**Donald Frank**

**Lab 6: Microorganisms in human food and water** (15 points)

**Objectives:** To learn the roles bacteria and fungi play in the production of human food.

**What you need:**

* *Computer access to the internet*
* *Alcamo’s Microbes and Society, Benjamin S. Weeks (a.k.a. your textbook)*

**What to do:**

* Answer the questions using your textbook and any websites that are listed
* Use <http://www.milkfacts.info/Milk%20Composition/Milk%20Composition%20Page.htm> to answer question #1
* Use [http://www.cdc.gov/foodsafety/rawmilk/raw-milk-questions-and-answers.html](http://www.cdc.gov/foodsafety/rawmilk/raw-milk-questions-and-answers.html%20%20)

to answer questions #2 – #4

* Use <http://www.idfa.org/files/249_Pasteurization%20Definition%20and%20Methods.pdf>

to answer questions #5

* Use <http://www.bccdc.ca/NR/rdonlyres/F325BEAF-BB3A-49AE-A101-8CEA70B48B9B/0/DairyProcessingHACCP.pdf> to answer questions #7 – 8
* Use <http://www.mass.gov/dep/water/drinking/microb.htm> to answer questions #10 – #11

**Answer the following questions:**

1. List the substances found in milk and milk products (0.5 point).

* **Water**
* **lactose**
* **fat**
* **protein**
* **ash (minerals)**
* **enzymes (Lactoperoxidase)**

1. What is "raw milk" (0.5 point)?

**Raw milk is milk from that has not been pasteurized to kill harmful bacteria. It can come from any animal.**

**Cited:**

[**https://www.cdc.gov/foodsafety/rawmilk/raw-milk-questions-and-answers.html**](https://www.cdc.gov/foodsafety/rawmilk/raw-milk-questions-and-answers.html)

1. What are the names of three disease-causing **organisms** that can be found in milk **and** briefly describe the symptoms of the disease that they cause (3 point)?

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| **Organism** | **Symptoms** |
| [E. coli](https://www.cdc.gov/ecoli/) | **Diarrhea, urinary tract infections, respiratory illness, pneumonia** |
| [Listeria](https://www.cdc.gov/listeria/index.html) | **Pregnant women: fever, flu-like symptoms, fatigue, muscle aches**  **People other than pregnant women: headache, stiff neck, confusion, loss of balance, convulsions, fever, muscle aches** |
| [Salmonella](https://www.cdc.gov/salmonella/index.html) | **Diarrhea, fever, abdominal cramps** |

1. List THREE factors that may contribute to the contamination of milk BEFORE processing (1.5 point).
2. **Animal feces coming into direct contact with the milk**
3. **Cow diseases (for example, bovine tuberculosis)**
4. **Bacteria that live on the skin of animals**
5. What does the acronym HTST mean? What does it accomplish (1 point)?

**High Temperature/Short Time**. **Milk is pasteurized to kill any pathogenic bacteria that may be present.**

1. What does the term "pathogenic" mean? List 3 examples of pathogenic organisms (1.5 point) – see Chapter 17.

**Able to cause or produce disease**

1. ***Streptococcus pneumoniae***
2. ***Mycoplasma pneumoniae***
3. ***Chlamydophilia***
4. What is HACCP? Why is it important in milk pasteurization and in other food processing plants (1 points)?

**HACCP Hazard Analysis Critical Control Point Program. HACCP purpose is to prevent a foodborne disease outbreak from occurring and reducing public health risk**

1. Starting on page 12 of the provided website, list the first three sections or processes in pasteurization plants and then discuss one critical control point in each of those steps (1.5 points).

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| **Section** | **Critical Control Point** |
| **Raw Milk Supply** | **Milk Temperature – temperature is to be measured before accepting each tanker load or container and immediately prior to use. If the milk temperature measures above 5° C, then the action is to hold and not process the milk until the milk acidity has been tested.** |
| **Ingredients/Packaging Materials** | **Receipt of Ingredients – Before accepting each shipment of ingredients, the shipment of ingredient containers must be inspected to ensure containers are intact and for signs of outside contamination. If the ingredient does not meet the critical limits, it is rejected.** |
| **HTST Pasteurization** | **Indicating Thermometer -Temperature Accuracy – Upon installation and every 3 months thereafter, the thermometer accuracy must be monitored. If the deviation is more than**  **± 5° C, the thermometer needs to be adjusted (if possible) or replaced.** |

1. If milk you purchased at the store had a foul odor indicative of contamination, how could the contamination have happened, assuming that the milk passed the final inspection at the bottling machine? Describe the source of contamination as well as why this cause the milk to go sour (0.5 point).

**The milk could have not been transported at the right temperature, which would allow for bacteria contamination. Bacteria coverts lactose into lactic acid which would result in a sour taste.**

1. List 4 sources of contamination to reservoir water (2 points).
2. **Rainwater**
3. **Surface Water**
4. **Groundwater**
5. **Direct sources – effluent outfalls from factories, refineries, waste treatment plants**
6. List 4 pathogenic organisms found in water supplies and the diseases (with symptoms) caused by those organisms. Do not use any diseases that you may have mentioned in question #3 (2 points).

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| **Organism** | **Disease** | **Symptom** |
| ***Legionella*** | **Legionellosis** | **Cough, Shortness of breath, Fever, Muscle aches, Headaches** |
| ***Giardia*** | **Giardiasis** | **Watery diarrhea, Fatigue or malaise, Abdominal cramps and bloating, Gas or flatulence, Nausea, Weight loss.** |
| ***Cryptosporidium*** | **Cryptosporidiosis** | **Stomach cramps or pain, Dehydration, Nauesea, Vomiting, Fever, Weight loss** |
| ***Shigella*** | **Shigellosis** | **Diarrhea, Fever, Abdominal pain, Tenesmus** |