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Food and Health Safety Part I

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Food and Healthy Safety



- Refers to standards set by Health Canada
- Each municipality applies the standards and there may be slight variations
- Understanding the basics of food safety will aid practitioners in providing clients with the proper standards
- It will provide you the knowledge you need to teach fermentation safely
- This material covers the conventional safety standards
- Fermentation has its own set of rules

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The Role



- Microorganisms both good and bad live everywhere and understanding this helps us understand how we can prevent illness and infections
- It also plays a role in our overall gut health – providing the exposure to diversity which is essential to good health
- Too much sanitation is not necessarily the best for health
- However, from a business perspective, making sure you understand how microorganisms that live outside of the body can make people ill can be helpful

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Food and Healthy Safety

- Refers to the policies and procedures to ensure food is safe for consumption
- Understanding the principles of how food ages and or how it can be exposed to dangerous elements means that foods can be produced safely
- This information is applicable for home use, instructing clients about preparing food, sampling foods and creating food products for sale
- NFSTP – National Food Safety Training Program
- <http://learn.nfstp.ca/>



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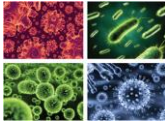
Food Safety: Why the concern?

Microbiological pathogens:

- Emerging pathogens
- Serotyping and DNA testing now allow pathogens to be traced back to their source

• Increasing knowledge about long term effects of chemicals

• Objects found in Food



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Foodborne Illness and Injury

- Canada experiences 8.5 million cases of foodborne illness each year, resulting in:
 - 39,000 hospitalizations
 - 10 to 100 deaths



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Why We Have An Issue Personally

- There are many things that can go wrong when producing food
- We are armed with the ability to defend ourselves
- However, food borne issues are increasing
- The number one reason we fail to defend ourselves and get sick is...



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Hazard

Definition: the potential to cause harm



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Types of Hazards

Biological

Chemical

Physical

Allergens



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Types of Microorganisms

• Inert	<i>The Neutral</i>
• Beneficial	<i>The Good</i>
• Food spoilage	<i>The Bad</i>
• Pathogenic	<i>The Ugly</i>



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Basic Needs of Microorganisms

- F** Food
- A** Acidity
- T** Temperature
- T** Time
- O** Oxygen
- M** Moisture

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Food

- Pathogenic Bacteria need food to grow
 - Proteins
 - Carbohydrates

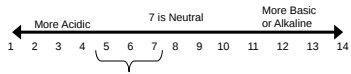


•Meats	•Cooked Vegetables
•Fish & Shellfish	•Rice
•Dairy	•Baked Potatoes
•Eggs	•Sliced Melons
•Poultry	•Sprouts
•Soy	•Garlic & Oil

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Acidity

- Most pathogenic bacteria like slightly acidic foods with a pH ranging from 5 to 7.5



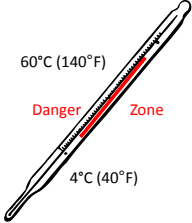
A horizontal pH scale from 1 to 14. Above the scale, 'More Acidic' is written above 1-4, '7 is Neutral' is above 7, and 'More Basic or Alkaline' is above 10-14. A bracket is drawn under the numbers 5, 6, and 7.

- Chicken, milk and egg yolks all fall in this range.

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Temperature

- Different types of bacteria have different ideal temperatures for growth
- The ideal for most pathogens is usually between 4°C (40°F) to 60°C (140°F)

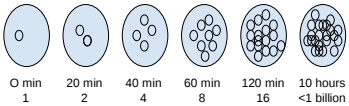


A thermometer is shown with a red liquid column. The top of the red column is labeled '60°C (140°F)' and the bottom is labeled '4°C (40°F)'. The space between these two temperatures is shaded red and labeled 'Danger Zone' in red text.

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Time

- Growth Rate:



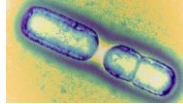
A series of six circles showing the progression of bacterial growth. The first circle has 1 cell, the second has 2, the third has 4, the fourth has 8, the fifth has 16, and the sixth is filled with many cells. Below each circle are the time and cell count: 0 min 1, 20 min 2, 40 min 4, 60 min 8, 120 min 16, and 10 hours <1 billion.

- Bacteria dies within 3 hours if it does not reproduce (as long as it is not in spore form)

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How Bacteria Grow

- Bacteria multiply asexually by dividing in two
- Under ideal conditions, bacteria can double in numbers every 10 - 20 minutes
- At a doubling rate of every 15 minutes, after only two hours, 20 bacteria can become 5,120 bacteria
- At the end of four hours, 20 bacteria can become 1,310,720 bacteria



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Oxygen

- Aerobic – needs oxygen – Yeasts, mold, fungus,
- Anaerobic – grows in the absence of oxygen – Clostridium, many good bacteria strains
- Facultative – can grow with or without oxygen – e. coli, staphylococcus, streptococcus, some good bacteria
- Creating a vacuum with heat inside a container is another



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Moisture

- Bacteria grow well in foods that have high moisture content – or 'available water'.
- Available water a_w is measured on a scale of 0 to 1.0.
- Most potentially hazardous foods have an a_w of .86 or higher.
- Drying foods can lower the risk of bacterial multiplication
- Creating a vacuum with heat inside a container is another



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Controlling Bacterial Growth

- Controlling the amount of *Time* Potentially Hazardous Foods are in the *Temperature* Danger Zone
- Changing the pH of food (i.e. Adding vinegar)
- Reducing the moisture (i.e. adding salt or drying foods)
- Pathogens need all three air, moisture and a more alkaline environment than good bacteria to thrive ,
- Name a example of a food preserved without air or one without moisture and one with acid?
- Preserving a banana loaf with vinegar 5% to the weight of the flour can prevent mold growth for 10 days at room temperature

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How Microorganisms Make You Sick

- Infection:
 - The microorganisms themselves make you sick
- Intoxication:
 - The microorganisms make a poison (toxin) that makes you sick
- A combination of the above



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Types of Biological Hazards

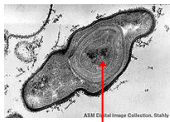
- Bacteria
- Yeast and Mould
- Parasites
- Viruses
- Prions



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Spore Forming Bacteria

- Some bacteria can form protective spores.
- This helps the bacteria survive in poor conditions.
- Spores do not multiply until conditions improve.



The circle shows a spore forming inside a bacteria.

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Temperature Effects

- Freezing will not necessarily kill bacteria
- Sufficient heat (time, temperature and humidity) will kill bacteria
- Spores are extremely resistant to heat
- Some bacterial toxins are NOT destroyed by heat

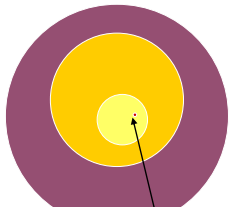


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Coliforms & E. Coli

1. **Coliform** Family of bacteria
2. **Faecal coliform:** Found in animals and birds
3. **E. coli** – Type of bacteria

Coliforms are generally not found on clean surfaces, should not be found in food and water and may not be harmful



Pathogenic E. coli

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Mold Pathogens

- Some moulds can produce toxins that will make you ill – not all molds can (ie blue cheese)
- Mould toxins are called mycotoxins or aflatoxins
- More than 300 mycotoxins have been identified
- Some moulds that can produce toxins are: *Aspergillus*, *Fusarium*, *Penicillium*, *Claviceps*



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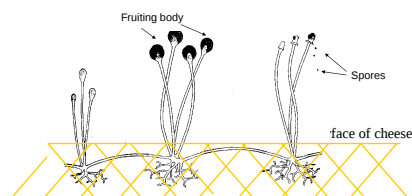
Who Suffer From Mold Issues

- Those who are sensitive to molds
 - Those who already suffer from asthma and allergies
 - Those with compromised immune systems
 - Those who live in damp and moldy environments
-
- Issues can include respiratory problems, exacerbation of existing asthma, sinusitis, allergic reactions
 - Excessive exposure to mycotoxins can cause death



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Mold



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Mold Reproduction

- Mold:
 - Needs oxygen to grow
 - Reproduces through spores or filaments
 - Has root-like structures and a fruiting body which produces spores
- Disturbing mould will cause the spores to become airborne, spreading the mould



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Parasites

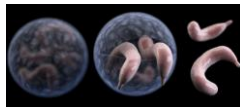
- Parasites:
 - Need a host to survive
 - May pass through several hosts during their life cycle
 - Can be very difficult to get rid of once you have one in your body



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Parasites Continued

- Parasites:
 - Can be single or multi-celled
 - Can come from a number of sources, including: meat, seafood, water, infected food handlers



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Viruses

- The smallest of the microorganisms
- Usually infect only one species
- Inert in food



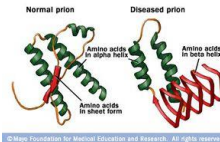
Examples of viruses transmitted through food:

- Hepatitis A & E
- Rotavirus
- Norwalk virus

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Prions

- Smaller than viruses
- Made up only of protein (do not contain any nucleic acid)
- Mad cow disease (Bovine Spongiform Encephalopathy, or BSE) is believed to be caused by prions
- Creutzfeldt-Jacob is a human syndrome with symptoms similar to BSE and it is possible that the two may be linked through ingestion of infected cattle



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Where Microorganisms Hide

- Dead ends
- Unclean surfaces
- Rough surfaces
- Cracks & crevices
- Unclean filters/gaskets
- Frayed equipment
- Floor & drains
- Human beings



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Cross-Contamination

- There are 3 common sources of cross contamination:
 - People can contaminate food
 - Equipment can contaminate food
 - Other foods can contaminate food



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Preventing Cross-Contamination

- Don't prepare foods for others when ill or prevent ill people from working with food.
- Good personal hygiene habits including proper and frequent hand washing.
- Proper cleaning and sanitizing of equipment.
- Proper storage of foods.



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Also

- Microorganisms are everywhere
- Only a few are pathogens
- Food infected with pathogens may not make food smell or taste bad
- We must control all microorganisms to ensure we control pathogens and prevent foodborne illness

