



UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

DIPLOMA IN ENVIRONMENTAL HEALTH
FINAL EXAMINATION PAPER 2010

TITLE OF PAPER : INTRODUCTION TO FOOD MICROBIOLOGY
COURSE CODE : EHS 312
DURATION : 2 HOURS
MARKS : 100

INSTRUCTIONS : ANSWER **FOUR** QUESTIONS
: QUESTION **ONE** IS **COMPULSORY**
: EACH QUESTION CARRIES 25 MARKS.
: WRITE NEATLY
: BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

Question 1 [Compulsory]
Multiple Choice Questions
(Choose the Best Answer)

1. Which diarrhoeal symptoms are associated with *Enterotoxigenic E.coli* (ETEC)?
 - A. Watery diarrhea with rice water stools
 - B. Profuse diarrhea with watery stools (blood and mucus in stools)
 - C. Watery diarrhea with mucus but no gross blood
 - D. Watery and grossly bloody diarrhea (all blood and no stools)
 - E. None of the above statements is true

2. Which diarrhoeal symptoms are associated with *Enterohaemorrhagic E.coli* (EHEC) *E.coli* 0157:H7?
 - A. Watery diarrhea with rice water stools
 - B. Profuse diarrhea with watery stools (blood and mucus in stools)
 - C. Watery diarrhea with mucus but no gross blood
 - D. Watery and grossly bloody diarrhea (all blood and no stools)
 - E. None of the above statements is true

3. The toxicity of the six most potent aflatoxins decreases in the following order.
 - A. B1>G1>B2>M1>M2=G2
 - B. B2>M2>G2>B1>M1=G1
 - C. B1>G1>M1>B2>M2=G2
 - D. B1>M1>G1>G2>M2=B2
 - E. B1>M1>G1>B2>M2=G1

4. The principal effect of aflatoxins produced by *Aspergillus flavus* is the;
 - A. Kidney nephritis
 - B. Muscular paralysis
 - C. Liver cancer
 - D. Spleen necrosis
 - E. Cysts in the heart

5. Toxins produced by *Clostridium botulinum* are known as;
 - A. Verotoxins
 - B. Enterotoxins
 - C. Neurotoxins
 - D. Exotoxins
 - E. Endotoxins

6. Which of the following statements is **not true**;
- A. Botulinum toxin (E) may be destroyed at 80 °C for 10-30min or boiling for 5-15min.
 - B. *Clostridium botulinum* type (E) will grow and produce toxin at 3.3 °C
 - C. *Clostridium botulinum* type (C) only causes botulism in fowls, cattle and other animals.
 - D. *Clostridium botulinum* is an aero-tolerant spore-forming gram positive microorganism
 - E. Clostridium type E is very common in Japan and mainly affect food of marine origin.
7. Which of these statements is **not true**?
- A. *Escherichia coli* will ferment carbohydrates to produce lactic acid, acetic acid [CO₂ / H₂]
 - B. The toxins produced by *Enterotoxigenic E.coli* (ETEC) are similar or identical to Shigella toxins and therefore will produce shigella-like symptoms
 - C. *E.coli* 0157: H7 is acid tolerant and therefore may survive and cause food borne illness in fruit juices and soft drinks
 - D. *Listeria monocytogenes* will colonize the intestinal tract and then invade the tissues including the placenta in pregnant mothers.
 - E. *L.monocytogenes* possess a bile-salt hydrolase enzyme that permits growth in the gall bladder
8. *Compylobacter jejuni* is;
- A. Slightly hemolytic, gram positive, halophilic, flagellated, psychrotrophic and facultative microorganism.
 - B. Psychrotrophic, facultative, rod shaped, gram negative microorganism
 - C. Slender or spirally or curved rod with a singly polar flagellum at one or both ends and microaerophilic
 - D. Straight or curved rod, motile with a single flagellum, halophilic and facultative microorganism
 - E. Psychrotrophic, facultative, rod shaped, and encapsulated gram negative microorganism
9. When a milking cow has consumed feedstuff containing AFB1 aflatoxin type, the resultant metabolites in milk will appear as;
- A. AFB1 aflatoxin
 - B. AFM2 aflatoxins
 - C. AFG1 aflatoxins
 - D. AFB2 aflatoxins
 - E. AFM1 aflatoxins

10. *Thamnidium elegans* mold will attack and cause grayish to brown rot on;
- Frozen and refrigerated meat
 - Cereals and cereal products
 - Chilled and refrigerated meat
 - Fruits and vegetables
 - Cheese and dairy products
11. Which of these microorganisms do not belong to the enterobacteriaceae family;
- Salmonella enteritidis*
 - Klebsiella species*
 - Yersinia pseudotuberculosis*
 - Listeria monocytogenes*
 - Campylobacter species*
12. Which statement is **not true** in relation to *Listeria monocytogenes*?
- Vegetative cells will invade the colonic epithelial cells, causing ulceration of the colon and resulting in bloody diarrhea
 - It can be a host to domestic and wild animals including fish, flies, ticks and crustacean
 - It can withstand repeated freezing and thawing
 - Poultry workers have been found to harbor high numbers
 - May cause bovine mastitis and bovine abortion
13. Which one of these mycotoxins is not produced by *Penicillium* mold?
- Yellow rice toxin
 - Ochratoxin
 - Rubratoxin
 - Patulin
 - Trichothecene
14. ----- mold is also known as the dairy mold
- Geotrichum candidum*
 - Candida tropicalis*
 - Cladosporium herbarum*
 - Penicillium camembert*
 - Geotrichum fragrans*
15. *Clostridium perfringens* foodborne illness is likely to be transported by which of the following vehicles.
- Potato salad
 - Meats served several hours or a day or so after cooking
 - Raw vegetables
 - Cooked vegetables
 - All of the above

16. The symptoms of *Clostridium perfringens* foodborne illness are largely;
- A. Nausea and vomiting
 - B. Abdominal pains and diarrhea
 - C. Chills and fever
 - D. Fever and headache
 - E. Dizziness and headache
17. Concerning *Salmonella*, all of the following are true **EXCEPT** that:
- A. It may produce serious systemic disease in humans
 - B. A carrier state exists in some who recover
 - C. Food animals do not serve as reservoirs
 - D. Animal feed is often contaminated, as cross-contamination occurs during processing
 - E. Animals kept in an enclosure and underfed
18. An outbreak characterized by nausea, vomiting and diarrhea which appears two to six hours after consumption of potato salad would lead you to suspect;
- A. Botulism
 - B. Shigellosis
 - C. Salmonellosis
 - D. Staphylococcal intoxication
 - E. Campylobacteriosis
19. General knowledge indicates that most foodborne illness is caused by:
- A. Viruses
 - B. Bacteria
 - C. Protozoan
 - D. Rickettsia
 - E. Molds
20. Assume that a culture of pathogenic bacteria was in a favorable food medium. Assume further that the food medium was ingested. Foodborne disease would be less likely if the culture were in the:
- A. Logarithmic phase
 - B. Stationary phase
 - C. Lag phase
 - D. Death phase
 - E. Late log phase

21. Under normal, comparable circumstances, which of the following would be expected to have the highest bacterial counts per gram?
- A. Dagwood
 - B. T-bone steak
 - C. Chicken drumstick
 - D. Cheese burger
 - E. A, B and C since it is meat
22. The most effective measure which a food service manager can apply in the control of bacterial multiplication in the storage, preparation and service of food is:
- A. pH control
 - B. Inventory control
 - C. Dishwashing control
 - D. Sanitation control
 - E. Time-temperature control
23. The chain of transmission for Salmonella may be:
- A. Humans to humans
 - B. Humans to animals
 - C. Animals to animals
 - D. Animals to humans
 - E. Any of the above
24. Outbreaks of *Clostridium perfringens* foodborne illness are associated with all of the following circumstances **EXCEPT**:
- A. Poor time-temperature control in the handling of cooked meat
 - B. Recontamination of cooked meat by food preparation equipment.
 - C. Sanitary care of utensils, equipment, and workers hands
 - D. Poor sanitation of food preparation utensils
 - E. Inadequate reheating of foods
25. Which statement is **not true** in relation to *Yersinia enterocolitica*?
- A. The incidences of Yersiniosis is high in infants and the elderly
 - B. It is catalase and oxidase positive but can not ferment carbohydrates
 - C. Will produce a greater amount of toxins at low temperature
 - D. Produce illness that resembles that of *Escherichia coli*
 - E. The principal source of the virulent type is pigs

[25 Marks]

Question 2

- a. Factory 'A' is canning garden peas and factory 'B' is canning pineapples. [5]
Which factory requires a botulinum cook and why? and why does the other factory not require a botulinum cook?
- b. Which symptoms are indicative of botulism in human? [5]
- c. How would you control botulism? [5]
- d. Write short notes on the causative agent of botulism. [10]
- [25Marks]**

Question 3

- a) Why are excreta-borne diseases a major cause of foodborne illness in Swaziland? [15]
- b) A food survey in the Siteki town in 1998 revealed that the lettuce served with food in the restaurant had Staphylococcal microorganisms? Explain the hygiene and health implications of this. [10]

[25 Marks]

Question 4

- a) Discuss the difference in characteristics and activity of molds and bacteria in food. [15]
- b) Explain the methods you would employ to prevent the growth of molds on food? [10]
- [25 Marks]**

Question 5

With the aid of a growth curve, show where you could set barriers to prevent foodborne illness or spoilage. (the barrier employed should be explained well, and noted how it would prevent the spoilage. Also show the disadvantages if any, of setting the barriers on other areas of the growth curve)

[25 Marks]