



Project: Technical assistance to improve implementation of food safety standards and disease crisis preparedness

1.2.5 (Task 4.2.2) Contribute to increased capacity of staff of the local chamber of commerce, chamber of food professionals, academy and others

Training on Food Associated Risks

SESSION 8: Food Microbiology

Dr. Hüseyin Değirmenci
Senior Non-key Expert

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CONTENT



- Essential food microbiology knowledge for food safety experts
- Overview of foodborne microbiological risk
- Factors of microbiological growth in food



FOOD MICROBIOLOGY AND FOOD SAFETY ARE RELATED WITH ALL ISSUES “FROM FARM TO FORK”





Food Microbiology Good, Bad & Ugly





- ❖ Good - important in food production:
 - Provide better taste and texture and promote health

- ❖ Bad - cause of food borne illness:
 - Infection with live organisms
 - Intoxication with bacterial toxins

- ❖ Ugly - cause food spoilage with undesirable changes



FOOD-BORNE DISEASES

FOODBORNE MICROBIOLOGICAL DISEASES

It is divided into subclasses according to the mechanism of action of the microbial agent:
Infection
Intoxication
Toksicoinfection

FOODBORNE CHEMICAL DISEASES

Diseases caused by chemicals that are naturally present or subsequently transmitted in food (Toxication)

OTHER DISEASE RELATED WITH FOOD

- Diseases caused by dietary properties of food
- Diseases arising from physical hazards in food
- Allergies and intolerances



FOOD-BORNE MICROBIOLOGICAL DISEASES

INFECTION

- ✓ *Salmonella* spp.
- ✓ *Listeria monocytogenes*
- ✓ Coliform Bacteria
- ✓ *Campylobacter jejuni*
- ✓ *Yersinia enterocolitica*

INTOXICATION

- ✓ *Staphylococcus aureus*
- ✓ *Clostridium botulinum*
- ✓ *Bacillus cereus* (emetic)
- ✓ Mycotoxigenic moulds

TOXICOINFECTION

- ✓ *Aeromonas hydrophila*
- ✓ *Clostridium perfringens*
- ✓ *Bacillus cereus* (diaretic)



FOOD-BORNE INFECTION

- A food borne disease when a person eats food containing harmful microorganisms, which then grow in the intestinal tract and cause illness.
- The agent may also grow within the food.
- The agent may be invasive or non-invasive.
- Some bacteria, all viruses, and all parasites cause food borne illness via infection.



FOOD INTOXICATION

The disease form which the multiplication of pathogenic bacteria or molds in food and following the release the toxins inside the food is called intoxication.

The pathogenic microorganism needs to multiply in food and secrete toxins.



TOXICOINFECTION

- After the proliferation, death and subsequent cell lysis of the large number of pathogenic microorganisms with food in the intestines
or
- During the formation of spores in the intestine, bacteria capable of forming toxins
- This type of food poisoning caused by toxins is defined as toxinfections.

FACTORS OF MICROBIOLOGICAL GROWTH IN FOOD



1. pH
2. Moisture
3. Nutrient Content
4. Oxygen
5. Light
6. Temperature
7. Osmotic pressure
8. Time



Foods Classified According to Acidity

GROUP	GROUP NAME	PH RANGE
1	Non acid	7.0 – 5.3
2	Low or medium acid	5.3 – 4.6
3	Acid 1	4.6 – 3.7
4	Acid 2	3.7 - low



Water activity:

A measure of the availability of water for use in metabolic processes.
Amount of free water in a sample.

Moisture:

Amount of bound water and free water in a sample.



Min a_w limit for m.o. for growth

a_w limit	Microorganisms
0.91	Gram negative bacteria
0.86	Gram positive bacteria
0.88	Yeast limit
0.80	Production of mycotoxins
0.70	Mold limit
0.62	Osmophilic yeast
0.60	Absolute limit for all growth



Examples for a_w values of some foods

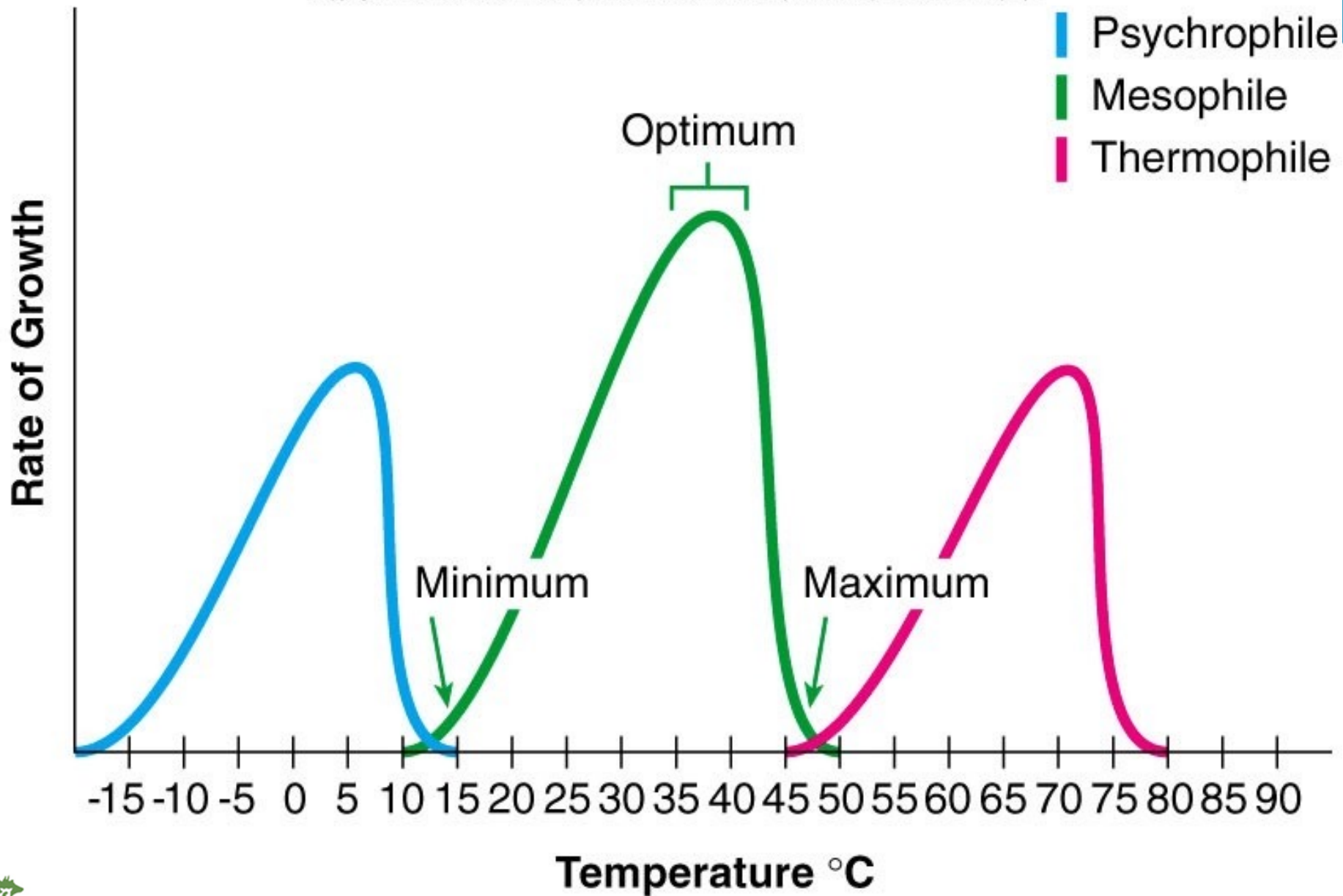
FOOD	a_w
Pure water	1
Fresh water	0,985
Milk	0,97
Bread	0,96
Potato chips	0,8
Flour	0,72
Raisins	0,45





Temperature

- Psychrophiles (cold loving microorganisms)
 - 0 °C - 20 °C
- Mesophiles (moderate temp. microorganisms)
 - 20 °C - 40 °C
- Thermophiles (heat loving microorganisms)
 - 40 °C - 100 °C



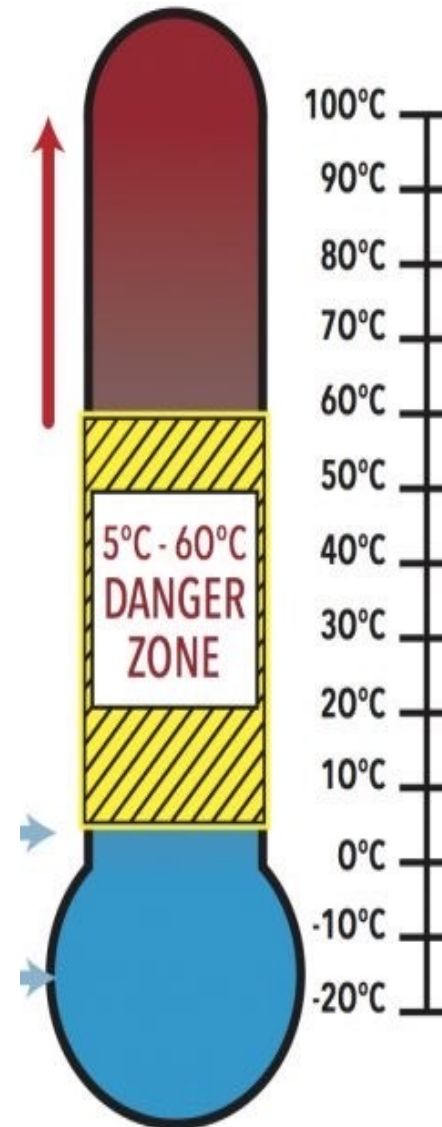


Keep cooked food at 60 oC or above.

Don't keep your food in the Temperature Danger Zone 5 oC to 60 oC for more than 2 hours.

Keep chilled food in the refrigerator at 5oC or below

Keep frozen food in the freezer at -15 oC or below.





Limiting factors for growth

- Lack of food, water or nutrients
- space
- accumulation of metabolic wastes
- lack of oxygen
- changes in pH
- temperature



- Science of food microbiology is strictly related with providing food safety and preventing food borne risks but also includes beneficial microorganisms.
- Food borne microorganisms cause diseases which classified in 3 groups: food infection, intoxication and toxic infection.
- Factors affecting the growth of microorganisms inside the food can be used as strategy fighting against food borne pathogens and spoilage microorganisms.



Project e-mail: foodsafetyprojectTcc@gmail.com

THANK YOU FOR YOUR ATTENTION



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