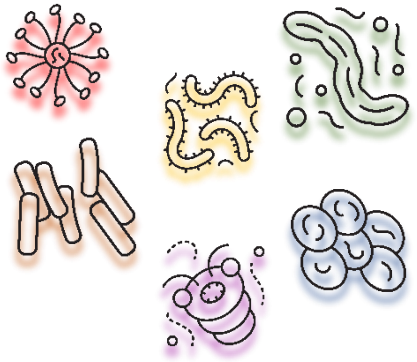
Foreign Material Control at Reception

CONTENTS

1. Introduction

- Contamination of milk with undesirable residues may occur through the animal itself, the environment and also during further processing which creates toxicological problem when present in milk.
- Foreign body' is a technical term which refers to any extraneous matter, whether of a physical, chemical or biological nature, found in food. Usually foreign bodies render the food unfit for human consumption.
- Foreign matter renders to food adulteration and any incidence of foreign matter harms the consumer, undermines confidence in the brand, arising questions on the quality of food product being manufactured.
- It is one of the important factor in effective implementation of the company's food safety program, particularly the Hazard Analysis Critical Control (HACCP) system

2. Classification of Contaminants

1. Physical	2. Chemical	3.Biological
These include metal shavings, stones, hairs, gasket material, dust, udder tissues and other extraneous material. 	These include antibiotics, mycotoxins, cleaning and sanitizing agents etc. 	These include vegetative pathogens. 

3. Sources of Contaminants

3.1 Farm Animal: Veterinary drugs e.g., antibiotics; hormones; Interior of the udder, exterior of the cow (udder and flanks); etc.

3.2 Feed Additives: Trace elements; antioxidants; feed drugs; etc.

3.2 Environment: Agrochemicals (pesticides, insecticides); dust; Mineral of soils (lead, cadmium); Environmental organics (mycotoxins, Radionuclides).

3.3 Milking and Processing: cleaning and disinfecting agents; insecticides; Surfaces e.g., metals, plasticisers.

4. Control Measures

Control measures for chemical and physical hazards in food are primarily preventive, aiming to prevent contamination rather than reducing or eliminating hazards once they are introduced.

4.1 Environmental Hygiene

- The management of water and environmental factors is crucial to prevent the transmission of hazards into milk.
- Contaminated water, pests, chemicals, and environments can lead to contamination of feed, equipment, or milking animals, introducing hazards into the milk production process.
- Water used in primary production operations should be suitable for its intended purpose and should not contribute to the introduction of hazards in milk.

4. Control Measures (Cont.)

4.2 Areas and premises for milk production: The milk production area should be designed, situated, and maintained to minimize the introduction of hazards into milk, to the extent possible.

4.3 Animal health: Milking animals and herds should be managed to avoid health hazards, ensuring good health and safety for the end products, and milk should come from healthy animals.

4.4 Feeding: Forage and feed for lactating animals should not introduce contaminants into milk that pose a health risk or negatively impact the suitability of milk or milk products.

4. Control Measures (Cont.)

4.5 Pest control: Pests should be controlled, and in a way that does not result in unacceptable levels of residues, such as pesticides, in the milk

4.6 Veterinary drugs: Veterinarian drugs should only be used by authorized authorities for specific use and not negatively impact milk safety or suitability, and residue levels should not pose an unacceptable consumer risk.

4.7 Hygienic milking: Milking should be carried out in such a manner that minimizes contamination of the milk being produced.

4. Control Measures (Cont.)

4.8 Handling, storage and transport of milk: With consideration given to the end use of the milk, handling, storage and transport of milk should be conducted in a manner that will avoid contamination and minimize any increase in the microbiological load of milk.

4.9 Milking equipment : Milking equipment should be designed, constructed, installed, maintained and used in a manner that will avoid the introduction of contaminants into milk.

- Milking equipment should be operated in a manner that will avoid damage to udder and teats and that will avoid the transfer of disease between animals through the milking equipment.

4.10 Storage equipment : Milk storage tanks and cans should be designed, constructed, maintained and used in a manner that will avoid the introduction of contaminants into milk and minimize the growth of micro-organisms in milk.

4. Control Measures (Cont.)

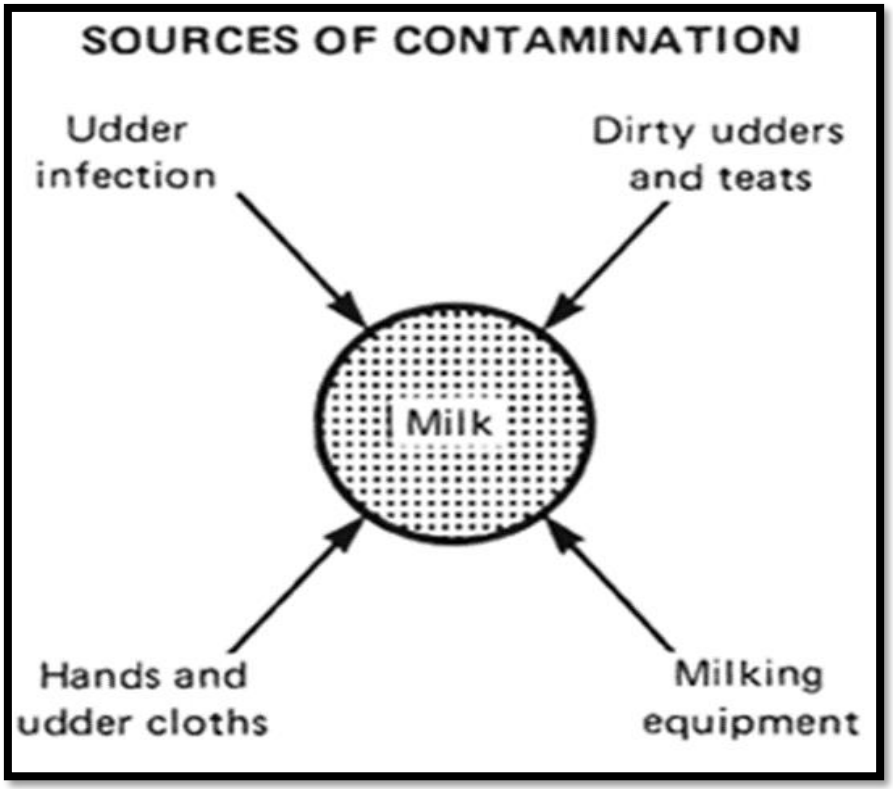
4.11 Premises for, and storage of, milk and milking-related equipment: Premises for the storage of milk and milking-related equipment should be situated, designed, constructed, maintained and used in a manner that avoids the introduction of contaminants into milk.

4.12 Collection, transport and delivery procedures and equipment: Milk should be collected, transported and delivered without undue delay, and in a manner that avoids the introduction of contaminants into milk and minimizes the growth of micro-organisms in the milk.

- Milk transport tankers and cans should be designed, constructed, maintained and used in a manner that will avoid the introduction of contaminants into milk and minimize the growth of micro-organisms in milk.

4.13 Documentation and record keeping: Records should be kept, as necessary, to enhance the ability to verify the effectiveness of the control systems.

4. Control Measures (Cont.)



5. Physical Separation of Contaminants

- Physical separation methods such as screening or filtration can be used to remove foreign material.
- These screens can separate solid foreign materials from liquid products or separate solid items based on size.
- Some systems require mechanical agitation or movement to allow for more effective product flow, but the basic method is creating a physical barrier that removes as much foreign material as possible.

5.1 Straining

- To minimize visible sediment in milk
- Introduced to remove some of the large particles of foreign material such as straw, hair, insects, grass, dirt, flies, etc.
- The straining in the ordinary sense is accomplished on the dairy farm by means

  - pieces of cloth,
  - cotton,
  - wire gauge or
  - specially prepared strainers/ strainer pads.

5.2 Filteration

- To remove visible sediment (foreign matter) from the milk to improve the aesthetic quality of milk
- filtration removes suspended foreign particles by straining process.
- filter material must have pores of 25 - 100 µ.
- smaller the pores greater is the separation effect and filtration time. For a filtration installation with a flow of 10,000 L/h, we can assume 1 - 2 h time with pores size of 45 µ and pores size of 100 µ up to 10 h. Changing of filter after every 6 h of operation is recommended.
- The filter consists of stainless-steel body wherein a filter with a small pore nylon cloth is placed and closed with a tight-fitting lid

5.2.1 Features of Good Filter

- A filter cloth or pad of the desired pore size is used that can retain the smallest particle.
- A frame or support to compress and hold the margins of cloth or pad, so that milk can pass through pores
- A perforated metal or other support for the cloth or pad which will not tear or break under the pressure of milk
- An enclosure to confine both the filtered and unfiltered milk in closed system fitted suitably with inlet and outlet connections for sanitary piping
- A continuous operation is essential to handle large volumes of milk; 2 or more filters may be used without interruption.

5.2.2 Types of Filter

Two widely used types of Filters used in Milk Reception for material control is:

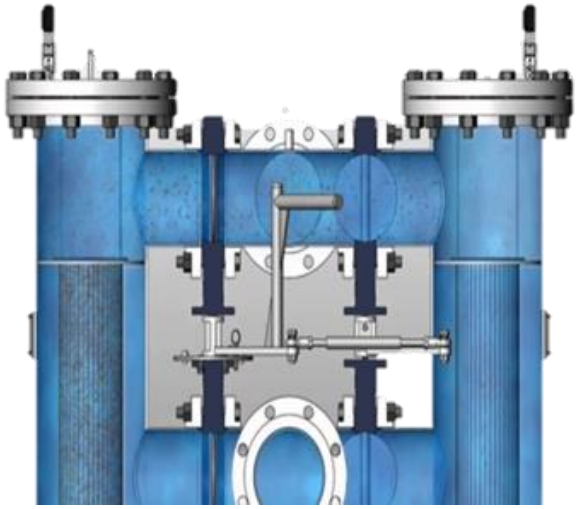
1. **Simplex Filter:**

- Simplex filters are the basic model of filtration technology.
- They have a compact design and are extremely easy to clean.
- The simplex strainers are preferably used where systems or the filter can be switched off with additional shut-off devices.
- They serve to protect the system parts from soiling and siltation.

5.2.2 Types of Filter (Cont.)

2. Duplex Filter:

- During normal operations the strengths of the duplex filter is that it can be completely operated maintenance-free, except for checking the seals and cleaning of the filter element.
- With two filter chambers connected with a changeover valve one chamber is always in operation while a clean filter chamber is in standby mode.
- Duplex filters are primarily used where shutting down machines and systems are not practical or highly uneconomical, for example, in the maritime or the production industry.



5.3 Clarification

- Clarification is more efficient than filtration for the removal of dirt and foreign matter from milk.
- Clarification removes leucocytes, udder tissues, other large cells and fine dirt which improve the appearance and marketability of milk.
- In general, the clarifiers are quite similar to cream separator but have some difference between clarifier and cream separator as follows:

#	Clarifiers	Cream separator
1.	Only one inlet and one outlet	One inlet and two outlets (cream and skim milk).
2.	Discs: smaller in diameter	Relatively larger
3.	Milk distribution holes are at the outer edge of the disk in the clarifier	Milk distribution holes are near the axis of rotation in the separators
4.	bowl diameter to disc diameter ratio is greater results larger sludge space	bowl diameter to disc diameter ratio is relatively smaller

- Other specification of clarifier:
  - Mostly have 10-20 discs without holes and 6-12 evenly spaced baffles on their surface, determining disc distance and influencing flow pattern.
  - Milk is pumped through a central pipe, passing through a rotating bowl and into the sludge area.
  - Dirt separation occurs in the disc assembly, enclosed by two baffles, one for rotation and the other for flow to the center.
  - The dirt particles with higher specific gravity are separated by the centrifugal force.
  - The clarified milk rises to the outer surface of the distributor and reaches the baffle and ejects out.
  - The pressure is about 5.4 bars.

5.3.1 Factors

1. The amount of foreign matter
2. Condition of the udder
3. Stage of lactation
4. The bacterial count and acidity of the milk
5. The clarifying temperature
6. The speed of the bowl
7. Amount of milk run through the bowl

A clarifier may be operated depending on the size of the machine, for a period ranging from 2 - 8 h for cold milk (5 - 10°C) and 1-4 h for warm milk (57°C), without cleaning.

5.4. Bactofuge

- A physical method used to remove bacteria from milk, based on their size and density.
- The efficiency depends on factors such as initial bacterial load, milk pre-treatment, machine throughput, bactofugate volume to throughput, partial desludging frequency, and run duration.

- Bactofuge have one inlet for raw milk and one outlet for treated milk.
- The bowl wall features 2-4 nozzles for skim milk discharge, with bacteria subjected to a centrifugal force of 7000-9000 G.
- Able to remove the heat resistant spores which otherwise are not removed during thermal process.

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