

# Agriculture Food Science and Processing (2018)

## FOOD INDUSTRY AND HISTORICAL DEVELOPMENT 1.0

### 1 Evaluate the Significance and Implications of Changes and Trends in the Food Products and Processing Industry 1.1

- 1 Discuss historical changes in the food products and processing industry. 1.1.1
- 2 Evaluate current trends in the food products and processing industry (e.g., dietary food guides, niche markets, marketing trends). 1.1.2
- 3 Identify consumer concerns related to food quality and safety (such as allergens, antibiotic use, genetically modified organisms (GMOs), pesticide use, and food borne illnesses). 1.1.3
- 4 Discuss the economic implications when low-quality and unsafe foods enter the market. 1.1.4
- 5 Describe the scope and economic importance of agriculture and food processing in the United States and the world, using quantitative data compiled by government agencies and news media. 1.1.5
- 6 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, farm-to-fork supply chains, food system transparency). 1.1.6
- 7 Compare and contrast cultural differences regarding food products and processing practices. 1.1.7
- 8 Identify and explain environmental and safety concerns about the food supply. 1.1.8
- 9 Evaluate desirable and undesirable outcomes of emerging technologies used in the food products and processing industry. 1.1.9

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### 2 Investigate Industry Organizations, Groups, and Regulatory Agencies Affecting the Food Products and Processing Industry 1.2

- 1 Explain the purposes of organizations that are part of and/or regulate the food products and processing industry. 1.2.1
  - 2 Determine the relationship between regulatory agencies (i.e., FDA, USDA, CDC, WHO) and the food products and processing industry. 1.2.2
  - 3 Assess the changes in the food products and processing industry brought about by industry organizations or regulatory agencies. 1.2.3
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## **FOOD SAFETY AND SANITATION 2.0**

### **1 Create Sanitation Standard Operating Procedures and Master Sanitation Schedules 2.1**

- 1 Create Sanitation Standard Operating Procedures (SSOP) for a food processing company. 2.1.1
  - 2 Understand Good Manufacturing Practices (GMP) and how they relate to a food processing company and employee and equipment hygiene. 2.1.2
  - 3 Create Master Sanitation Schedule (MSS) for a food processing company. 2.1.3
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### **2 Create a Food Safety Plan, Understand the Biological, Chemical, and Physical Hazards Associated with Food Processing and Handling 2.2**

- 1 Understand and evaluate the different biological hazards (prions, bacteria, viruses, protozoans, etc.) that could be present in the raw ingredient through processing and distribution of a food product. 2.2.1
  - 2 Understand and evaluate the different chemical hazards (pesticides, herbicides, allergens, paints, heavy metals, dioxins, PCBs, etc.) that could be present in the raw ingredient through processing and distribution of a food product. 2.2.2
  - 3 Understand and evaluate the different physical hazards (metal, plastic, rubber, etc.) that could be present in the raw ingredient through processing and distribution of a food product. 2.2.3
  - 4 Identify potential sources of contamination. 2.2.4
  - 5 Develop strategies to eliminate or reduce contamination to an acceptable level. 2.2.5
  - 6 Discuss current regulatory food safety programs, including HACCP (Hazard Analysis Critical Control Point), FSP (Food Safety Plan), and Food Defense. 2.2.6
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### **3 Apply Sanitation Procedures in the Handling, Processing, and Storing of Food Products 2.3**

- 1 Evaluate food product handling procedures. 2.3.1
  - 2 Explain the importance of microbiological tests (e.g., ATP, equipment swabs, Environmental swab, Pathogen Environmental Monitoring -PEM) in food sanitation verification. 2.3.2
  - 3 Explain the importance of allergen cross-contact and how sanitation affects allergen management. 2.3.3
  - 4 Discuss documentation procedures and their importance in a food processing and distribution system. 2.3.4
  - 5 Understand how Clean in Place (CIP) and Clean Out of Place (COP) affects overall sanitation of a facility. 2.3.5
  - 6 Understand the use of chemical types and applications and how it affects plant sanitation procedures. 2.3.6
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## **PERSONAL SAFETY 3.0**

### **1 Understand Worker Safety Principles in a Manufacturing Facility 3.1**

- 1 Outline guidelines for personnel safety in the food products and processing industry (e.g., lockout-tagout, personal protective equipment, permit required confined space, machine guarding, walking working surfaces, motorized vehicles). 3.1.1
  - 2 Perform a safety risk analysis of a manufacturing facility, including behavior based accident preventions. 3.1.2
  - 3 Create mitigation strategies (engineering, administrative, and PPE) focusing on controls. 3.1.3
  - 4 Demonstrate the ability to follow safety and operational procedures in a lab setting and satisfactorily complete a safety test. 3.1.4
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## **THE SCIENCE OF FOOD PRODUCTS 4.0**

### **1 Apply Principles of Science to Provide a Safe, Wholesome, and Nutritious Food Supply 4.1**

- 1 Design a research project in food science using the scientific method. 4.1.1
  - 2 Examine, interpret, and explain the meaning of required components on a food label. 4.1.2
  - 3 Determine a strategy to prepare and label foods according to the established standards of regulatory agencies (including nutrition facts panel, ingredients, weights, and measures, allergens, etc.). 4.1.3
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### **2 Evaluate, Grade, and Classify Processed Food Products 4.2**

- 1 Perform quality control inspections of raw and finished food products. 4.2.1
  - 2 Explain how the chemical and physical properties of foods influence nutritional value and eating quality. 4.2.2
  - 3 Compare and contrast foods stored under varying conditions for quality, shelf life, and intended use. 4.2.3
  - 4 Design and construct experiments for quality assurance tests on food products. 4.2.4
  - 5 Interpret and evaluate results of quality assurance tests on food products and examine steps to implement corrective procedures. 4.2.5
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### **3 Understand the Constituents of Food (e.g., Lipids, Proteins, Carbohydrates, Water, Vitamins, Minerals) 4.3**

- 1 Differentiate between the common food constituents (i.e., proteins, carbohydrates, fats, vitamins, minerals, and water). 4.3.1
- 2 Compare and contrast food constituents and their relative value to product taste, appearance, and so forth. 4.3.2
- 3 Research and report methods of nutritional planning to meet essential needs for the human diet (e.g., MyPlate). 4.3.3

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#### **4 Understand and Recognize the Different Additives in Food and Purposes of Use in Processing** 4.4

- 1 Identify common food additives and identify their properties (e.g., preservatives, antioxidants, buffers, stabilizers, colors, flavors). 4.4.1
  - 2 Describe the purpose of common food additives (CFA). 4.4.2
  - 3 Describe how CFAs influence the chemistry of food. 4.4.3
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#### **5 Research and Development** 4.5

- 1 Identify the steps of research and development in the food production and processing industry. 4.5.1
  - 2 Outline the process for designing a new food product from concept to production. 4.5.2
  - 3 Identify the needs and mechanics of a plant scale test. 4.5.3
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### **FOOD PROCESSING OPERATIONS AND TECHNOLOGY** 5.0

#### **1 Process Food and Food Products for Sale and Distribution** 5.1

- 1 Understand principles of raw material/ingredient receiving. 5.1.1
  - 2 Create a flow diagram for food production process steps. 5.1.2
  - 3 Identify packaging processes and logistics (e.g., sub packaging, case filling, palletizing). 5.1.3
  - 4 Understand principles of production scheduling, product storage, and distribution. 5.1.4
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#### **2 Preserve Food and Food Products for Sale and Distribution** 5.2

- 1 Describe factors related to food preservation. 5.2.1
- 2 Describe factors that contribute to food deterioration. 5.2.2
- 3 Preserve foods using various methods and techniques. 5.2.3
- 4 Identify and summarize purposes of food storage procedures (e.g. temperature regulation, monitoring). 5.2.4
- 5 Prepare plans that ensure implementation of proper food storage procedures and traceability. 5.2.5
- 6 Differentiate between methods and materials used for processing food for different markets (e.g., fresh food products, ready to eat food products, organic). 5.2.6

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### **3 Food Process Technology and Maintenance** 5.3

- 1 List and categorize types of equipment used in food products and processing systems including automated systems. 5.3.1
  - 2 List and apply strategies to maintain equipment and facilities for food products and processing systems (Preventative Maintenance). 5.3.2
  - 3 Describe Piping and Instrumentation Diagrams as they relate to food processing. 5.3.3
  - 4 Describe the principles of Operational Technology (OT) and how they relate to larger Information Systems (Big Data Analytics, Statistical Process Control). 5.3.4
  - 5 Identify the role of Robotics in Food Processing and Packaging. 5.3.5
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### **EXPLORE CAREER OPPORTUNITIES** 6.0

#### **1 Understand Employment Fields in the Food Science Technology Industry** 6.1

- 1 Identify potential careers in the food science and processing industry. 6.1.1
  - 2 Interview current food science/processing professionals. 6.1.2
  - 3 Demonstrate employability skills for a career in the food science and processing industry (e.g., create a resume and cover letter, participate in job interviews). 6.1.3
  - 4 Research additional industry certifications available (i.e., Serve safe, HACCP, OSHA, PCQI). 6.1.4
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### **LEADERSHIP TRAINING THROUGH AGRICULTURAL EDUCATION** 7.0

#### **1 Recognize the Traits of Effective Leaders and Participate in Leadership Training through Involvement in FFA** 7.1

- 1 Demonstrate effective leadership and participation in leadership training. 7.1.1
  - 2 Expand leadership experience by participating in a chapter activity. 7.1.2
  - 3 Participate in a career development event at the local level or above. 7.1.3
  - 4 Exhibit leadership skills by demonstrating proper parliamentary procedure. 7.1.4
  - 5 Participate in a speech or presentation activity. 7.1.5
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#### **2 Understand the Importance of School and Community Awareness** 7.2

- 1 Participate in a school improvement or community development project. 7.2.1
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### **SUPERVISED AGRICULTURAL EXPERIENCE (SAE)** 8.0

#### **1 Maintain a Supervised Agricultural Experience** 8.1

- 1 Accurately maintain SAE record books. 8.1.1
- 2 Investigate the proficiency award areas related to SAE program area. 8.1.2
- 3 Actively pursue necessary steps to receive higher degrees in FFA. 8.1.3