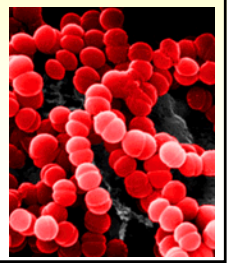
MilkTech International

UW-MRIL

Milk Quality Introduction Bacterial Quality



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Objectives

- In this module you will learn:
  - Types of bacteria that can be found in milk
  - Common sources of bacterial contamination
  - Reasons for concern about bacteria counts
  - Common measures of bacterial quality

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Milk quality can refer to:

- Physical and chemical properties
  - Color, texture
  - Odor, flavor
  - Nutritional composition
    - ✓Protein, fat, lactose, and minerals
  - Acidity
  - Presence or absence of abnormal substances
- Biological properties
  - Somatic cell count
  - Bacterial count

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High Quality Milk

- Is white in appearance
- Has no objectionable odors
- Contains no abnormal substances
  - Pesticides, added water, or antibiotic or antiseptic residues
- Has a low somatic cell count
  - Is produced by healthy animals.
- Has low bacteria counts
  - Is produced in hygienic conditions.

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Why Is Bacterial Quality Important?

- Some bacteria can cause diseases in animals and humans.
- Some bacteria can cause the deterioration of milk quality.
  - Bacteria break down milk components such as lactose, protein, and fat.
  - Bacteria secrete substances that affect milk's taste and chemical characteristics.

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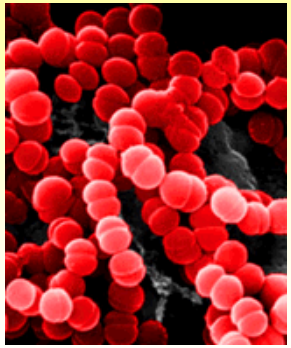
What Are Bacteria?

- Bacteria are single-cell organisms that are not visible without a microscope.
  - Some bacteria live and thrive in the environment.
  - Some bacteria can only survive inside animals; for example, inside a cow's udder.



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Bacteria Counts in Milk

- There will always be bacteria in milk because milking is not a completely sanitary process.
- The number of bacteria in milk is a relative indication of:
  - The quality of the conditions in which it was produced.
  - Its quality as a food product.

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Where Do Bacteria Come From?

- There are three main sources of bacterial contamination of milk:
  1. From the environment
     - ✓ Transported on the exterior surfaces of udders and teats.
     - ✓ Drawn directly into the milking machine from the milking environment.
  2. From milk handling and storage equipment
     - ✓ Due to cleaning failures.
     - ✓ Due to incubation during long milking periods.
  3. From within the udder
     - ✓ Mastitis organisms shed from cows.

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Bacteria Growth in Milk

- Milk is an excellent growth medium for bacteria.
- The bacteria population in milk can grow fast.
  - It can double in less than 20 minutes in an average temperature of 90°F, or 30°C.
- The rate of bacteria population growth in milk depends on:
  - Type of bacteria that contaminates milk.
  - Initial amount of bacteria in milk.
  - Temperature of milk.

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Types of Bacteria

- Bacteria can be classified according to the places in which they are found.
  - Environmental bacteria live and grow in the environment outside of the cow.
  - Some bacteria live inside the udder or on the udder skin, but do not survive in the environment outside of the cow.
    - ✓ They are called contagious bacteria because they can cause contagious mastitis.

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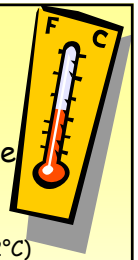
Types of Bacteria



- Bacteria can be classified according to the optimal growth temperatures.
  - Mesophilic
    - ✓ Optimal growth at a high temperature of 90°F (32°C)
  - Psychrophilic
    - ✓ Optimal growth at a low temperature of 55°F (13°C)
- Bacteria can also be classified according to their survival temperatures.
  - Thermoduric
    - ✓ Can survive at a high temperature of 145°F (75°C)
  - Psychrotrophic
    - ✓ Can survive at a low temperature of 32°F (0°C)

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Consequences of Bacterial Contamination of Milk

- Mesophilic bacteria
  - Consume milk lactose, protein, and fat.
  - Produce lactic acid.
  - Reproduce rapidly at room temperature.
- Psychrophilic bacteria
  - Produce lipases that cause hydrolysis of fatty acids (rancidity).
- Thermoduric bacteria
  - Can cause spoilage of products even after pasteurization.

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Why Is Pasteurization Performed?

- To kill bacteria that may affect human health.
- To kill other types of bacteria that may cause dairy products to spoil after processing and reduce shelf life.

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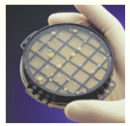
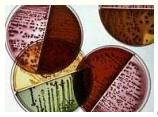
Measuring Bacterial Quality

- The major tests used to determine the types of bacteria present in milk, and to estimate the amount of bacteria present in milk are:
  - Standard plate count (SPC)
    - ✓ A broad spectrum test for mesophils
  - Lab pasteurized count (LPC)
    - ✓A test for thermoduric bacteria
  - Preliminary incubation count (PI)
    - ✓A test for psychrotrophic bacteria
  - Coliform count (CC)
    - ✓A test that indicates environmental contamination

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