

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



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



Food and Healthy Safety

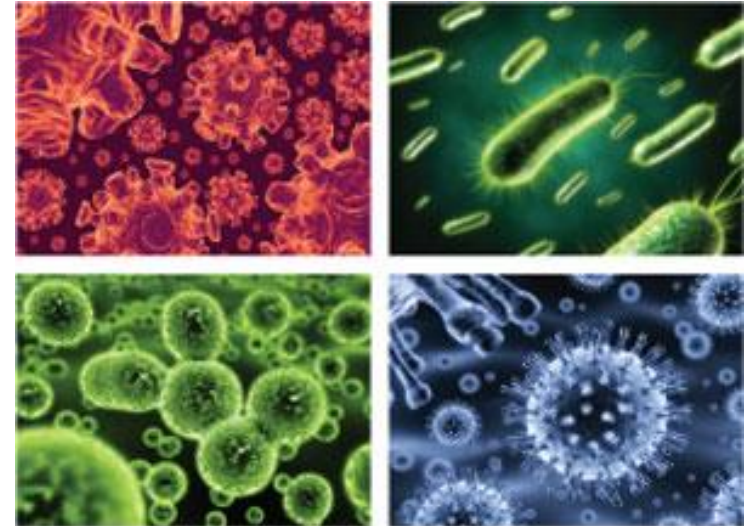


- Refers to the policies and procedures to ensure food is safe for consumption
- Understanding the principles of how food ages and or how it can be exposed to dangerous elements means that foods can be produced safely
- This information is applicable for home use, instructing clients about preparing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

Food Safety: Why the concern?

Microbiological pathogens:

- Emerging pathogens
 - Serotyping and DNA testing now allow pathogens to be traced back to their source
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- Increasing knowledge about long term effects of chemicals
 - Objects found in Food



Foodborne Illness and Injury

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



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...



Hazard

Definition: the potential to cause harm



Types of Hazards

Biological

Chemical

Physical

Allergens



Types of Microorganisms

- Inert *The Neutral*
- Beneficial *The Good*
- Food spoilage *The Bad*
- Pathogenic *The Ugly*



Basic Needs of Microorganisms

F Food

A Acidity

T Temperature

T Time

O Oxygen

M Moisture

Food

- Pathogenic Bacteria need food to grow

- Proteins
- Carbohydrates

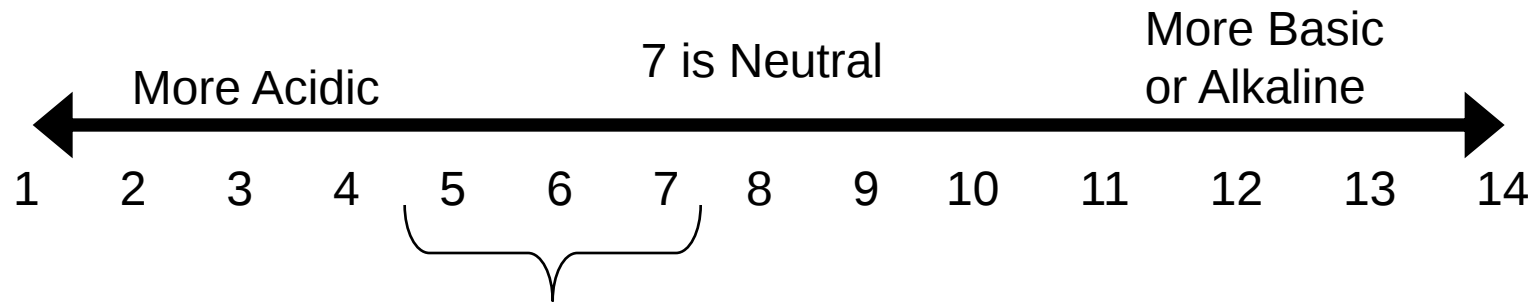
- Meats
- Fish & Shellfish
- Dairy
- Eggs
- Poultry
- Soy

- Cooked Vegetables
- Rice
- Baked Potatoes
- Sliced Melons
- Sprouts
- Garlic & Oil



Acidity

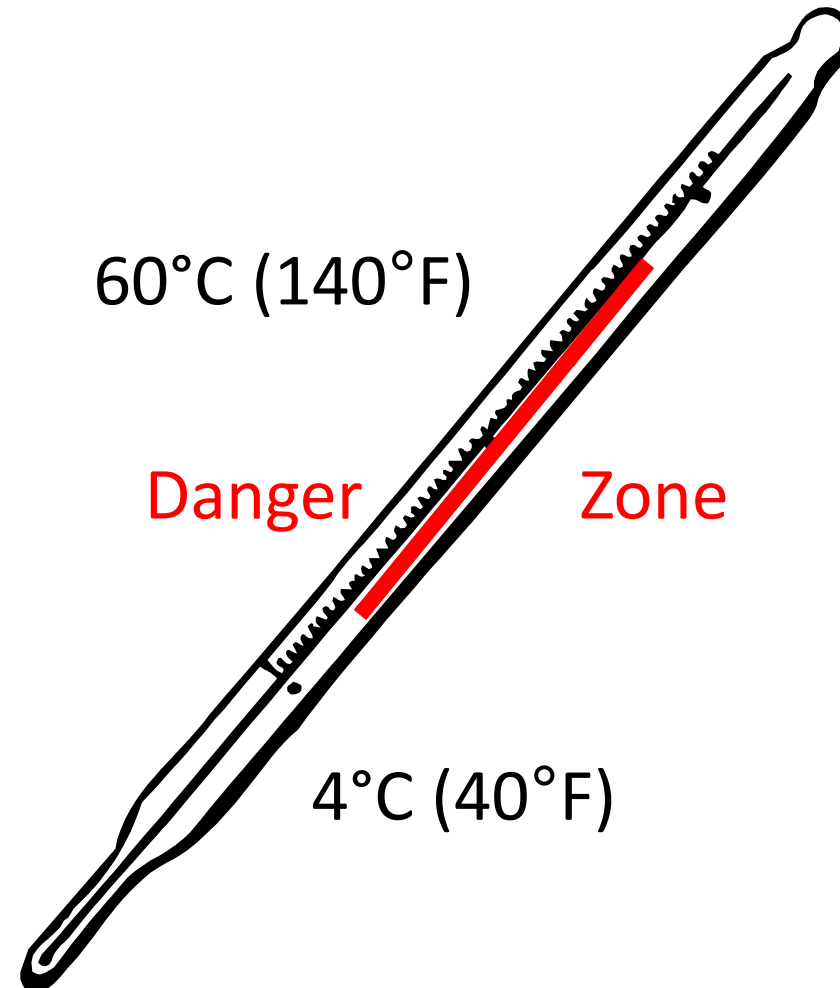
- Most pathogenic bacteria like slightly acidic foods with a pH ranging from 5 to 7.5



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

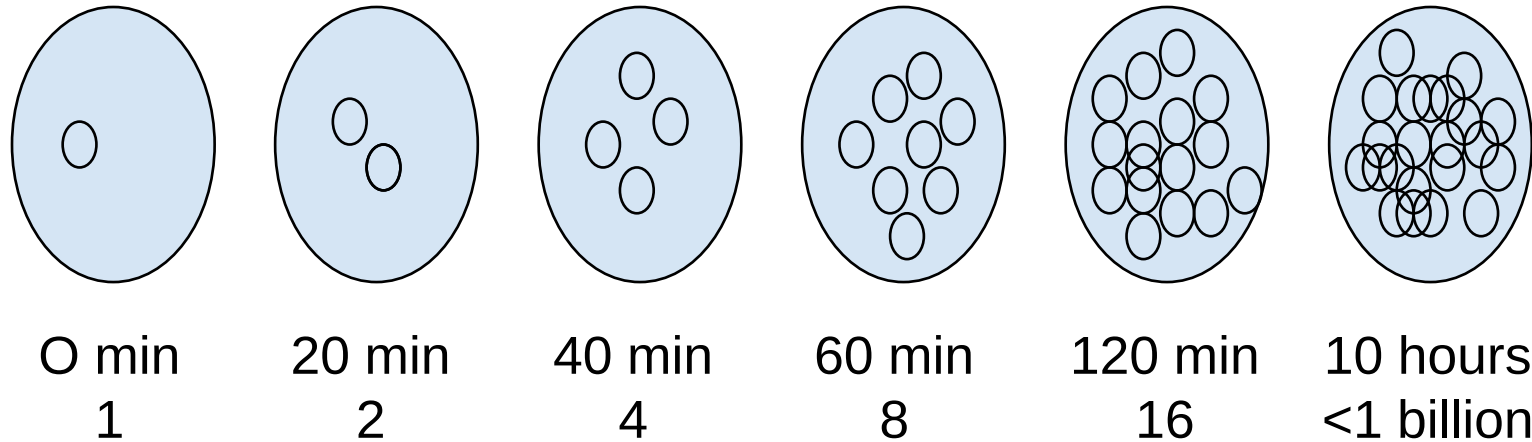
Temperature

- 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)



Time

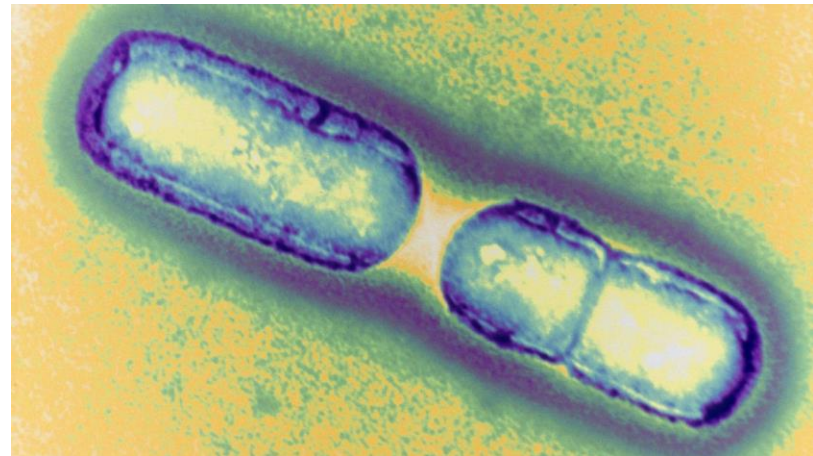
- Growth Rate:



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

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



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



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



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

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



Types of Biological Hazards

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



Spore Forming Bacteria

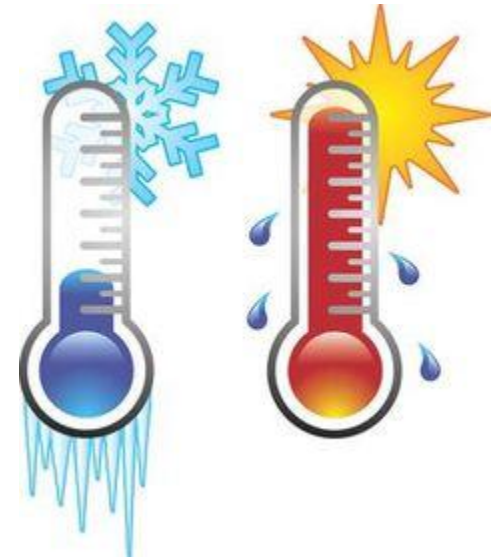
- Some bacteria can form protective spores.
- This helps the bacteria survive in poor conditions.
- Spores do not multiply until conditions improve.



The circle shows a spore forming inside a bacteria.

Temperature Effects

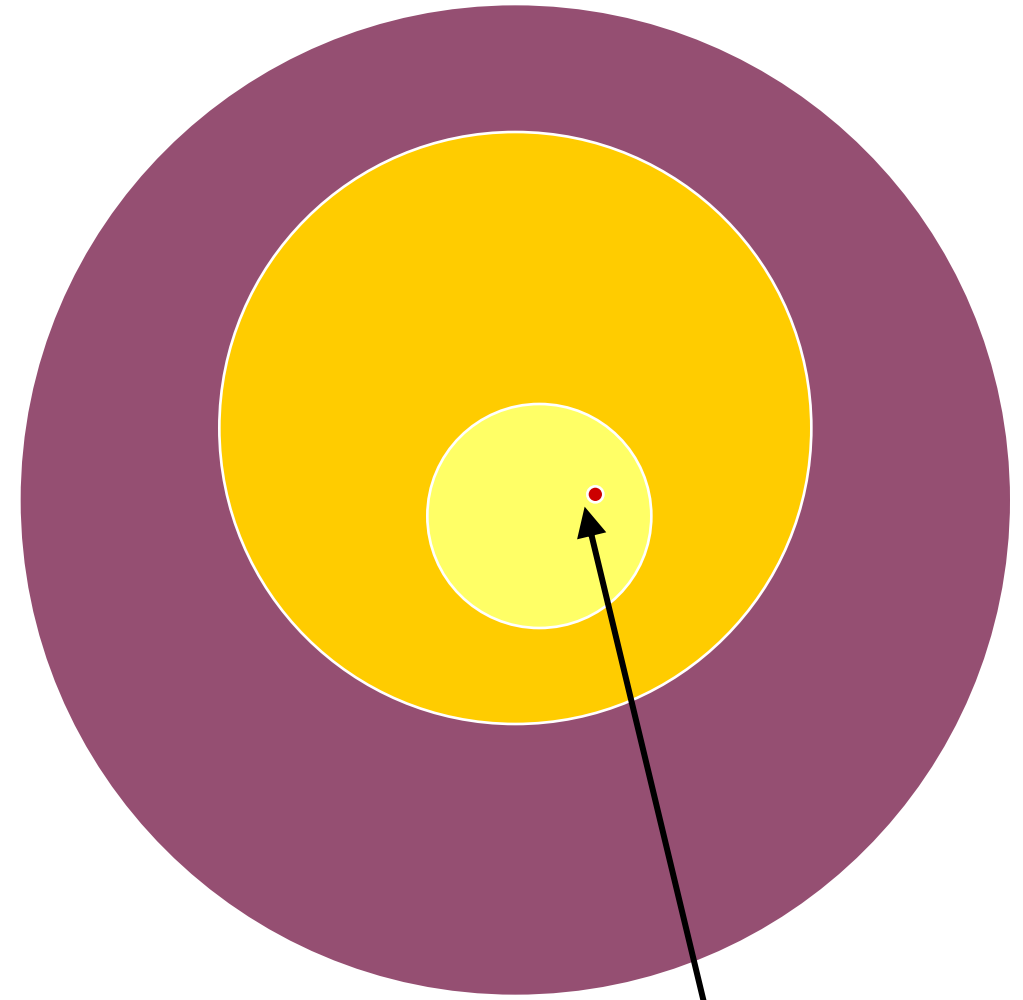
- Freezing will not necessarily kill bacteria
- Sufficient heat (time, temperature and humidity) will kill bacteria
- Spores are extremely resistant to heat
- Some bacterial toxins are NOT destroyed by heat



Coliforms & E. Coli

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

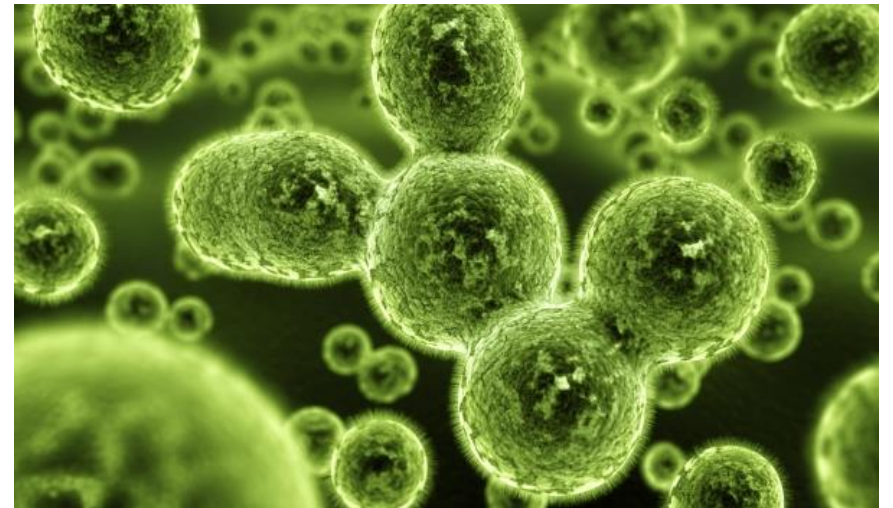
Coliforms are generally not found on clean surfaces, should not be found in food and water and may not be harmful



Pathogenic *E. coli*

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*

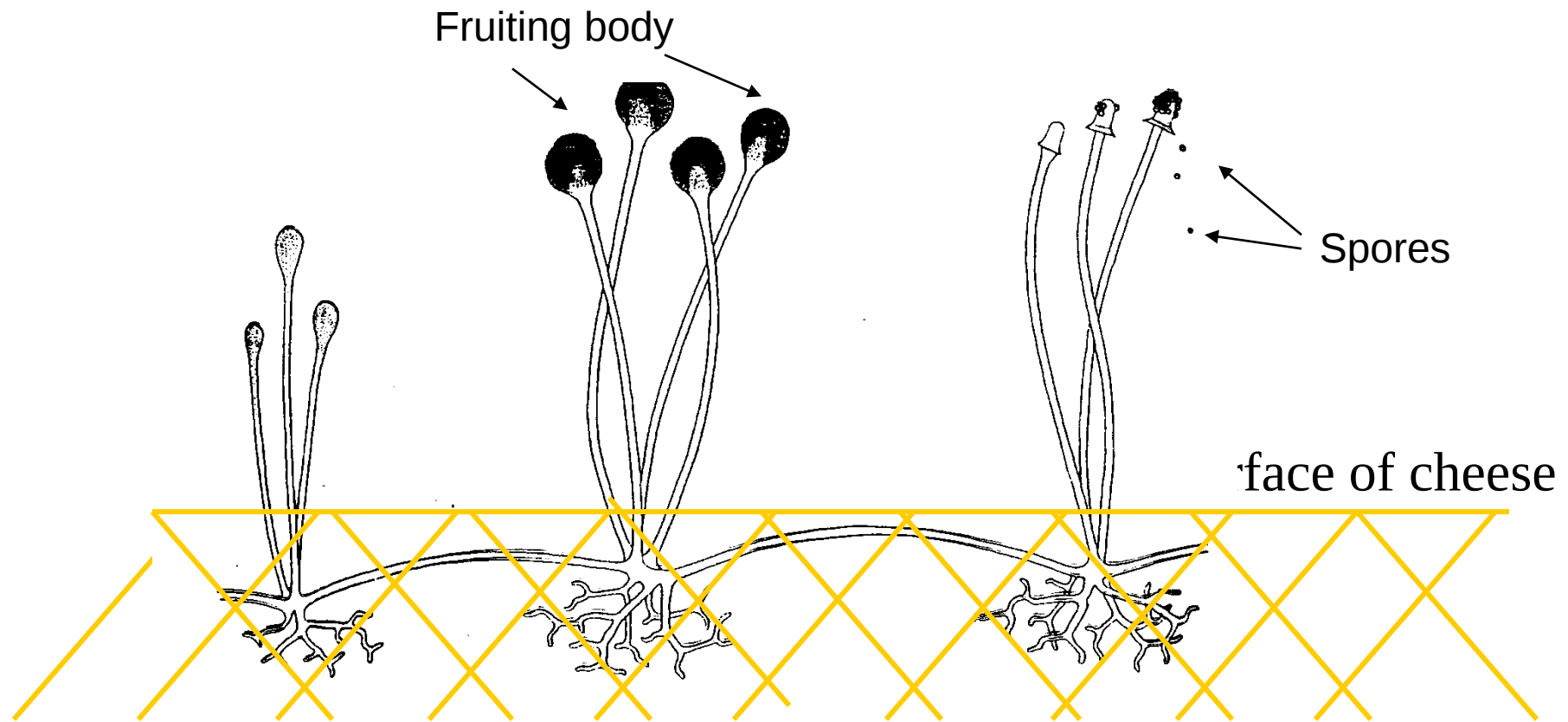


Who Suffer From Mold Issues

- 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



Mold



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



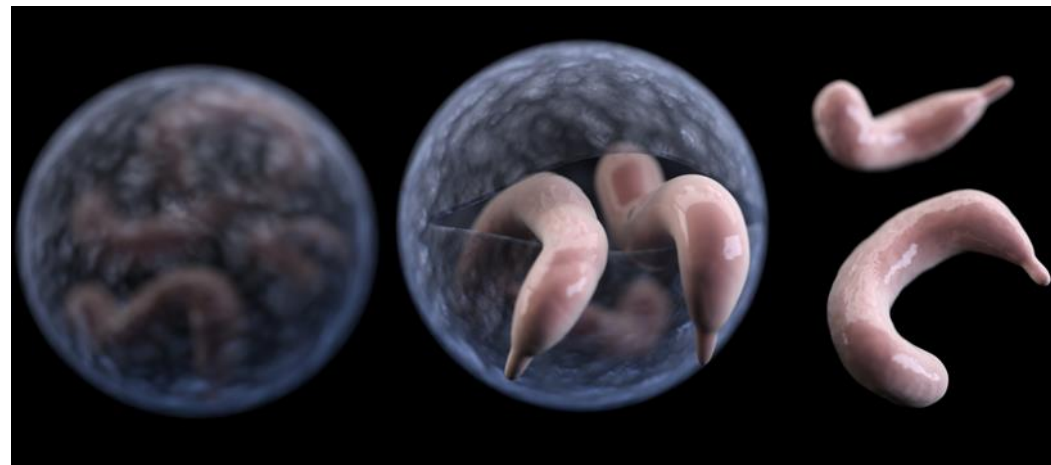
Parasites

- 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



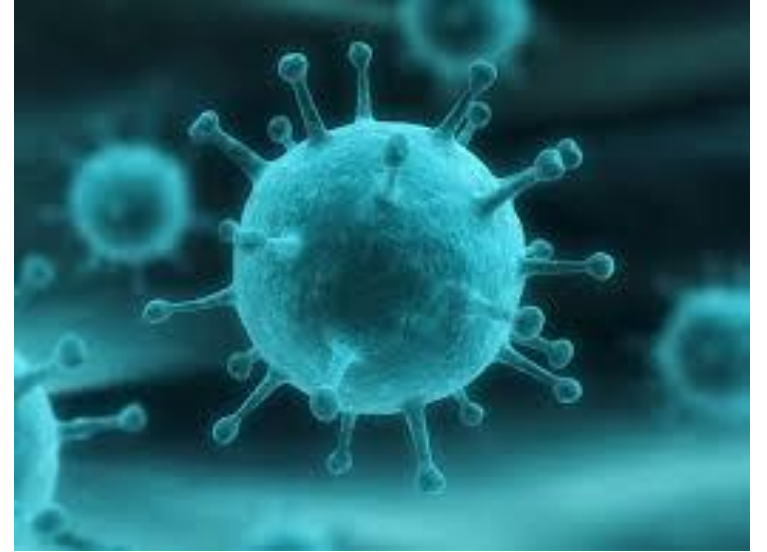
Parasites Continued

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



Viruses

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

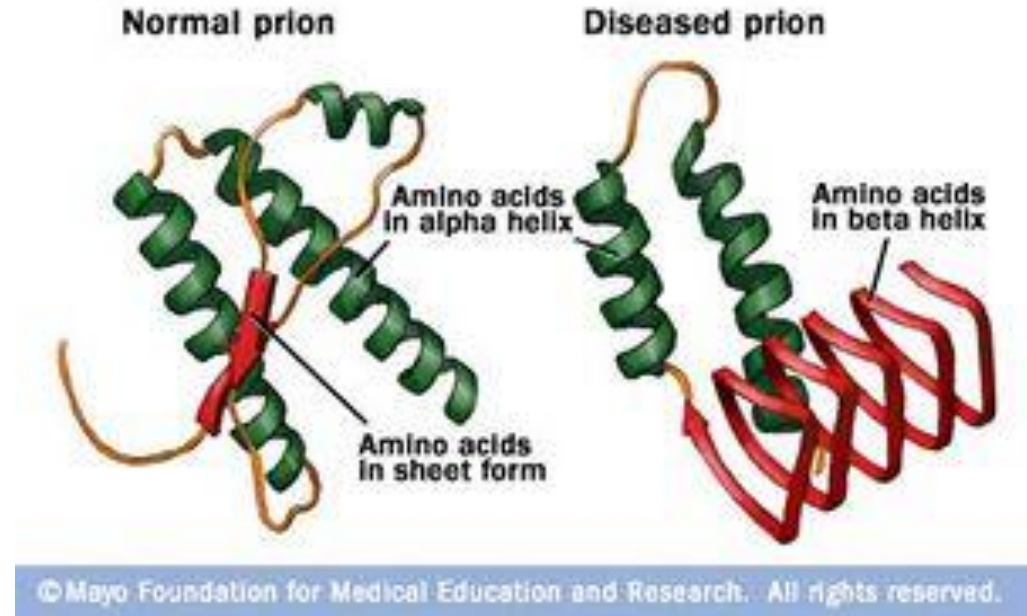


Examples of viruses transmitted through food:

- Hepatitis A & E
- Rotavirus
- Norwalk virus

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



Where Microorganisms Hide

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



Illustration: Don Smith

Cross-Contamination

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



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.



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

