Public Health Training Network

SELF-STUDY COURSE 3010-G Lesson 8

Food Protection

Environmental Health Sciences
Self-Study Course SS3010

Lesson 8: *Food Protection*

I. Lesson Consists of

A. Part I: 25 multiple choice questions
B. Part II: 25 multiple choice questions
C. Part III: 25 multiple choice questions
D. Part IV: 25 multiple choice questions

II. References

Salvato, J. A. *Environmental Engineering and Sanitation*, 4th ed. New York: John Wiley & Sons, 1992.

III. Topics and Reading Assignments

1. Chapter 8 - Food Protection	**(Page No.)**
A. Design of Structures	898 to 904
B. Food Protection, Quality, and Storage	904 to 926
C. Milk Sources, Transportation, Processing and Control Tests	926 to 953
D. Milk Program Administration	953 to 956
E. Hospital Infant Formula	956 to 958
F. Regulation of Restaurants, Slaughterhouses, Poultry Dressing Plants, and Other Food Establishments	958 to 974
G. Design Details	974 to 1011

2. *A Statewide Outbreak of Escherichia Coli 0157:H7 Infections in Washington State*; copy included with lesson

3. *Hemolytic Uremic Syndrome*, Minnesota Department of Health; copy included with lesson

4. CDC/NCID, *Preventing Foodborne Illness: Listeriosis*; copy included with lesson

5. *The Epidemiology of Listeriosis in the United States--1986*; copy included with lesson

IV. Suggested Supplementary Readings

Bryan, F. *Hazard Analysis Critical Control Point Evaluation.* WHO, 1992.

Kazarian, E. A. *Foodservice Facilities Planning.* 2nd ed. Westport, Connecticut: A.V.I. Publishing, 1983.

Food Code, 1993. Food and Drug Administration, U.S. Public Health Service, National Technical Information Service, Springfield, Virginia.

Thorner, Manning. *Quality Control in Foodservice.* Westport, Connecticut: A.V.I. Publishing, 1983.

V. Objectives

Upon successful completion of Lesson 8, the student should be able to correctly

- apply the principles of disease prevention to the following: food service facility layout, effective and efficient floor plan concepts, equipment design, function, selection, and clean-up potential
- demonstrate an understanding of the chemical, physical, and biological contamination potentials of food and their control
- demonstrate an understanding of the relationship of time-temperature management and foodborne disease control
- demonstrate an understanding of the basic inspection and test methods utilized in milk and food programs.

Environmental Health Sciences
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Lesson 8: *Foodborne Disease Control*

Part I: Multiple Choice

1. The annual cost attributable to foodborne illnesses in the United States is estimated to be

   a. $1.2 million to $5 million per year
   b. $5 trillion per year
   c. $10 million to $15 million per year
   d. $1 billion to $10 billion per year.

2. An interior food service facility wall surface should **not** be constructed of

   a. wallboard
   b. marble
   c. concrete
   d. clay tile.

3. In food processing plants, dairy plants, kitchens, toilet rooms, and similar places, a trapped floor drain is needed for every ___ of floor area.

   a. 600 square yards
   b. 400 square yards
   c. 400 square feet
   d. 600 square feet.

4. Floors in food processing plants, dairy plants, kitchens, and similar places should be sloped _____ toward each drain.

   a. 1/32 to 1/16 inch per foot
   b. 1/8 to 1/4 inch per foot
   c. 1/2 to 1 inch per foot
   d. 3/4 to 1 1/2 inch per foot.

5. If properly installed, one of the best floorings for kitchens, dairies, bakeries, and similar places is

   a. cork
   b. linoleum
   c. ceramic tile
   d. concrete.

6. In order to simplify cleanliness, window sills should be sloped toward the room and down at an angle of _____ degrees.

   a. 30
   b. 20
   c. 80
   d. 40.

7. Which would be the **least** effective method of controlling condensation of moisture in food preparation areas?

   a. increase air temperature
   b. decrease humidity of air
   c. increase temperature of cold surfaces
   d. cool the air.

8. Vegetative forms of *Clostridium botulinum* spores are killed in

   a. 10 to 15 minutes at 176°F
   b. 10 to 15 minutes at 80°F
   c. 1 minute at 250°F
   d. 10 to 15 minutes at 230°F.

9. Thawing a 16-pound turkey at 40°F will take a period of _____ days?

   a. 6 hours
   b. 12 hours
   c. about 3 days
   d. 24 hours.

10. The FDA action level for aflatoxins in milk shipped in interstate commerce is _____.

    a. 0.5 ppb
    b. 0.7 ppb
    c. 0.1 ppb
    d. 1.0 ppb.

11. Which of the following is not a sign of bad fish?

    a. off-odor
    b. elastic flesh
    c. gray or greenish gills
    d. sunken eyes.

12. Beef usually spoils first

    a. near the bone
    b. in the inner portions
    c. on the surface
    d. near the edges.

13. Which bacteria in large numbers can survive extended storage in Cheddar cheese?

    a. *Salmonella*
    b. *Brucella sp.*
    c. *Shigella*
    d. *Clostridium perfringens.*

14. A solution of malachite mixed with ground meat will turn _____ if sodium sulfite has been added to preserve or mask decomposition of the meat.

    a. pale green
    b. bright red
    c. bright yellow
    d. dark brown.

15. Adequate light is essential for proper operation, maintenance, and sanitation. A minimum of ___ is recommended on work surfaces.

    a. 5-foot candles
    b. 10-foot candles
    c. 20-foot candles
    d. 30-foot candles.

16. Poor health in a food handler exposes food to unacceptable risks of contamination; therefore, a physical exam should be required

    a. every 3 years
    b. every 2 years
    c. every year
    d. none of the above.

17. A primary responsibility of food service management is

    a. trust and delegation of responsibilities
    b. recognition of sanitary inspections
    c. approval and provisions for legal responsibilities
    d. education and supervision of employees.

18. For custard-filled pies to be considered safe, they should be heated to

    a. 190°F for ten minutes
    b. 170°F for ten minutes
    c. 180°F for ten minutes
    d. 200°F for ten minutes.

19. Which food has the highest acceptable plate count of *E. coli?*

    a. cheese
    b. unfrozen beef
    c. chicken
    d. fish.

20. Dry stored goods should be stored off the floor at least _____ to prevent their contamination.

    a. 2 inches
    b. 6 inches
    c. 12 inches
    d. 24 inches.

21. Contamination in a block of ice can be identified by _____ in the geometric center.

    a. air bubbles
    b. discoloration
    c. crystallization
    d. separation of the core section.

22. Practically all foods, whether canned, pickled, cured, or dried

    a. perish and become part of the phosphorous cycle
    b. are no longer sanitary after six months on the shelf
    c. will become unsanitary after eighteen months of storage
    d. deteriorate upon storage.

23. In a dry food storage room, the artificial lighting should provide a minimum of

    a. 10-foot candles
    b. 50-foot candles.
    c. 100-foot candles.
    d. 3-foot candles.

24. Which minerals and chemicals cause problems in ice manufacturing?

    a. calcium and silica
    b. iron and magnesium carbonates
    c. aluminum oxide and manganese
    d. all the above.

25. Celery, a major source of salad contamination, has proven to be acceptable when

a. bathed with the juice of citrus fruits such as grapefruits, oranges, lemons or limes.
b. blanched for a few seconds in water at a rolling boil.
c. placed in a vinegar solution for three hours prior to use.
d. immersed in boiling water for thirty seconds, then chilled under running tap water.

Part II: Multiple Choice

1. Which of the following is best to use when sanitizing food contact equipment?

   a. phenols
   b. copper
   c. zinc
   d. none of the above.

2. A healthy milk herd is expected to be free of which disease(s)?

   a. mastitis
   b. brucellosis
   c. tuberculosis
   d. all of the above.

3. The quality of milk reaching the ultimate consumer is largely determined

   a. at the plant, where processing and handling occurs
   b. at the farm, where the milk is produced
   c. by the USDA through stringent testing and laboratory analysis
   d. by the FDA in accordance with Federal regulations.

4. Dairy equipment can be disinfected with a chlorine solution of

   a. 20 mg/l
   b. 2 mg/l
   c. 200 mg/l
   d. 220 mg/l.

5. When disinfecting rubber valves and other parts of milking equipment with hot water, the water temperature should be _____ or a strong chlorine solution of _____ strength can be used instead.

   a. 180° to 190°F, 200 mg/l
   b. 180° to 190°F, 190 mg/l
   c. 190° to 200°F, 200 mg/l
   d. 190 to 200°F, 190 mg/l.

6. In case of emergency, raw milk may be rendered safe for drinking if _____ and then immediately cooled.

   a. heated in a water bath to a temperature of 165°F
   b. heated after bottling to a temperature of 165°F
   c. heated to 145°F before bottling
   d. heated to 145°F after bottling.

7. As milk leaves the cow, it is approximately 96° to 100°F. Prechilling of the milk helps:

   a. to ensure rapid bulk cooling within the refrigerated bulk tank to the desired temperature of less than 40°F
   b. to locate toxic chemicals which precipitate upon cooling before they enter the bulk tank
   c. to detect infected or feverish heifers since cooling sensor readily spot overheated milk
   d. to mellow the flavor of the final product.

8. At what time and temperature specifications does a sweetened milk product have to be pasteurized?

   a. 150°F for 30 minutes
   b. 65°F for 30 minutes
   c. 75°F for 15 seconds
   d. 100°F for 0.001 seconds.

9. Common refrigerants include which of the following?

   a. freon
   b. ammonia
   c. carbon dioxide
   d. all of the above.

10. Pasteurization of milk product does not eliminate which of the following?

    a. toxins
    b. anthrax spores
    c. pesticides
    d. all of the above.

11. If the fat content of milk increases by ten percent or more, the pasteurizer temperature must be increase by

    a. 15°F
    b. 25°F
    c. 5°F
    d. 10°F.

12. The pipeline milker

    a. was first introduced in 1854 and is still used today
    b. is vastly inferior to Branigien's Quadra-Path Sterilizer
    c. was a welcome improvement to Branigien's so called "sterilizer"
    d. requires special attention to ensure its sanitary condition.

13. After milk is pasteurized, it should be rapidly cooled to below _____ so that _____.

    a. 45°F; any remaining bacteria will be killed by rapid temperature change
    b. 40°F; molecular activity in any remaining organisms will be stopped
    c. 40°F; lactic acid bacteria will be slowed in reproduction
    d. 45°F; the remaining bacteria will not materially increase.

14. Hot water for the sanitizing of assembled equipment is not to be cooler than _____ at the end of the system.

    a. 170°F for 5 minutes
    b. 180°F for 5 minutes
    c. 185°F for 5 minutes
    d. 187°F for 5 minutes.

15. Food inspection programs of the future will focus increasingly on

    a. hazard analysis and critical control point evaluations
    b. more frequent inspections
    c. more rigid enforcement of all rules
    d. increased food handler exams.

16. The appropriate procedure used for bottle washing in large plants is

    a. wash, rinse, air-dry
    b. pre-soaking, wash, rinse and sanitizing rinse
    c. steam-cleaning at a pressure of 170°F
    d. wash, rinse, and sanitizing rinse.

17. Milk is considered Ultra-High Temperature pasteurized if it reaches

    a. 145°F (63°C) for 30 minutes
    b. 194°F (90°C) for 0.5 seconds
    c. 212°F (100°C) for 1 seconds
    d. None of the above

18. Which of the following is not a common refrigerant?

    a. carbon dioxide
    b. methyl chloride
    c. sulfur dioxide
    d. nitrogen oxide.

19. Quality control of milk includes which of the following?

    a. transportation, herd health
    b. milk handling, processing
    c. distribution, refrigeration
    d. all of the above.

20. A yellow to brownish black stain taken during the sediment test

    a. is a simple visual indication of the amount of dirt and abnormal substances in the milk
    b. encourages straining of the milk at the farm rather than cleaning milking procedures
    c. is an indication of high sediment content from the cow's udder
    d. reveals unsanitary practices during the milking process.

21. The _____ test shows the amount of extraneous material in milk but will not show dissolved material.

    a. appearance
    b. microscopic count
    c. thermoduric
    d. sediment.

22. Pasteurized milk quality is indicated by

    a. direct microscopic count, coliform test, standard plate count
    b. appearance, thermoduric, determination
    c. phosphatase test, taste and odor tests
    d. a and c above.

23. The contamination of milk with sediment is typically the result of which of the following?

    a. improper cleaning of milking apparatus
    b. improper cleaning of the cow
    c. improper handling of the milk
    d. improper vaccination for brucellosis.

24. Salty flavors in milk may be due to the use of milk from cows infected with _____.

    a. tuberculosis
    b. mastitis
    c. brucellosis
    d. hepatitis.

25. When it is not possible to collect and examine a large number of samples for bacteria examinations, an indication of the sanitary condition of the milk can be obtained by

    a. methylene blue reduction test
    b. resazurin test
    c. both a and b above
    d. none of the above.

Part III: Multiple Choice

1. Escherichia coli 0157:H7 was first identified as a pathogen during the investigation of two outbreaks in what two states?

   a. Washington and Illinois
   b. Minnesota and Kentucky
   c. Texas and Iowa
   d. Oregon and Michigan.

2. Escherichia coli 0157:H7 has become

   a. less of a problem due to antibiotics
   b. a particular problem for produces and users of ground beef
   c. a minor threat to children
   d. not a threat to the elderly.

3. Escherichia coli 0157:H7 can be found thriving in the

   a. intestines of man and animals
   b. water
   c. soil
   d. air.

4. Escherichia coli 0157:H7 is a bacteria that currently

   a. tends to cause disease in all who come in contact with it
   b. is difficult to test for
   c. is responsible for numerous diseases of the skin
   d. none of the above.

5. The bacteria is often spread by

   a. direct contact
   b. under cooked food
   c. a and b
   d. none of the above.

6. Listeriosis is a

   a. skin irritation caused by contact with cold products
   b. serious infection caused by food contaminated with Listeria monocytogenes
   c. disease caused by exposure to lysolic agents
   d. disease that attacks people in their early 20s.

7. People at increase risk for listeriosis are

   a. pregnant women
   b. newborns
   c. a and b
   d. none of the above.

8. Which of the following foods are not at high risk for transmitting listeriosis?

   a. soft cheese
   b. hot dogs
   c. raw vegetables
   d. potato chips.

9. Hemolytic Uremic Syndrome is caused by

   a. mental stress
   b. a virus
   c. by infection with Escherichia coli 0157:H7
   d. listeriosis.

10. Which group of the following bacteria typically contains most of the pathogenic bacteria?

    a. mesoduric
    b. thermophilic
    c. mesophilic
    d. thermoduric.

11. Thermoduric bacteria grow best at a temperature range of

a. 40° to 58°F
b. 60° to 72°F
c. 70° to 98°F
d. 46 to 118°F.

12. A certified industry inspection is an inspection

a. conducted by a certified local governmental unit
b. conducted by a certified state official
c. conducted by a certified member of the industry
d. conducted by a federal agency.

13. The voluntary federal-state program is commonly referred to as the

a. IMS
b. FDAVP
c. PHSVFSP
d. VFS.

14. The _____ was a system which encouraged dairy farmers to maintain large enough herds to meet drinking milk needs during seasons of lowest production.

a. Milk Marketing Agreement Act
b. Agricultural Milk Agreement Act
c. Agricultural Management Agreement Act
d. Agricultural Marketing Agreement Act.

15. Deaths of newborns caused by milk-induced diarrhea has been mainly attributed to the bacteria:

a. *Shigella*
b. *Pseudomonas*
c. *Escherichia coli*
d. *Enterobacter aerogenes.*

16. The major reason for the regulation of food establishments is

    a. to prevent foodborne illnesses
    b. to ensure restaurant safety
    c. to reduce liability
    d. to increase consumer confidence.

17. Routine and frequent inspections of food-processing and food-service establishments alone does not ensure that adequate levels of sanitation will be met. Inspections must be supplemented with

    a. quality control
    b. education
    c. management supervision
    d. all of the above.

18. Inspection report forms are primarily tools used to

    a. enforce regulations
    b. assure complete investigations and compliance with uniform policy
    c. assure complete compliance
    d. motivate management supervision.

19. Oysters, soft-shell and hard-shell clams, mussels, lobsters, crabs, and shrimp fall under what group?

    a. molluscan shellfish
    b. shellfish
    c. fomites
    d. crustacea.

20. Mussels from _____ contain a chemical poison during certain times of the year which is not destroyed during cooking.

    a. the Pacific Coast
    b. England
    c. Europe
    d. all of the above.

21. Strong emphasis is placed on the control of shellfish because

    a. shellfish can transmit a number of infectious diseases such as dysentery, infectious hepatitis, cholera, and typhoid fever
    b. seafood is in popular demand
    c. the shellfish population is decreasing due to water pollution
    d. a great number of shellfish are bought and sold illegally.

22. According to the text, which state has a quarantine on mussels from June to September? (Please Note that the quarantine has been changed to May 1 to October 31.)

    a. Florida
    b. California
    c. Louisiana
    d. New York.

23. Of the shellfish listed below, the ones most likely to cause illness are

    a. oysters
    b. crabs
    c. shrimp
    d. lobsters.

24. Which of the following agencies is responsible for protecting our waterways from contamination?

    a. OSHA
    b. FDA
    c. EPA
    d. PHS.

25. Outbreaks of _____ traced to contaminated shellfish between 1900 and 1925 led to the PHS Certification of dealers involved in interstate shipment.

    a. cholera
    b. gastroenteritis
    c. typhoid fever
    d. dysentery.

Part IV: Multiple Choice

1. Shellfish spawning takes place between the months of

   a. June and September
   b. May and July
   c. May and August
   d. April and August.

2. Dealers involved in interstate shipment and control of shellfish must have

   a. a certification
   b. PHS certification
   c. USEPA certification
   d. NRCD approval.

3. Oysters grow best in water with a salinity of

   a. 0.42 to 0.72
   b. 0.24 to 0.27
   c. 2.5 percent
   d. greater than 0.31.

4. Oysters grow best at what pH and temperature?

   a. 6.2 to 6.4 and 37°F
   b. 6.2 to 6.8 and 41°F
   c. 6.4 to 7.0 and 45°F
   d. 6.0 to 6.8 and 32°F.

5. Oyster-shell stock or shucked oysters sampled at the source should not have MPNB of _____ or more fecal coliform per 100 grams of shellfish.

   a. 240
   b. 230
   c. 235
   d. 250.

6. Many states rules requre the refrigeration of Shucked shellfish at or below _____ but above 32^0F.

   a. 45°F
   b. 42°F
   c. 47°F
   d. 32°F.

7. When direct consumption of shellfish might be hazardous due to radionuclide or industrial wastes pollution; the median coliform MPN of the water does not exceed 700 per 100 ml; and not more than 10 percent of samples exceed MPN of 2300 per 100 ml, an area is designated

   a. prohibited
   b. provisionally restricted
   c. restricted
   d. unprohibited.

8. Oysters free themselves of contaminating viruses and bacteria within _____ of exposure in purified seawater.

   a. 12 to 24 hours
   b. 6 to 12 hours
   c. 12 to 2 days
   d. 18 to 24 hours.

9. Proper facility lighting is essential for

   a. cleanliness
   b. accident prevention
   c. fatigue reduction
   d. all of the above.

10. An ideal floor covering for a kitchen is

    a. carpet
    b. linoleum
    c. quarry tile
    d. asphalt tile.

11. In order to protect against salmonellae growth in potentially hazardous food, the recommended temperature for storage is

    a. 45°F
    b. 42°F
    c. 50°F
    d. 40°F.

12. When the internal temperatures of perishable foods is 42°F, growth of which of the following is inhibited?

    a. *Salmonellae*
    b. *Staphylococci*
    c. *Bacillus cereus*
    d. a and b above.

13. Which of the following factors slow(s) down biological activity and preserve(s) food?

    a. high or low temperatures
    b. reduced moisture
    c. refrigeration
    d. all of the above.

14. Temperatures of _____ have been found more satisfactory for the storage of foods used within 24 or 48 hours.

    a. 32° to 40°F
    b. 38° to 40°F
    c. 40° to 45°F
    d. 35° to 40°F.

15. The racks in refrigerators or walk-in coolers must be _____ to allow circulation of cold air.

    a. slotted
    b. solid
    c. spaced equal distances apart
    d. none of the above.

16. Sandwich and salad mixtures should be placed in shallow pans at a depth not greater than _____ to accelerate the rapid cooling of the food.

a 3 inches
b. 2 inches
c. 5 inches
d. inches.

17. In order to avoid pathogen growth and/or survival, food that is greater than _____ thick frozen or partially thawed should not be cooked.

a. 4 inches
b. 3 inches
c. 2 inch
d. 1 inch.

18. The amount heat required to lower one pound of a product one degree Fahrenheit is

a. exothermic traction
b. the specific at
c. the coolant or
d. important to w.

19. A freezer unit for en food should maintain temperatures of _____ or below.

a. 32°F
b. 24°F
c. 10°F
d. 0°F.

20. To prepare a solution c
bleach with one gallon mg per liter available chlorine, _____ of 5.25 percent r should be used.

a. 0.5 oz.
b. 1.0 oz.
c. 0.33 oz.
d. 0.25 oz.

21. A mold control program should include all of the following factors **except**

    a. spraying with a 5000 mg/1 sodium hypochlorite solution
    b. spraying with a 1000 mg/1 quaternary ammonium compound
    c. respraying the entire section with 400 to 500 mg/1 of quaternary solution every week or two
    d. cleaning the affected area with an alkaline detergent.

22. The correct order of sequence for hand washing dishes is

    a. scrape and flush, wash, sanitize, rinse, air dry
    b. scrape and Flush, wash, rinse, sanitize, air dry
    c. scrape and flush, wash, rinse, air dry
    d. scrape and flush, wash, sanitize, rinse, towel dry.

23. The final rinse water temperature for a *heat sanitizing* machine dishwasher should be

    a. 180°F
    b. 160°F
    c. 175°F
    d. 210°F.

24. Which of the following is not a step in proper machine dishwashing?

    a. wash and sanitize
    b. scrape
    c. cloth dry
    d. rack dishes.

25. What is the minimum period of wash time for a single-tank conveyer dishwashing machine?

    a. 10 seconds
    b. 25 seconds
    c. 20 seconds
    d. 15 seconds.

Public Health Training Network

SELF-STUDY COURSE 3010-G

Answer Keys

Self-Study Course SS3010
Environmental Health Sciences
Answer Keys (Page No.)

Lesson 8: **Part I**

1. D (989)	6. A (901)	11. B (909)	16. D (907)	21. B (921)
2. A (901)	7. A (910)	12. C (909)	17. D (923)	22. D (922)
3. C (899)	8. A (912)	13. A (910)	18. A (911)	23. A (922)
4. B (899)	9. C (904)	14. B (910)	19. A (920)	24. D (921)
5. C (900)	10. A (918)	15. D (902)	20. C (922)	25. D (919)

Part II

1. D (941)	6. A (927)	11. C (935)	16. D (925)	21. D (944)
2. D (926)	7. A (936)	12. D (935)	17. C (941)	22. D (944)
3. B (926)	8. A (935)	13. D (939)	18. D (935)	23. B (944)
4. C (927)	9. D (935)	14. A (939)	19. D (943)	24. B (945)
5. A (927)	10. D (943)	15. A (940)	20. A (944)	25. C (945)

Part III

1. D (945)	6. B (950)	11. C (952)	16. A (958)	21. A (966)
2. B (949)	7. C (950)	12. C (953)	17. D (960)	22. B (966)
3. A (949)	8. D (951)	13. A (954)	18. B (961)	23. A (966)
4. B (949)	9. C (952)	14. D (956)	19. B (961)	24. C (969)
5. C (949)	10. C (952)	15. C (956)	20. D (961)	25. C (967)

Part IV

1. C (969)	6. A (970)	11. B (981)	16. A (983)	21. B (992)
2. A (968)	7. C (972)	12. D (982)	17. A (984)	22. B (992)
3. B (969)	8. A (969)	13. D (982)	18. B (984)	23. A (994)
4. B (969)	9 D (976)	14. B (982)	19. D (990)	24. C (992)
5. B (970)	10. C (975)	15. A (983)	20. D (992)	25. D (1000)