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MICROBIAL STANDARDS, PACKAGING MATERIAL AS SOURCES OF CONTAMINATION

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Introduction

- Modern packaging can be defined as a means of ensuring safe delivery of a product to the consumer in sound condition at minimal overall cost.
- Packaging materials contain the product and protect it from environment.
- It also provides important information to the consumers and enables convenient dispensing of food. In simple the functions of the packaging materials are containment, protection, preservation, identification and convenience.



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Microbial Standards

Microbial characteristics of food that influence package selection are based on foods which can be divided into 3 types:

- Perishable: Milk
- Semi perishable: Dried Milk
- Non perishable canned, sterilized

Spoilage of foods by microorganisms is influenced by: pH, moisture content and microbial growth rate which is affected by water activity and Storage temperature. Selection is based on type of spoilage considered i.e. whether microbial or chemical.



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Effect of packaging material on microbial quality of milk and milk products depends on two factors:

1. Directly influences the microbial load due to the presence of microbes on their surfaces.
2. Indirect influence due to their permeable character to the access of microbes



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Important factors in choosing a packaging unit may depend on:

- + Degree of protection needed against light,
- + Humidity,
- + Temperature,
- + Micro-organisms/insects,
- + Protection for Protein, Fat,
- + Characteristic Flavour and Water in products.
- + The Price,
- + Sales appeal,
- + Ease in handling,
- + Mechanical hazard and
- + Handling by consumers



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The two important factors that control the influence of packaging materials on milk products are

1. Exposure to high temperature during the fabrication of packaging materials to keep them sterile.
2. Care during subsequent handling and storage of these materials and avoiding the contamination.



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Proposed microbiological standards

■ SPC: 10 / 100 cm² or 10 per 100 ml capacity among which about 3% are spores.

■ Laminated paper:

10 organisms per 100 cm². The inner surface of a 1-liter carton is about 800 cm² and will thus on average be contaminated by about 2.5 spores. These spores are the most heat resistant, and hence their number must be reduced to less than 10⁻⁵ per package. Furthermore, the packages should be aseptically closed; an atmosphere with overpressure and sterile air is usually applied.

■ Coliforms: Nil per cm² or Nil per 100 ml capacity



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- For aseptic packaging the packaging material should be sterile.
- Such material is allowed to pass through 15-35.5 % of H_2O_2 before packing.
- At present scenario liquid milk cheese and ice cream are the products that are most affected.
- The main trend is going towards plastics such as plastic bags, plastic lined cartons and plastic containers.
- This substitution for glass will eliminate problems of foreign bodies and glass fragments in containers.
- An ideal pack should be virtually, but may not be absolutely, oxygen and moisture proof.



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Testing of packaging materials for microbial quality

A specified area of the packaging material is cut and placed on a solid agar medium in a petri dish and overlaid with medium.

- Incubate the plates and count the colonies on both sides of the medium.
- This technique is for the non absorbent packaging material such as cardboard, plastics and aluminum foil.
- The packaging materials for the presence of pin holes are tested by using the bacterial suspension of *Bacillus polymyxa*. The packages are immersed in the chilled suspension of *Bacillus polymyxa* under slightly induced vacuum in the packages. The bacteria penetrate the pin holes and cause spoilage on incubation.



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Thank you