FOOD SCIENCE & HYGIENE

Contamination, Food Allergens & Foodborne Illness.

YUMMY!!!

Foodborn contamination

- Ensuring the safety of food is the managers most important job.
- A thorough understanding of the causes and prevention of various types of contamination can help you keep the food safe.

Biological Contamination

- Microorganisms are small, living beings that can only be seen with a microscope.

Helpful Bacteria

- Yeast for bread, Rennet for cheese

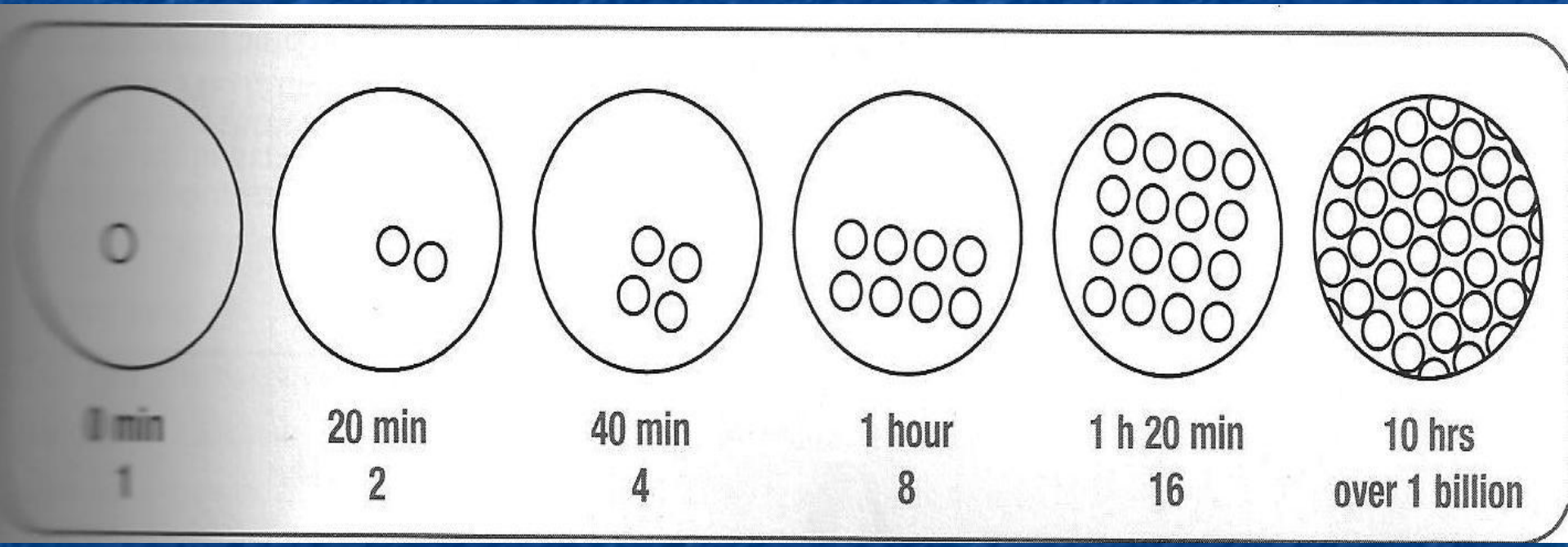
Harmful Bacteria

- cause food poisoning, Pathogens

Bacteria

- Smallest living celled organisms
- Found in Food, Water, Soil, Humans, Insects
- They can reproduce every 20 mins (double)
- Some can survive freezing
- Some can turn into spores to protect themselves
- Some can produce toxins as they multiply, die and break-down. These are not destroyed by cooking

Bacteria growth pattern

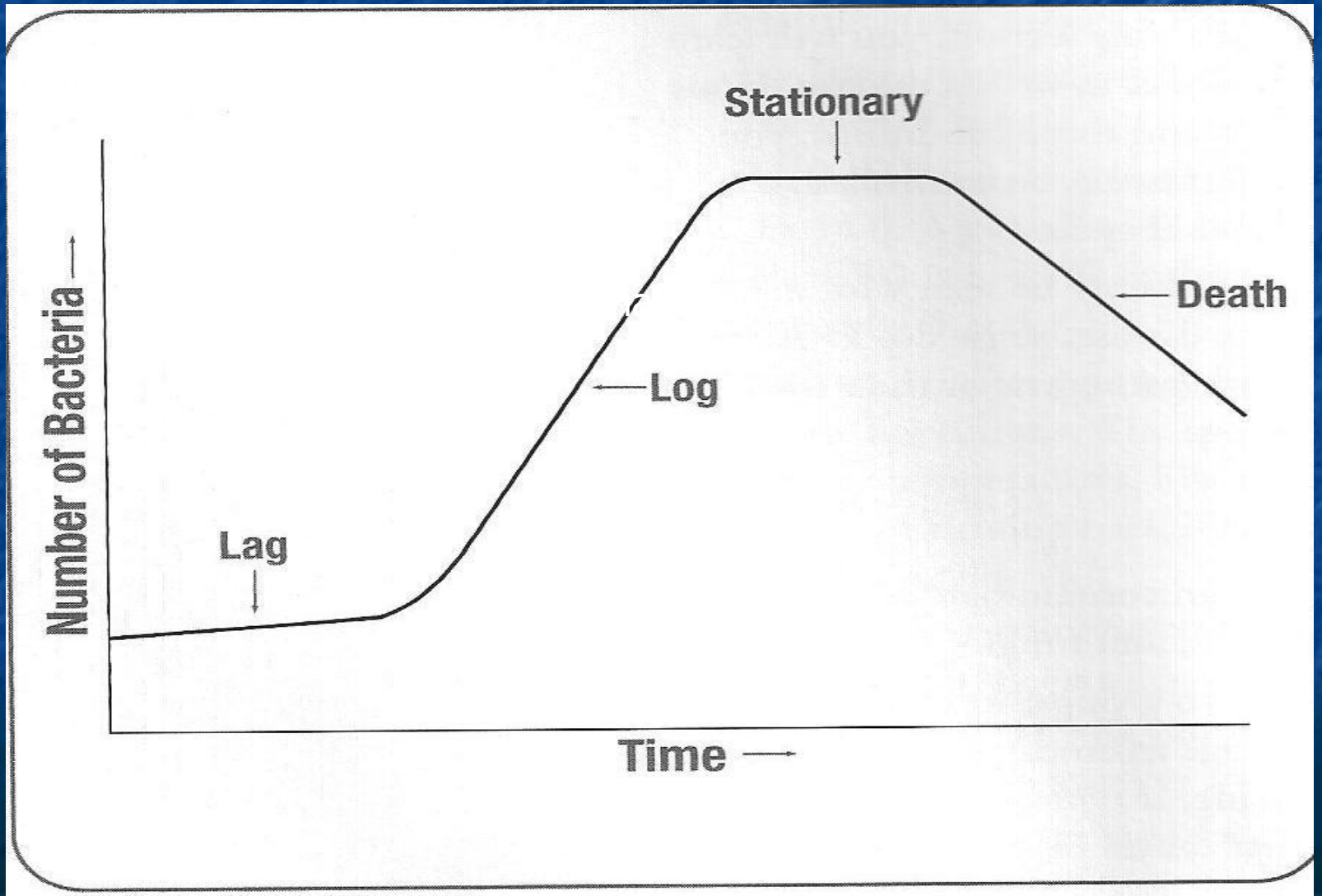


Bacterial Growth continued

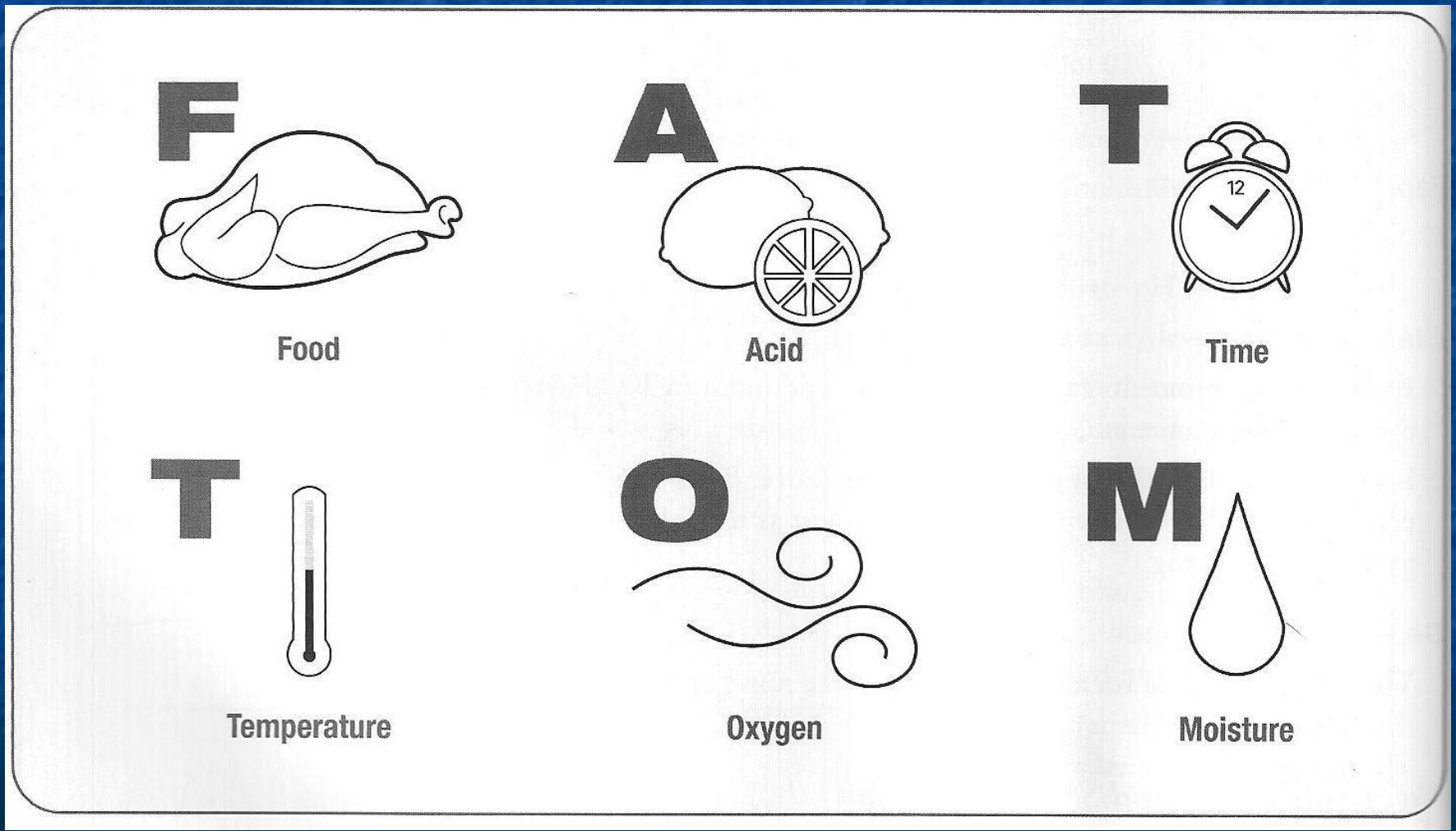
There are 4 phases that bacteria go through

1. ***Lag phase***… Starting to adjust to environment
2. ***Log Phase***… In favorable conditions Rapid growth
3. ***Stationary phase***… Nutrients used and waste accumulates
4. ***Death phase***… nothing left to support growth, and all waste, bacteria die

Bacterial Growth Chart



Bacterial Growth



FOOD

All food is susceptible to microorganisms, however they grow best in foods that are high in protein, and/or Carbohydrates

- Meat, Poultry, eggs
- Dairy products. Milk, Cheese, cream

Acidity (pH)

This is a measurement of the degree of Acidity or Alkalinity. The scale is 0 – 14

- A pH of 7 is neutral.
- Bacteria grow best between 4.6 to 7.5

0 7 14

Acidity ----------Neutral----------Alkalinity

TEMPERATURE

Bacteria grow best between the temperature of

- *5* degrees c and *60* degrees c (Temperature danger Zone)

- They will begin multiplying again if given the correct conditions

MOISTURE

There must be adequate moisture for bacteria to grow. The amount of moisture available is defined as water activity (a_w)

It is measured on a scale 0 through 1

with 1 = to 100% of water available for the bacteria to use

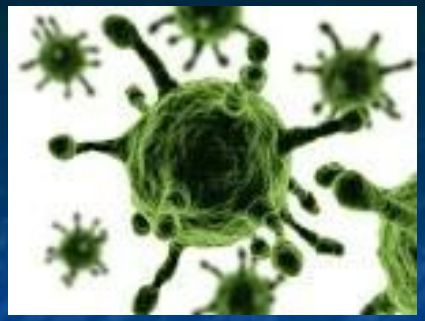
Bacteria grows best between 0.85 – 0.97

Dried foods. Dried milk is 0.2 Crackers 0.3

CONTROLING THE GROWTH OF MICROORGANISMS

- Adding lactic or citric acid (Vinegar/ Lemon) pH
- Adding sugar or salt (lower water activity) a_w
- Vacuum packing (deny oxygen)

- Don't allow food to stay at temperatures between 5 – 60 degrees c (the danger zone)
- Prepare small batches if possible



VIRUSES

Viruses are the smallest of the microbial contaminants. They consist of genetic material wrapped with an outer layer of protein.

Whilst a virus cannot reproduce outside a living cell, once inside a human cell, it will produce more viruses, such as Hepatitis A

BASIC CARACTERISTICS OF VIRUSES

Unlike bacteria they rely on a living cell to reproduce

- They are not complete cells
- They do not reproduce in food
- Some may survive freezing and cooking
- They can be transmitted from person to person
- They can be transmitted from people to food
- Usually transmitted by improper hygiene
- They can contaminate both food and water supplies

PARASITES

Parasites need a live host to survive

- Person, Animal or Plant
- Cattle, Poultry, Pigs and Fish
- Vegetables and Fruit
- Usually passed to humans by meat or Fish

- Precautions:
  - Ensure food is from an approved source
  - Use proper cooking to avoid cross contamination
  - Use clean water, and follow personal hygiene

MOULDS

Individual mould cells can usually be seen only with a microscope, however fuzzy or slimy mould colonies consisting of a large number of cells are often visible to the naked eye.

Bread mould is an example.

MOULDS continued

Moulds are responsible for the spoilage of food, that results in discoloration and the formation of odours and off-flavors

Moulds can grow on most foods at most temperatures in most environments… moist, dry, high or low pH, salty or sweet

They prefer to grow on and in acidic food with a low water activity

Examples;- Fruit, Vegetables, Meat, Cheese, Bread

MOULDS continued

Some moulds produce toxins that can cause allergic reaction, nervous system disorders and kidney and liver damage.

Examples;-

- Corn, and Corn products
- Peanuts and peanut products

- Brazil nuts, Pecans, pistachio and wallnuts have all been associated with aflatoxins.

BASIC CHARACTERISTICS OF FOODBORN MOULDS continued

Trim back or throw away moldy food unless the mould is a natural part of the food

Examples;-

- Gorgonzola, Blue, Brie, Camembert

NOTE: While mould cells can be killed by heating them, toxins that may be present are NOT destroyed by normal cooking methods

YEASTS

- Yeast is best known for producing bread and beer, however
- Yeast can spoil food by giving of carbon dioxide and alcohol as it slowly consumes the food, leaving a smell or taste of alcohol
- Yeast prefers the same conditions as moulds

BIOLOGICAL TOXINS

- Ciguatera poisoning… reef fish
- Paralytic poisoning… shell fish
- Scombroid poisoning… spoiled fish
- Some plants may be toxic in their raw state, but safe when properly cooked
- Some beans may be toxic if eaten raw or uncooked,
- Examples;- Fava beans, Red kidney beans

CHEMICAL CONTAMINATION

Chemical contaminants are responsible for many cases of foodborne illness, they may come from a variety of substances normally found in restaurants and foodservice establishments… these include

- Toxic metals
- Pesticides
- Chemicals

TOXIC METALS

Utensils and *equipment* that contain toxic metals such as Lead, Copper, Brass, Zinc, can cause a toxic poisoning. If acidic food is stored in or prepared using these types of utensils or equipment it can leach toxins into the food.

Examples;-

- Tomato sauce in copper,

- Lemonade in pewter

CHEMICALS AND PESTICIDES

Chemicals such as cleaning products, polishes, lubricants and sanitizers can contaminate food

- Always read manufactures instructions
- Store away from food in locked cupboard
- **Always….** leave in original containers
- **Never….** transfer into other containers
- Some chemical combinations can **KILL !!!**
  - **(bleach & ammonia)**

PHYSICAL CONTAMINATION

- Physical contamination can occur when foreign objects are accidentally introduced into food

Examples;-

- Natural objects… Bones ect
- Metal, staples, glass, plastic, pins, plasters

FOOD ALLERGENS

A food allergy is the body's negative reaction to a particular food protein. Allergic reaction include some or all of the following symptoms;-

- Itching, Tightening in the throat, wheezing or shortness of breath, Hives, Swelling of the face eyes hands or feet
- Gastrointestinal symptoms including abdominal cramps, vomiting, or diarrhoea, loss of consciousness, death.