

# **Drum Roller Drying Technique**

**LPT-610**

**UNIT - I**

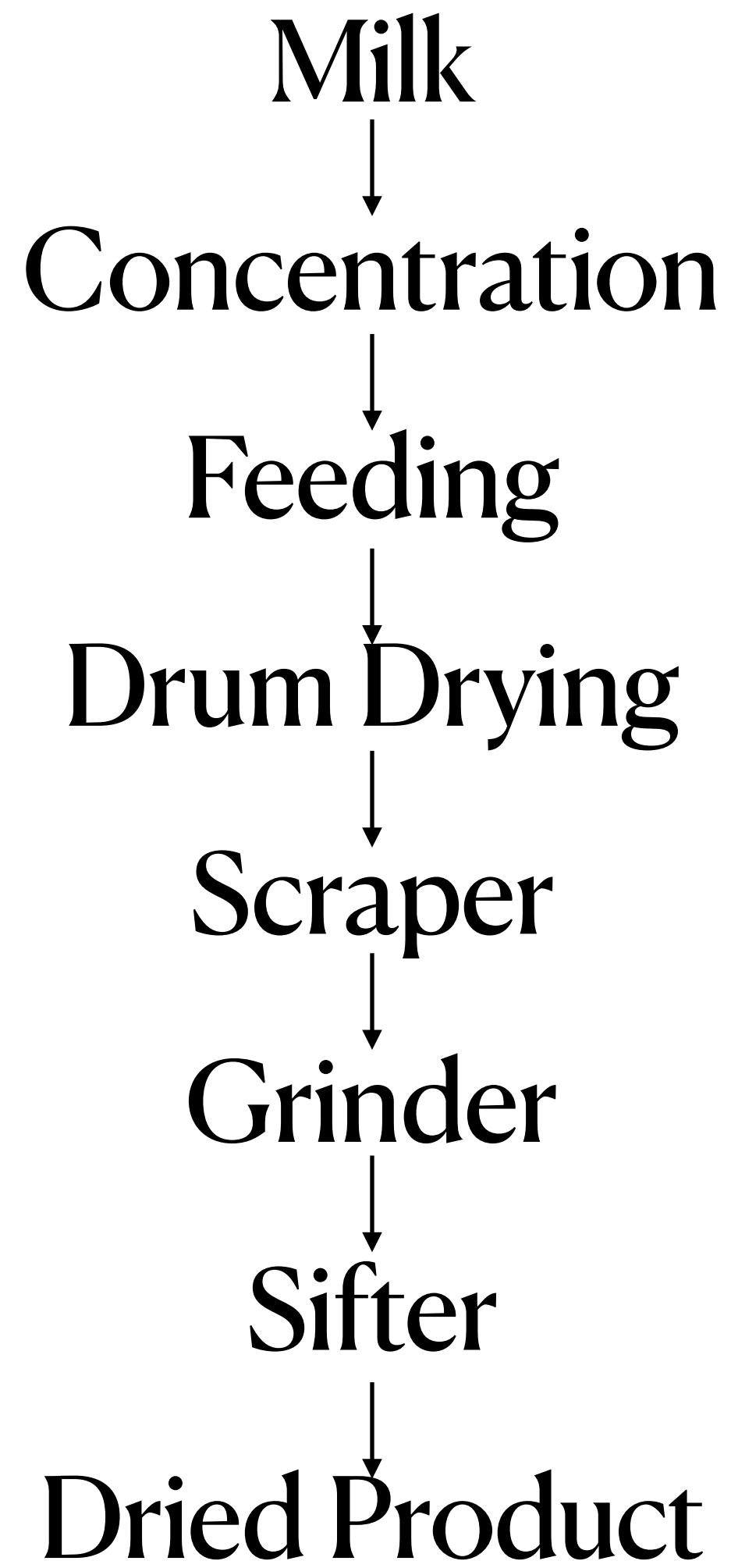
**By: Dr. Gargi Mahapatra, Assistant Professor cum Junior Scientist  
Department of Livestock Products Technology  
Bihar Veterinary College  
Bihar Animal Sciences University, Patna-14.**

# Principle

(working)

A thin film of concentrated milk is applied upon the smooth surface of a continuously rotating steam heated metal drum maintained at 150 degree centigrade and the thin film of dried milk is continuously scrapped off by a stationary knife, angled at 15 to 30 degrees, located opposite to the point of application of the milk . The drum rotates at a speed of 14-19 rpm. The thin film of milk stays in contact with the heated drum for a period of 3 secs or less, for  $\frac{3}{4}$  or  $\frac{7}{8}$  of a revolution and is then scrapped off and ground to obtain a fine powder.

# Functioning



# **Types**

**(based on set-up of the machine)**

- 1. Number of hollow drums- Single; Twin & Double Drum.**
- 2. Environment- Atmospheric and/or Vacuum Drier**
- 3. Direction of turning drums-**
  - (a) Twin drum- Turn up at the centre, away from the top**
  - (b) Double drum- Turn at the centre, together at the top**

# Types

(based on set-up of the machine)

4. Method of feeding the product on the surface of the drum.
5. Method of obtaining vacuum-
  - (a) By steam ejector
  - (b) By vacuum pump
6. Material of construction for drum- **Cast iron**, Steel, Alloy steel, Stainless steel, Chrome or nickel plated steel.

## Note

1. Usually cast iron drums are used.
2. Metal used for knife is softer than metal used for drum.
3. Top feed system yields thicker film
4. Most commonly used driers for the dairy industry is double drum atmospheric drier.
5. Vacuum drier- Most commonly used is top feed system

# Drum

## Specifications

- Hollow
- Normally horizontal; Length 90-360 cm Diameter-60-120 cms.
- Speed- 14-19 rpm. Double drum drier, both drums function at the same speed.
- Contact time- 3 secs or less.
- Heated internally by steam (60-70 psi), temperature 150 degree centigrades.
- Double drums: Placed apart by 0.5-0.75 mm.
- Drum surface should be smooth, checked after every 1000-3000 hrs of operation.
- When not in use should be lined by oil or paraffin wax.

# Milk

## Processing before drying

- Normally pre-condensed milk is used.
- Milk pre-condensed to 2:1; Total solids 16-18%.
- Objectives for using pre-condensed milk:
  1. Provides satisfactory film thickness.
  2. Greater thermal economy.
  3. Increased capacity of the driers
  4. Increased bulk density.
  5. Increased keeping quality.



# Vacuum Drying v/s Atmospheric Drying

- Merits

1. Higher solubility of the powder.
2. Product of better keeping quality.

- Demerits

1. Higher initial cost of the plant.
2. Higher operation cost.
3. Plant is complicated.
4. Cannot be easily relocated.

# **Advantages**

**(over spray drying system)**

- Lower capital investment and operating cost.
- Plant requires a smaller floor space and is movable.
- Easy to operate.
- Suitable for operating small quantities of milk.
- Produces milk powder of better keeping quality.
- Economically more viable.

# **Disadvantages**

**(over spray drying system)**

- Product obtained is of lower solubility.
- A cooked or burnt flavour may be experienced at the time of reconstitution into liquid milk.

**Thank You**

**Dr. Gargi Mahapatra**