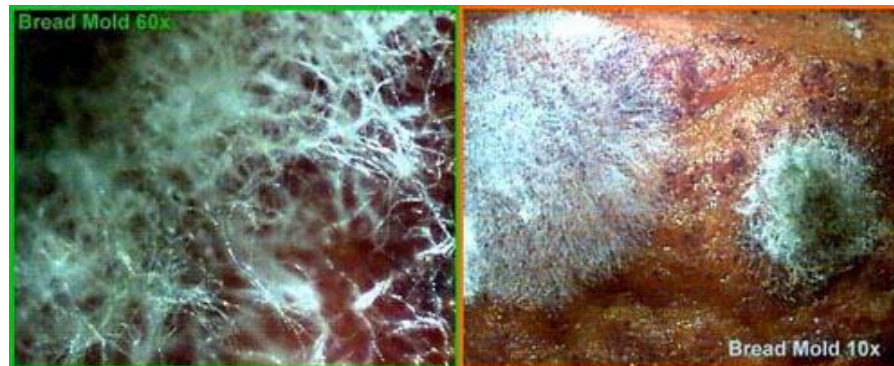


FOOD DETERIORATION

What Makes Food Go Bad?

Food Hazard

Anything that interferes with safe food



3 Categories of Food Hazards

- **Physical** – any material foreign to food
 - ▣ Dust, dirt, hair, etc.
- **Chemical** – any chemical foreign to food
 - ▣ Cleaning solutions, Pesticides, Toxic metals
- **Biological** – viruses, fungi, microbes, insects, enzymes
 - ▣ Cause more foodborne illness (FBI) than physical or chemical hazards
 - ▣ Are more difficult to control than physical or chemical hazards



Activity: Is It a Physical, Chemical, or Biological Food Hazard?

Food Hazard	Physical	Chemical	Biological
An assistant cook has an open sore on her hand.			X
Tomato soup is stored in a copper bowl.		X	
A glass is used to scoop ice.	X		
After cutting raw chicken, the food service worker uses the same knife to slice fruit.			X
The counter cleaner is stored next to the flour on an overhead shelf.		X	

Food Deterioration Includes:

- Changes in **ORGANOLEPTIC** quality (how something is perceived by a sensory organ)
- Nutritional Value
- Food Safety
- Aesthetic Appearance
- Color
- Texture
- Flavor
- To some degree, all foods undergo deterioration after harvest
- The role of food science is to minimize negative changes as much as possible

Shelf Life and Dating of Foods

- All foods have a time limit of their usefulness
 - ▣ Time Limit depends on:
 - Type of food
 - Storage conditions
 - Other factors
- **Shelf Life** – Time required for a food product to reach an unacceptable quality

Useful Life at 70°F

FOOD	Days
Meat	1 – 2
Fish	1 – 2
Poultry	1 – 2
Dried, smoked meat	360 +
Fruits	1 – 7
Dried fruit	360 +
Leafy vegetables	1 – 2
Root crops	7 – 20
Dried seeds	360 +

Causes of Food Deterioration

- Microorganisms such as bacteria, yeast, and molds
- Activity of food enzymes
- Infestations by insects, parasites, and rodents
- Inappropriate temps during processing and storage
- Gain or loss of moisture
- Reaction with Oxygen
- Light
- Physical stress or abuse
- Time
- Temperatures
 - ▣ High – Faster reactions
 - ▣ Cooler – Damage tissue

GROWTH CONDITIONS

Use **FAT TOM** to remember.



Bacterial Growth

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FAT TOM

- **F**ood
- **A**cididity
- **T**emperature
- **T**ime
- **O**xygen
- **M**oisture



Bacterial Growth

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FAT TOM

- **F**ood or nutrients—especially foods high in protein favor bacterial growth



Bacterial Growth

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FAT TOM

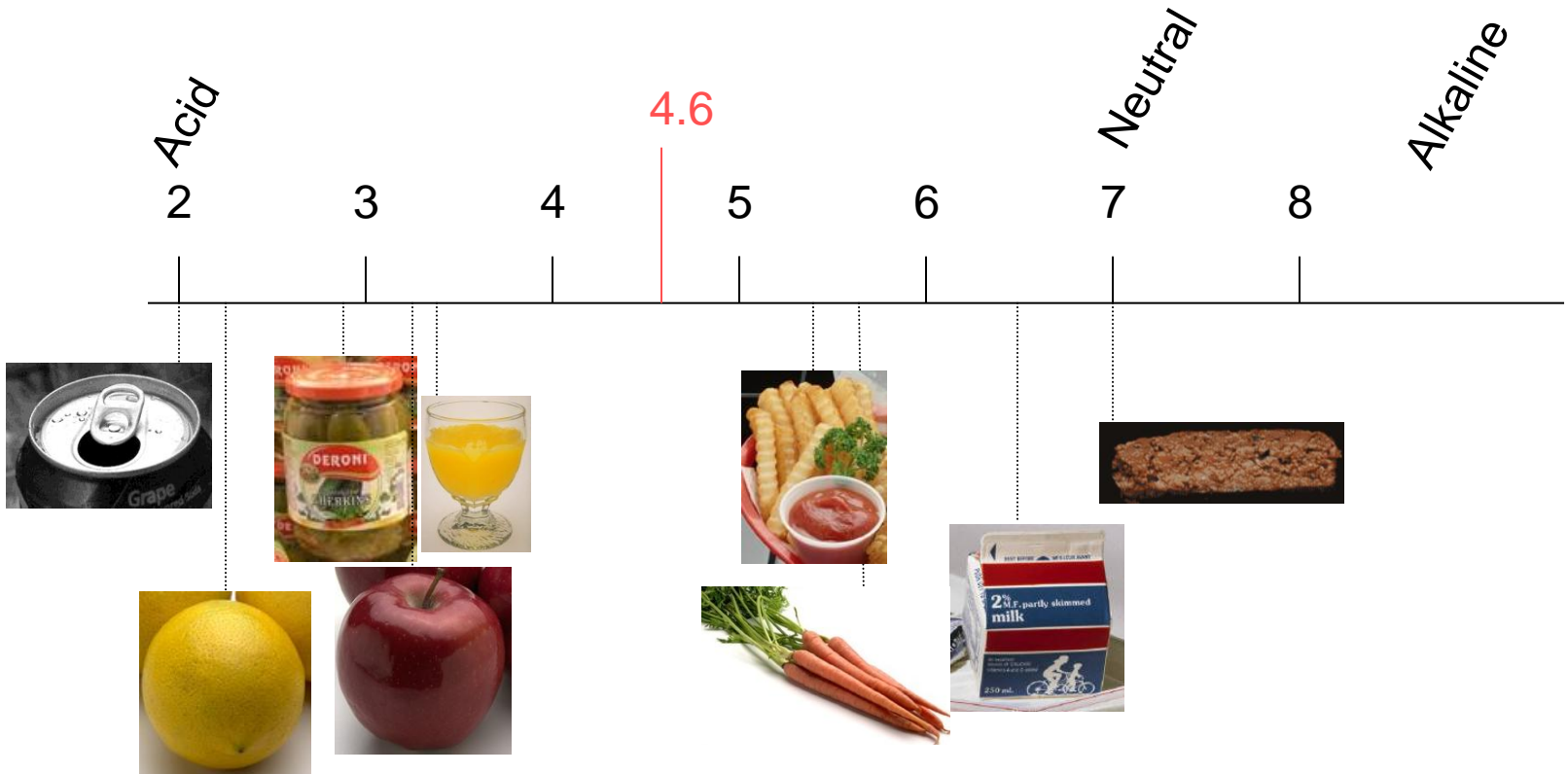
- Food
- Acidity - mild to low acidity favors bacterial growth (pH ~ 4.6 to 7)

Acid foods help control microbe growth.

Acidity

pH scale = 1 to 14

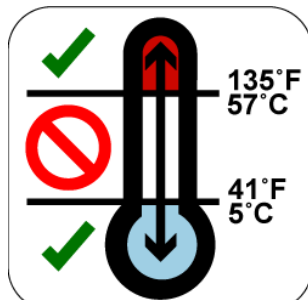
pH of some foods



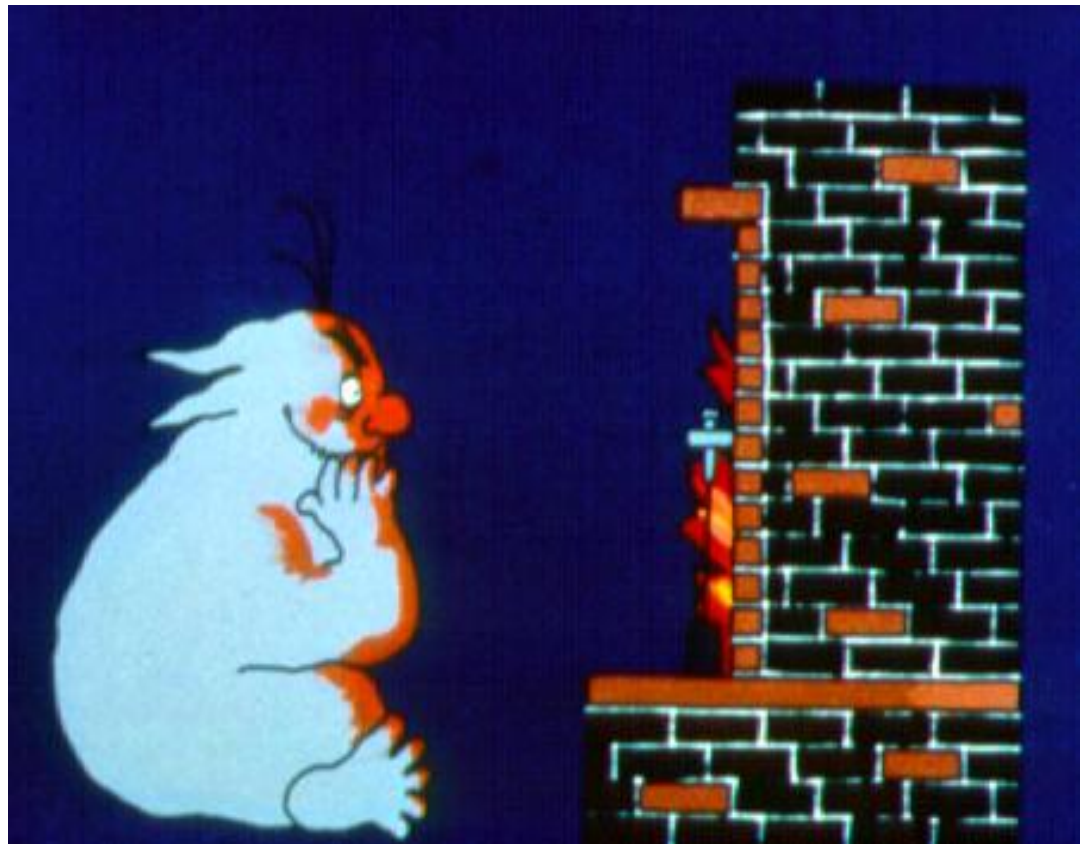
Bacterial Growth

FAT TOM

- Food
- Acidity - low
- Temperature –
Ideal temperature
is 90-110°F.

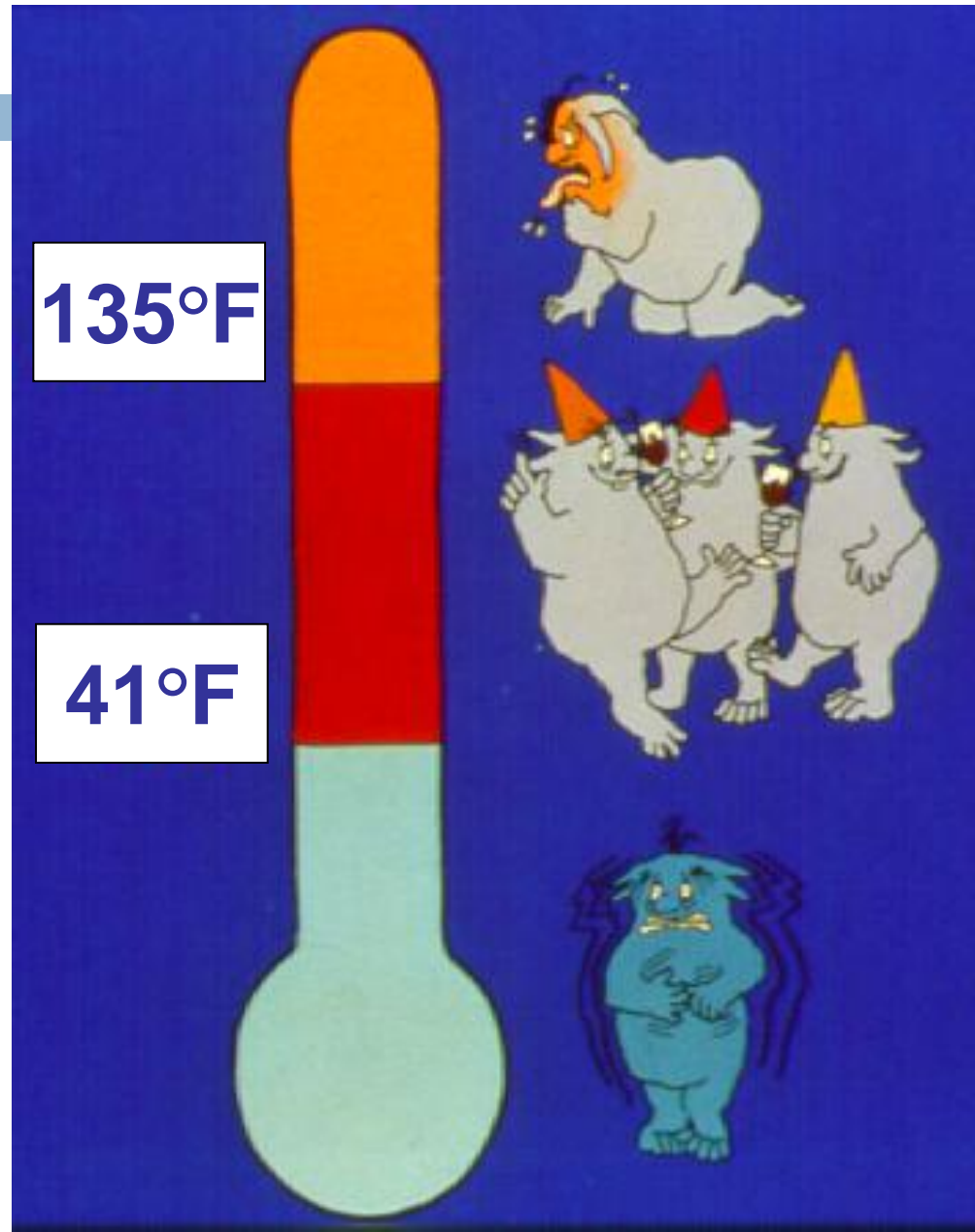


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Bacterial Growth

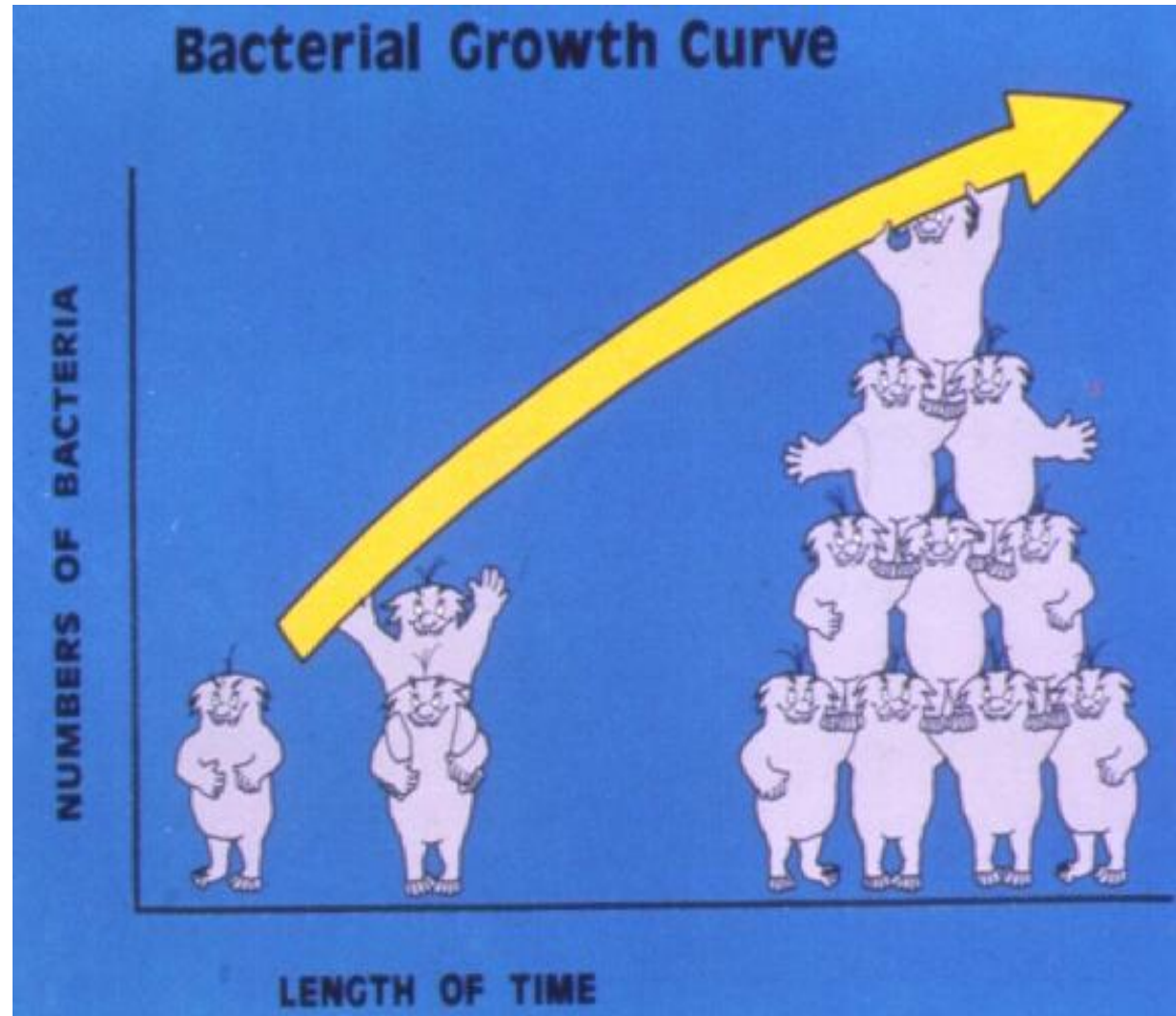
The “Danger Zone”
is 41° to 135°F.



Bacterial Growth

FAT TOM

- Food
- Acidity
- Temperature
- Time – no more than 4 hours in the Danger Zone



Bacterial Growth

FAT TOM

- Food
- Acidity
- Temperature
- Time
- Oxygen - requirements vary

Aerobic **Facultative**

Anaerobic

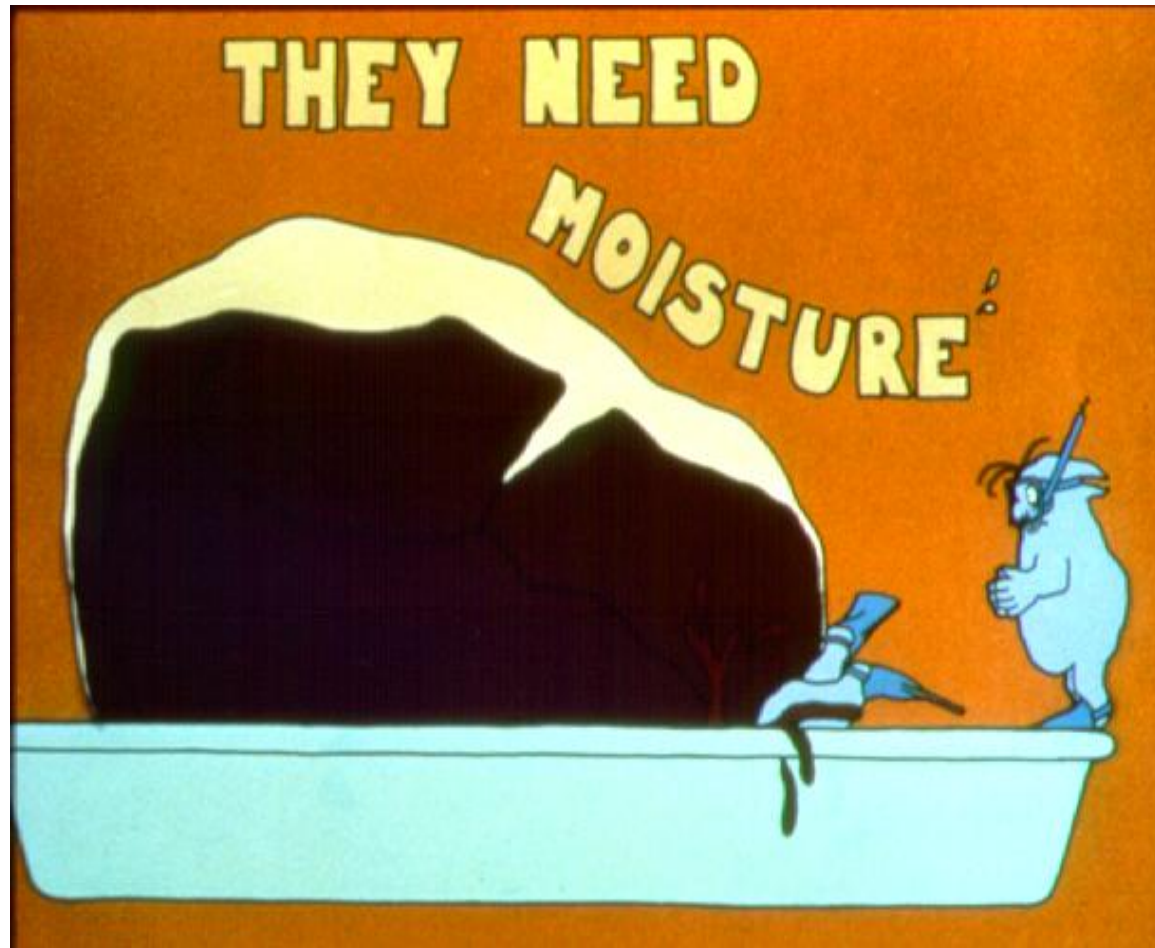
Microaerophilic

Bacterial Growth

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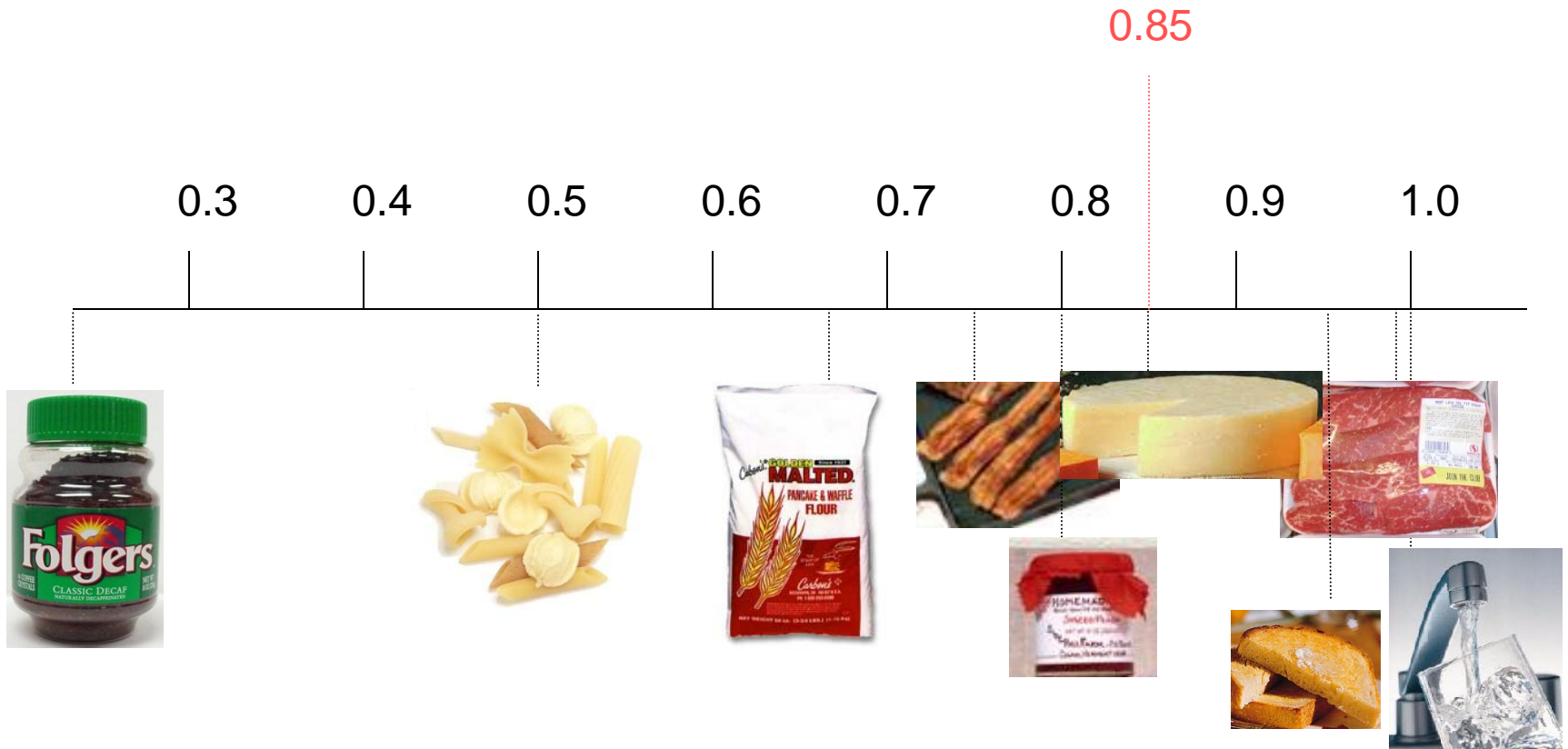
FAT TOM

- Food
- Acidity
- Temperature
- Time
- Oxygen
- Moisture -
Water activity
of 0.85 or
higher



Water Activity

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Bacterial Growth Is Favored By

19

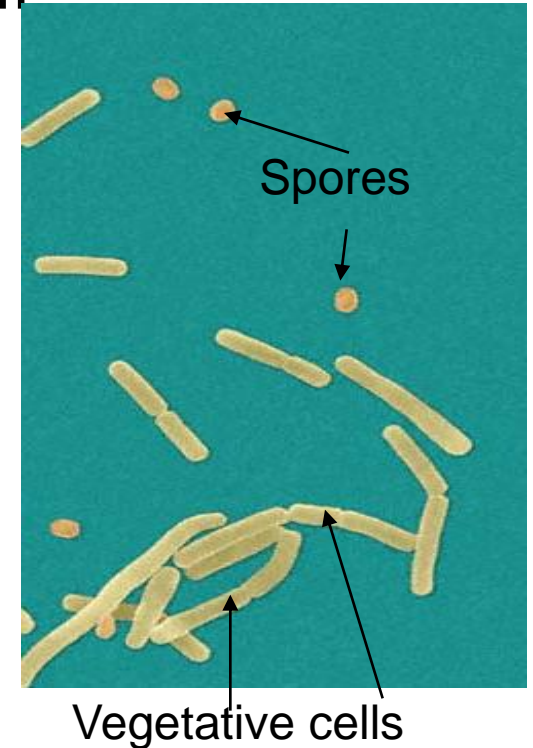
FAT TOM

- **F**ood - especially protein foods
- **A**cidity - mild to low acidity
- **T**emperature - 41° to 135°F is **The Danger Zone**
- **T**ime - more than 4 hours in **The Danger Zone**
- **O**xygen - varies for different types of bacteria
- **M**oisture - water activity of 0.85 or higher

Vegetative Cells vs. Spores

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- Vegetative cell = destroyed by heat (most by a temperature of 165°F)
- Spore = more resistant to heat (requires 240°F to destroy)



Assignment – FOOD BOURNE ILLNESSES

- Read the Food Bourne Illness Handout
 - Choose 3 illnesses and answer the following:
 - Name
 - Symptoms
 - Possible Sources
 - Explain how to properly handle food to avoid Food Bourne illnesses