CHAPTER 1: DIMENSIONS OF FOOD STUDIES

OVERVIEW

Review the food marketplace and consumer expectations and concerns, including organic, functional, and genetically modified foods. Focus on new terminology that consumers may encounter in the marketplace, security of the food supply, career opportunities in food science, experimental approach to food science, metrics, and experimental control.

STUDENT OBJECTIVES

Upon completion of Chapter 1, Dimensions of Food Studies, the student should be able to:

1. Relate consumer trends to new food products in the marketplace
2. Define the terms: natural, organic, phytochemicals, functional food, designer food, nanotechnology, genetically modified organisms (GMO), biotechnology, and genetic engineering.
3. Identify agencies with responsibilities for a safe and secure food supply
4. Discuss the variety of careers available in the food industry in relation to your own career goals.
5. Review the basis of the metric system.
6. Explain why control is critical to food experimentation.

WEB SITES

A large number and variety of commercial sites and news releases exist under the terms "natural," "organic," biotechnology, and genetic engineering.

Biotechnology - http://www.fda.gov/Food/Biotechnology/default.htm. Many interesting links from the FDA Center for Food Safety and Applied Nutrition.

Dr. Duke's Phytochemical and Ethnobotanical Databases - http://www.ars-grin.gov/duke Compiled by the Agricultural Research Service with links to plant, chemical, activity, ethnobotany searches with other databases and documents available for browsing. Includes a warning statement.

The Linus Pauling Institute - http://www.orst.edu/dept/lpi Located at Oregon State University, the Linus Pauling Institute conducts research to determine the role of micronutrients, phytochemicals, and microconstituents of food in maintaining human health and preventing and treating disease.

The Institute of Food Technology - http://www.ift.org Check this link for information on careers in food science and technology.

TEST BANK

1. T or F. The food marketplace is undergoing limited changes because the U.S. population is quite constant in its demographics (e.g., age distribution and ethnicity).

2. Ultragrain flour is (1) a rye mutation, (2) a cellulose with gluten added, (3) a new strain of wheat milled to a fine texture, (4) a mixture of wheat and triticale flours, (5) a mixture of triticale and rye flours.

3. T or F. Regulations for labeling food "made with organic ingredients" are more restrictive than for foods labeled "organic."

4. T or F. Probiotics are active in the small intestine.

5 T or F. NIH has approved some heart-health claims regarding nutrients and heart health for use on food labels.

6. T or F. Designer foods are being promoted to help consumers lose enough weight to wear designer fashions.

7. Bt is a term meaning (1) beets, (2) beef, (3) biologically tainted, (4) genetically modified, (5) none of these.

8. GMO is a term meaning (1) beets, (2) beef, (3) biologically tainted, (4) genetically modified, (5) none of these.

9. T or F. A cup of butter and a cup of flour weigh the same.

10. 140°F = (1) 20°C, (2) 60°C, (3) 100°C, (4) 140°C, (5) 180°C.

11. 2.5 kg = (1) 5.5 lb, (2) 25,000 g, (3) 2.5 lb, (4) 25 lb, (5) 1.14 lb.

12. 1 ½ c = (1) 255 ml, (2) 295 ml, (3) 355 ml, (4) 375 ml, (5) 395 ml.

13. 250 ml = (1) 9 tbsp, (2) 11 tbsp, (3) 13 tbsp, (4) 15 tbsp, (5) 17 tbsp.

14. 50°F = (1) 0°C, (2) 10° C, (3) 20°C, (4) 30° C, (5) none of these.

15. 15°C = (1) 47°F, (2) 53°F, (3) 59°F, (4) 65°F, (5) 71°F.

16. Phytochemicals include (1) Beta glucan in oats, (2}catechins in green tea, (3) isoflavones in soy products, (4) lycopene in tomatoes, (5) all of the above.

17. T or F. Phytochemicals are chemical compounds in plants needed for life and growth.

18. T or F. Genetically modified organisms (GMO) are not well accepted in the European Union because of consumer worries about safety.

19. T or F. The metric system is less accurate for measuring than the household measure; which is why it is not used in household cookbooks.

20. T or F. The metric system is based on the decimal system and can be used effectively to express length, weight, and volume.

21. T or F. The Department of Homeland Security is the only federal agency charged with maintaining the security of the nation's food supply.

22. T or F. Nanotechnology is based on genetically modifying microorganisms.

23. T or F. Nanotechnology may be useful in some packaging materials.

ESSAY/SHORT DISCUSSION

1. Forecast what you see happening in the food marketplace in the next 25 years. Take into account consumer trends and lifestyles in your discussion.

[In forecasting the food marketplace for the year 2025, one might see an increase in prevention and treatment of disease through nutrition. This would be in response to the increase in the 65 years and older population group. Consumers will be interested in foods that have been linked to reducing the risk of obesity, heart disease and cancer. The current interest in cultural foods will increase in response to the increasing cultural diversity of the population. Expect more foods representing other cultures, including Mexican, soul, and Asian food products. With the continued acceleration in the pace of life, expect more convenience

foods: frozen, refrigerated, and dried. Small portions of food for snacking and small meals will continue to grow. Consumers will also demand accountability in the food supply, both from food safety and environmental standpoints.]

2. Distinguish between the following:

Natural and organic foods - [A natural food is one made without chemical or artificial additives. An organic food is a food where no chemical fertilizers or pesticides were applied when the crops were being grown.]

Functional food and designer food - [A functional food contains useful amounts of chemical compounds that promote health beyond basic nutrition. A designer food is formulated to contain enhanced levels of phytochemicals.]

Biotechnology and genetic engineering - [Biotechnology is the development of new products by making a genetic modification in a living organism. Genetic engineering is biotechnology in which a genetic modification is achieved by removing, adding, or modifying genes.]

3. Enumerate the careers available to food professionals in health settings, feeding people away from home, and in basic food science. Relate this discussion to the skills needed to meet your personal career goal.

[Health - nutritionists and dietitians (R.D.) finding careers in clinical dietetics, food service administration, community nutrition, sports nutrition, consulting, nutrition counseling, and industries based on nutrition-related products. Food settings away from home - hospitality, hotels, and restaurant settings with emphasis placed on preparation and applied aspects of food and its service to groups of people. Entrepreneurs might operate their own restaurants; other fields include restaurant managers and catering. Food businesses provide a variety of careers in product development, quality assurance, food analysis, processing, packaging, microbiology and food safety, sensory evaluation, physical testing, labeling and governmental regulation, and marketing. Discussion of skills (writing, oral communication, scientific leaning, public relations, management, etc.) would relate to each student's personal career choice.]

4. If you were not familiar with the metric system of measurement, where would you turn to find information concerning the metric system, uniform weights for common ingredients, and conversion from Fahrenheit to Celsius and vice versa?

[Handbook of Food Preparation, 10th edition, 2001, published by the American Home Economics Association.]

5. Based on the food science experiments you have performed, why is control critical?

[Control eliminates unintentional variables. This allows one to test for variations without having confounding, intervening variables. Unexplained or unintentional variables can influence the results. Control is needed in the formula, procedure, and also in the sensory and objective measurements, to ensure accuracy.]

6. Read the following experiment. List at least five factors or items that must be controlled for the experiment to be accurate. The control product is a basic white sauce, and the variation is the type of fat used.

Experiment: Prepare a medium white sauce.

Fat	2 T.
Flour	2 T.
Salt	1/2 tsp.
Milk	1 c.

Melt the fat, and stir in the flour and salt until all particles are coated with fat.
Remove from the heat, and add cold liquid all at once.
Resume heating with continuous stirring until the mixture thickens.

[All ingredients from the same container or lot. Same person does all the measuring. Same range used for all variations. Set temperature for step 1. Set number of strokes for stirring in the flour and salt. Set time to melt the fat. Set temperature for step 3. Same person gives end point in step 3.]

7. Think of the topic for a possible short experiment and answer the following questions.

1. Topic:
2. Control product:
3. Variation:
4. Factors that you will have to control: [Formula, procedure, sensory and objective evaluation]

CHAPTER 2: THE RESEARCH PROCESS

OVERVIEW

This chapter will be critical to the success of students in Experimental Food Science. Focus on parts of a research report and laboratory notebook set-up. Review statistical analyses.

STUDENT OBJECTIVES

Upon completion of Chapter 2, The Research Process, the student should be able to:

1. Outline and define each part of a research report (title, purpose, literature review, experimental design, method, results and discussion, conclusion, bibliography).
2. Compare Food Technology with the Journal of Food Science from the type of articles published, advertisements, news, etc.
3. Select an article from one of the above journals. Find the purpose statement for the article. Write the reference for this article, using the style guide of the journal selected.
4. Set up and keep a laboratory notebook for use in Experimental Food Science.
5. Review statistical analyses for possible use in food experiments.
6. Distinguish between a table and a figure.

WEB SITES

Style guides for research papers

http://www.ift.org/knowledge-center/read-ift-publications/journal-of-food-science/authors-corner.aspx.

This link takes you to the Institute of Food Technologists' style guide for the Journal of Food Science. Access to the style guide for the Journal of Food Science also is available at IFT. These guides give valuable information on parts of a research report, how to cite references, reference list, tables and figures, etc. A JFS Cheat Sheet provides a quick look at reference citations.

The link to the Guidelines for Authors for the Journal of the American Dietetic Association is http://www.adajournal.org/authorinfo. Check under Manuscript Preparation for parts of a research report.

TEST BANK

1. T or F. Development of a statement of the purpose of a research project may begin with identifying a general topic, but needs to be defined specifically so that an appropriate research design can be planned.

2. A statement of an expected positive result of an experiment is called the (1) title, (2) purpose, (3) theory, (4) hypothesis, (5) null hypothesis.

3. Research journals of importance in reviewing the literature for food research include (1) Journal of Food Science, (2) Food Technology, (3) Cereal Chemistry, (4) Journal of Dairy Science, (5) all of the above, depending on the topic..

4. T or F. Qualified researchers and scientists are the only people reporting research about food on the Internet.

5.T or F. The method to be used in preparing samples in a research project needs to be stated precisely at all steps so that other researchers can replicate preparation of samples.

6. The results that are measured are the (1) dependent variable(s), (2) independent variables, (3) extraneous variables, (4) hypothetical variables, (5) none of these.

7. The variable that is manipulated by the researcher is the (1) dependent variable, (2) independent variable, (3) extraneous variable, (4) hypothetical variable, (5) none of these.

8. If flour and sugar are needed in conducting an experiment, the amounts needed should be (1) taken from fresh packages each day, (2) purchased weekly, (3) purchased monthly, (4) purchased at one time before beginning the experiment, (5) purchased as needed during the experiment.

9. Cake samples for evaluation should be cut using a (1) template, (2) scissors, (3) basic concept, (4) random plan, (5) geographic atlas.

Matching:

10. Measures of central tendency (1)	(1) Descriptive statistics
11. ANOVA (2)	(2) Inferential statistics
12. Mean (1)	(3) Referential statistics
13. Percentage (1)	(4) Pictorial statistics

14. Chi square (2) (5) None of these

15. Omega square (5)

16. Median (1)

17. Student's "t" (2)

18. Standard deviation (1)

19.T or F. Mean and mode are synonyms that can be used interchangeably to report experimental results.

20. T or F. The calculated average of scores can be reported as the mean of the scores.

21.Control is critical in a food science experiment to eliminate the (1) dependent variables, (2) extraneous variables (3) independent variables, (4) statistical deviation, (5) none of the above.

22.The laboratory notebook for research in food science should be a (1) bound notebook, (2) loose leaf notebook, (3) purchased food science lab book, (4) spiral notebook, (5) any of the above will be fine.

23.Statistical significance for the means of two groups can be determined by (1) ANOVA, (2) Chi square, (3) Regression, (4) Student's "t" test, (5) none of the above.

24.T or F. The justification and purpose of an experiment are usually found in the Introduction.

25.T or F. Reading an abstract can substitute for reading the actual article if the journal is not available.

26.T or F. Follow the style guide for the journal in which the paper might be published.

27.T or F. Since you are conducting the experiment, you do not need to be concerned about whether anyone else can follow what you are doing.

28.T or F. Plans for sensory and objective measurements and the scorecard need to be made when the experiment is planned.

29.T or F. There is no need to record variations from exact procedures in the laboratory notebook.

30.T or F. Samples should be coded to eliminate bias from the judges.

31.T or F. Statistical analyses are conducted to determine the probability that the observed results are due to the variable applied and not simply to chance.

ESSAY/SHORT DISCUSSION

1.A student is conducting an experiment using all-purpose flour, whole wheat flour, and bread flour in a standard yeast bread recipe. Write a simple purpose statement that would be applicable to that experiment. Then write a hypothesis and null hypothesis for the same experiment.

[Purpose: To determine the effect of substituting whole wheat and bread flour for allpurpose flour in yeast bread. Hypothesis: There will be a significant difference in the volume of yeast bread made with all-purpose flour, whole wheat flour, and bread flour. Null hypothesis: There will be no significant difference in the volume of yeast bread made with all-purpose, whole wheat, and bread flour.]

2. In the above experiment, give the independent variable: [type of flour]

What are some dependent variables that might be considered: [bread volume, texture, crust color, tenderness, flavor]

3. In the above experiment, list five control measures that would prevent extraneous variables from affecting the experiment results:

[Each flour from the same batch; all flours of the same brand, if possible; same amount of flour weighed each time; same amounts of other ingredients; same procedure followed in preparation; same oven at the same time; same cooling procedure; same volumeter procedure; same slice for each panelist from each bread]

4. Distinguish between:

Tables and figures - [Both are methods of reporting/visualizing data. A table provides figures/numerals, while a figure consists of photographs, graphs, tracings, etc. Tables are titled above the table, while figures are titled below the figure.]

Descriptive statistics and inferential statistics - [Descriptive statistics involve analysis of data by describing results in terms such as frequency, measures of central tendency, and percentages. Inferential statistics involve data analysis based on the probability of predicting an occurrence by the use of such statistical tests as chi-square, analysis of variance, Students' "t" distribution, or other statistical tools.]

5. For the following list of numbers, calculate the mode, median, and mean.

55	89	
67	89	
73	95	
73	98	Mode = [89]
85	99	Median = [89]
89		Mean = [83]