt aroma. The sell-by date on the carton was June 8, 2017. I wasn’t sure if I should eat the yogurt or not because of the liquid separating from the yogurt. I decided to throw it out, but wanted to check with you to see if this was safe or not, so if it happens again, I would know what to do. Could you answer the following questions for me?*

- 1. What caused the separation of the liquid in the yogurt?*
- 2. Will I get sick from eating the yogurt?*
- 3. Is there anything I can do to correct the problem or should I just throw it out?*
- 4. What will your company do to make sure that this liquid separation does not occur in the future?*

*I look forward to hearing from you.*

*Thank you.*

*Madison Crosby*

	Points Possible	Points Received
Identification of Problem	15	
Presentation of Solution	15	
Courteousness of Response	10	
Conciseness (less than 1 page)	5	
Grammar and spelling	5	
	50	

## FFA Food Science Consumer Complaint Response

June 8, 2017

50 points

School Name \_\_\_\_\_

Name \_\_\_\_\_

Contestant Number \_\_\_\_\_

Score \_\_\_\_\_/50

Complete your response in the box below:

## **2017 Iowa FFA Food Science CDE**

### **Food Safety and Sanitation Section**

In this segment of the contest, you will be given pictures/graphics to view in reference to common problems that exist within the food industry. Your task for each set of pictures and/or graphics are to: (a) identify the problem and (b) select the most appropriate solution to the problem. There will be five (5) sets of food safety and/or sanitation concerns with each question valued at 5 points for a total of 50 possible points.

When done, return this document with your answer sheet to the test proctor.

**DO NOT MARK ON THIS DOCUMENT**



Set #1:



Question 1: These pictures most represent which of the following food industry concerns:

- a. Staphylococcus
- b. Salmonella
- c. Listeria
- d. Botulism
- e. Campylobacter

Question 2: In reference to the above pictures, what would be the solution to this food industry concern/problem?

- a. Thoroughly cook raw food from animal sources, such as beef, pork, or poultry.; Wash raw vegetables thoroughly before eating; and Keep uncooked meats separate from vegetables and from cooked foods and ready-to-eat foods.
- b. Carefully wash fruits and vegetables, and steam oysters before eating them; Frequently wash your hands, especially after toilet visits and changing diapers and before eating or preparing food; and Thoroughly clean and disinfect contaminated surfaces immediately after an episode of illness.
- c. Always wash hands with warm, soapy water; if your hands have any kind of skin abrasion or infection, always use clean disposable gloves; and keep cutting boards clean.
- d. Do not eat raw or undercooked eggs, poultry, or meat; avoid Cross-contamination of foods; and wash hands after contact with animal feces and/or reptiles.
- e. Handle poultry carefully to prevent cross-contamination; utilize proper wrapping; and most egg products should be pasteurized.

Set #2:



Question 3: These pictures most represent which of the following food industry concerns:

- a. Cross contamination
- b. E coli
- c. Botulism
- d. Listeria
- e. Salmonella

Question 4: In reference to the above pictures, what would be the solution to this food industry concern/problem?

- a. Home canned products need to use higher level acids, follow strict hygienic procedures, and prepare foods using high temperatures.
- b. Thoroughly cook raw food from animal sources, such as beef, pork, or poultry; Wash raw vegetables thoroughly before eating; and Keep uncooked meats separate from vegetables and from cooked foods and ready-to-eat foods.
- c. Drink only pasteurized milk, juice, or cider; wash fruits and vegetables under running water, especially those that will not be cooked; and cook all ground beef and hamburger thoroughly.
- d. Sterilize raw foods at the plants, pasteurization of milk, and improving safe food handling practices in kitchens
- e. Do not eat raw or undercooked eggs, poultry, or meat.; avoid Cross-contamination of foods; and wash hands after contact with animal feces and/or reptiles.

Set 3:



Question 5: These pictures most represent which of the following food industry concerns:

- a. Listeria
- b. Metal contamination in ground beef
- c. Botulism
- d. Staphylococcus
- e. E coli

Question 6: In reference to the above pictures, what would be the solution to this food industry concern/problem?

- a. Sterilize raw foods at the plants, pasteurization of milk, and improving safe food handling practices in kitchens
- b. Thoroughly cook raw food from animal sources, such as beef, pork, or poultry.; Wash raw vegetables thoroughly before eating; and Keep uncooked meats separate from vegetables and from cooked foods and ready-to-eat foods.
- c. Drink only pasteurized milk, juice, or cider; wash fruits and vegetables under running water, especially those that will not be cooked; and cook all ground beef and hamburger thoroughly.
- d. Home canned products need to use higher level acids, follow strict hygienic procedures, and prepare foods using high temperatures.
- e. Do not eat raw or undercooked eggs, poultry, or meat; avoid Cross-contamination of foods; and wash hands after contact with animal feces and/or reptiles.

Set #4:



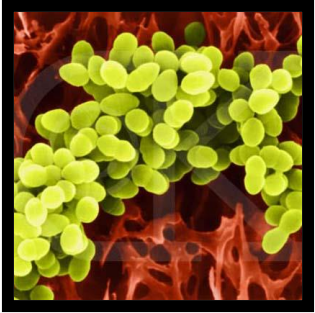
Question 7: These pictures most represent which of the following food industry concerns:

- a. Campylobacter
- b. E. coli
- c. Salmonella
- d. Listeria
- e. Norovirus

Question 8: In reference to the above pictures, what would be the solution to this food industry concern/problem?

- a. Home canned products need to use higher level acids, follow strict hygienic procedures, and prepare foods using high temperatures.
- b. Sterilize raw foods at the plants, pasteurization, and improving safe food handling practices in kitchens.
- c. Increased regulations; over-use promotes emergence of resistant bacteria; and regulated usages to minimize residues in the human food chain.
- d. Thoroughly cook raw food from animal sources, such as beef, pork, or poultry.; Wash raw vegetables thoroughly before eating; and Keep uncooked meats separate from vegetables and from cooked foods and ready-to-eat foods.
- e. Carefully wash fruits and vegetables, and steam oysters before eating them; Frequently wash your hands, especially after toilet visits and changing diapers and before eating or preparing food; and Thoroughly clean and disinfect contaminated surfaces immediately after an episode of illness.

Set 5:



Question 9: These pictures most represent which of the following food industry concerns:

- a. Norovirus
- b. parasites
- c. E coli
- d. Staphylococcus
- e. Botulism

Question 10: In reference to the above pictures, what would be the solution to this food industry concern/problem?

- a. Carefully wash fruits and vegetables, and steam oysters before eating them; Frequently wash your hands, especially after toilet visits and changing diapers and before eating or preparing food; and Thoroughly clean and disinfect contaminated surfaces immediately after an episode of illness.
- b. Home made or processed foods need to be properly stored; when preparing foods, remember to prepare foods under sanitary conditions; if food is to be stored longer than two hours, keep hot foods hot (over 140°F) and cold foods cold (40°F or under).
- c. Drink only pasteurized milk, juice, or cider; wash fruits and vegetables under running water, especially those that will not be cooked; and cook all ground beef and hamburger thoroughly.
- d. Handle poultry carefully to prevent cross-contamination; utilize proper wrapping; and most egg products should be pasteurized.
- e. Do not eat raw or undercooked eggs, poultry, or meat; avoid Cross-contamination of foods; and wash hands after contact with animal feces and/or reptiles.

## **2017 Iowa FFA Food Science CDE**

### **Food Safety and Sanitation Section -- KEY**

In this segment of the contest, you will be given pictures/graphics to view in reference to common problems that exist within the food industry. Your task for each set of pictures and/or graphics are to: (a) identify the problem and (b) select the most appropriate solution to the problem. There will be five (5) sets of food safety and/or sanitation concerns with each question valued at 5 points for a total of 50 possible points.

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- a. Thoroughly cook raw food from animal sources, such as beef, pork, or poultry.; Wash raw vegetables thoroughly before eating; and Keep uncooked meats separate from vegetables and from cooked foods and ready-to-eat foods.
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Set #2:



Question 3: These pictures most represent which of the following food industry concerns:

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- b. E coli
- c. **Botulism**
- d. Listeria
- e. Salmonella

Question 4: In reference to the above pictures, what would be the solution to this food industry concern/problem?

- a. **Home canned products need to use higher level acids, follow strict hygienic procedures, and prepare foods using high temperatures.**
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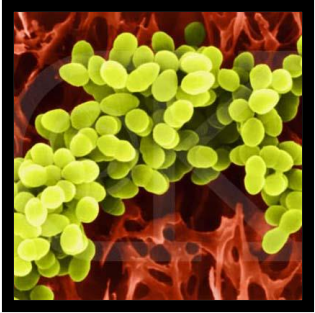
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- a. **Campylobacter**
- b. E. coli
- c. Salmonella
- d. Listeria
- e. Norovirus

Question 8: In reference to the above pictures, what would be the solution to this food industry concern/problem?

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Set 5:



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- a. Norovirus
- b. parasites
- c. E coli
- d. Staphylococcus**
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## **FFA Food Science Product Development Career Development Event Developing a Breakfast Bars/Sports Bars**

**BACKGROUND** Americans are becoming increasingly more interested in their health through improved diet and exercise. Breakfast/Sport bars have gained popularity as a means to provide important nutrition prior to and during work outs. These bars are generally high in protein, vitamins, and minerals, but can also be high in calories and low in fiber. On the other hand, granola bars and trail mixes are generally good sources of fiber, but may be limited in some of the nutrients found in the breakfast bars/sports energy bars.

**OBJECTIVE** Your task is to develop a breakfast/sports bar with the desirable characteristics of a breakfast/sports bar (high in protein and carbohydrates) and a granola bar (good source of fiber). Your product should be nutritious, easy to eat, require minimal time for preparation, be easy to prepare, and have satisfactory sensory characteristics. In addition, you will attempt to commercialize the product for grocery store use.

Your target nutrient guidelines are:  
Serving size: 75 g (1 bar)  
Fat: Less than 5 g  
Protein: At least 7 g  
Carbohydrates (total): At least 25 g  
Dietary Fiber: At least 3 g  
Calories: Less than 300 calories

**METHOD** With your team, create a food product from the ingredients supplied in the following table. Your team should develop a product name, consider the potential use by consumers, determine the nutritional value, and evaluate the appearance, texture, and flavor of the final product.

Your team will present an oral report (15 minutes – 10 to present and 5 for questions) to a group of trained judges. The evaluation form attached is how your group presentation will be evaluated. It is important that you have graphics to clearly show your product.

**RULES**

**Your team will need to develop but not prepare your product.** The following table includes suggestions for ingredients you may use. You may also use related ingredients (not listed) as alternates. You will need to include at least one source of fiber, one source of protein, and a binder which will hold the ingredients together so a bar can be formed. The use of dried fruits and flavorings is optional. A maximum of 8 ingredients can be used in your product. Select items from the following categories:

<b>Fiber</b>	<b>Proteins</b>	<b>Binder</b>	<b>Dried Fruits</b>	<b>Flavorings</b>
Oatmeal	Peanuts	Corn syrup	Raisins	Cinnamon
Wheat Germ	Almonds	Peanut butter	Dried apples	Vanilla
Oat bran	Walnuts	Soynut butter	Dates	Chocolate
	Sunflower seeds	Honey	Coconut	Chocolate chips
	Non-fat dried milk	Oil		
	Sesame seeds			

**EVALUATION**

Product name \_\_\_\_\_

Ingredients \_\_\_\_\_

Preparation time \_\_\_\_\_

**MARKETING PRESENTATION**

Each team member should present at least one of the following aspects of food product development: selection of ingredients, nutritional value, ease of preparation, sensory characteristics.

**COMMERCIALIZATION**

The product that you develop will need to meet all aspects of labeling requirements including principal display panel, nutritional label, and ingredient listing. Your team will be evaluated on this being done correctly. **Information about labeling can be found at:**

<https://www.fda.gov/food/guidanceregulation/guidancedocumentsregulatoryinformation/labelingnutrition/ucm2006828.htm>.

## **RESOURCES FOR DETERMINING NUTRIENT INFORMATION**

USDA Food Composition Database

Downloadable data sets prepared by the **USDA** Nutrient Data Laboratory with nutrient values of foods. <https://ndb.nal.usda.gov/ndb/>

## **SPECIFIC REQUIREMENTS**

- Suitability of product as a high fiber sports energy bar
- Ingredients should be listed in order of amounts used in product.
- All required parts of the principle display panel should be there.
- All required elements on the Information Panel
- Correct relative placement of PDP and Information Panel
- Appealing PDP and Creative Character
- Reasonably close nutritional panel
- Ability to answer questions about the product.
- All members participate in presentation.

**Team Presentation Scorecard**

CHAPTER NAME \_\_\_\_\_

<b>CRITERION</b>	<b>POSSIBLE POINTS</b>	<b>POINTS EARNED</b>
Objective met – to develop a breakfast/sports bar.	50	
All required parts of the principal display panel (PDP).	50	
All required elements on the Information Panel	50	
Correct relative placement of PDP and Information Panel	50	
Reasonably close nutritional panel	50	
Communication skills/oral presentation (clear, logical, easy to understand, confidence in presentation and the information presented, :	50	
Ability to answer questions about the product.	50	
Did all team members contribute?	50	
<b>OVERALL</b>	400	