**Contamination and Spoilage of Meat and Meat Products**

 Meat is an ideal culture medium for many organisms because it is high in moisture; rich in nitrogenous food and various degrees of complexity and plentifully supplied with minerals and accessory growth factors. It usually contains some fermentable carbohydrates at a favorable pH for most microorganisms.

The inner flesh of meat is generally sterile or only a few numbers of microorganisms can survive there. They are found in bone marrow, lymph etc. Normal slaughtering will remove the lymph nodes form edible parts.

**Meat spoilage**: can be considered as any change which renders a product (meat) unacceptable for human consumption.

**Sources of Contamination**

. **-**Majority of the spoilage microorganisms are contaminants, comes from external sources: during unhygienic bleeding, handling and processing

**-**The exterior of the animals normally harbors large numbers and many kind of microorganisms from soil, water feed, and manure, as well as natural surface flora.

 The intestinal contents contain the intestinal organisms. **-**

**-**Knives, cloths, air, and hands of workers can serve as intermediate sources of contaminants.

**-**During handling of the meat thereafter, contamination can come from carts, boxes, or other containers; other contaminated meat; air; and personnel.

-Molds of many genera may reach the surface of meats and grow there. Especially important are species of genera Cladosporium, Sporotrichum, Geotrichum, Thamnidium, Mucor, Penicilium, Alternaria, and Monilia. Yeasts, mostly asporogenous ones, often are present.

The survival and growth of these microbes is influenced, to a great extent, by

the composition of the atmosphere surrounding the meat. Meat spoilage is, according to

most frequently caused by the following groups of bacteria

*Pseudomonas spp*-1

Enterobacteriaceae-2

*Brochothrix thermosphacta*-3

Lactic acid bacteria -4

***Upon gaining entry to the flesh the growth of the contaminant microbes are affected by a wealth of factors such as:***

1-The kind and amount of contamination with microorganisms and the spread of these organisms in the meat

2- The physical properties of the meat

Chemical properties of the meat-3

4-Availability of oxygen

5-pH

6-Temperature

7-Moisture content

8-Osmotic pressure

**General type of Spoilage of meats and meat Products**

**Spoilage under Aerobic condition:**

**Surface slime**: caused by species of Pseudomonas, Acinetobacter, Moraxella, Alcaligens, Micrococcus, Streptococcus, Leuconostoc, and Bacillus. Some species of lactobacillus can also produce slime. The temperature and the availability of moisture influence the kind of microorganisms causes surface slime.

**Changes in colour of meat pigments** : The red colour of meat, or grey as a result of the production of oxidizing compounds, e.g., peroxides, or of hydrogen sulfide, by bacteria. Species of Lactobacillus and Leuconostoc are reported to cause the greening of sausage

**Changes in fats**: Lipolytic bacteria may cause some lipolysis and also may accelerate the oxidation of the fats. Rancidity of fats may be caused by lipolytic species of *Pseudomonas* and *Achromobacter* or by yeasts.

**Phosphorescence:** This rather uncommon defect is caused by phosphorescent e.g., *Photobacterium spp*., growing on the surface of the meat.

Moreover, various surface colors due to pigmented bacteria has been reported in spoiled meat:

-The "red spot" may be caused by *Serratia marcescens* or other bacteria with red pigments.

- *Pseudomonas syncyanea* can impart a blue color to the surface.

-Yellow discolorations are caused by bacteria with yellow pigments, usually species of Micrococcus or Flavobacterium. *Chromobacterium lividum*

**Off odours and off tastes:** "Taints," or undesirable odours and tastes, which appear in meat as a result of the growth of bacteria on the surface often, are evident before other signs of spoilage.

 "Souring" is the term applied to almost any defect that gives a sour odour that may be due to volatile acids, e.g., formic, acetic, butyric, and propionic, or even to growth of yeasts. *Actinomycetes* may be responsible for a musty or earthy flavor.

**Procedure:**

1-Prepare a 1:10 dilution of the meat by aseptically blending 10 g into 90 mL of peptone water, blending time should not exceed 2.5 min in order to prevent over-heating.

2-Prepare succeeding decimal dilutions as required, using a separate sterile pipette for

making each transfer

3-Shake all dilutions immediately prior to making transfers to ensure uniform distribution

of the microorganisms present

4-Pipette 1 mL of the required dilutions to appropriately marked duplicate

Petri plates

5-Pour 12-15 mL of tempered agar into each plate, and mix by rotating and tilting

For Total count ---Nutrient agar

 Fungi----------------Potato dextrose agar

Total coliform bacteria--------Macconckey agar

Pseudomonas------------------- Pseudomonas agar

5-Allow to solidify

6-For total count incubate at 35-37 C̊ for 24-48 hr and for fungi incubate at 25 C̊ for 2-3 days