



PANEER PROCESSING

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1. Introduction

- Paneer- popular indigenous dairy product
- Obtained by combined action of heating & acid resulting coagulation of milk.
 - **Acid used for coagulation:** citric acid, lactic acid, tartaric acid, alum or sour whey,
 - **Heating:** high heat treatment ~70-90°C
 - **Moisture removal:** manually using muslin cloth followed by machine press.
- It has marble white appearance, slightly spongy body and firm texture, and sweetish-acidic-nutty flavour



1.1 Status of Paneer in Indian Market

- The paneer total marketing observed as Rs. 494 Billion in 2022 and
- Market surveys reported it to grow having market of Rs. 1173 Billion with growth rate of 15.7% by 2028.
- Nationwide aggregate demand for healthy products is being impacted by the growing awareness among fitness enthusiasts and health-conscious people, may increase the chances of market growth.
- Though only 5% milk is being used for paneer manufacturing out of total milk production.



1.2 Nutritional Profile

- According to a research article written by Pal et al. (2019), a block of hard cheese containing 122g tofu constitute:

#	Parameters	Traditional Paneer
1.	Raw Material	Dairy based Milk (majorly Buffalo and cow milk)
2.	Colour	Creamy-white to yellowish,
3.	Suitability	Can't be consumed by lactose intolerant people.
4.	Moisture	60-70% (increases with increase in fat content)
5.	Protein %	18-20% (mainly casein)
6.	Fat	20-50%; High cholesterol, rich in omega-3 & 6 fatty acids.
7.	Fiber	Absent

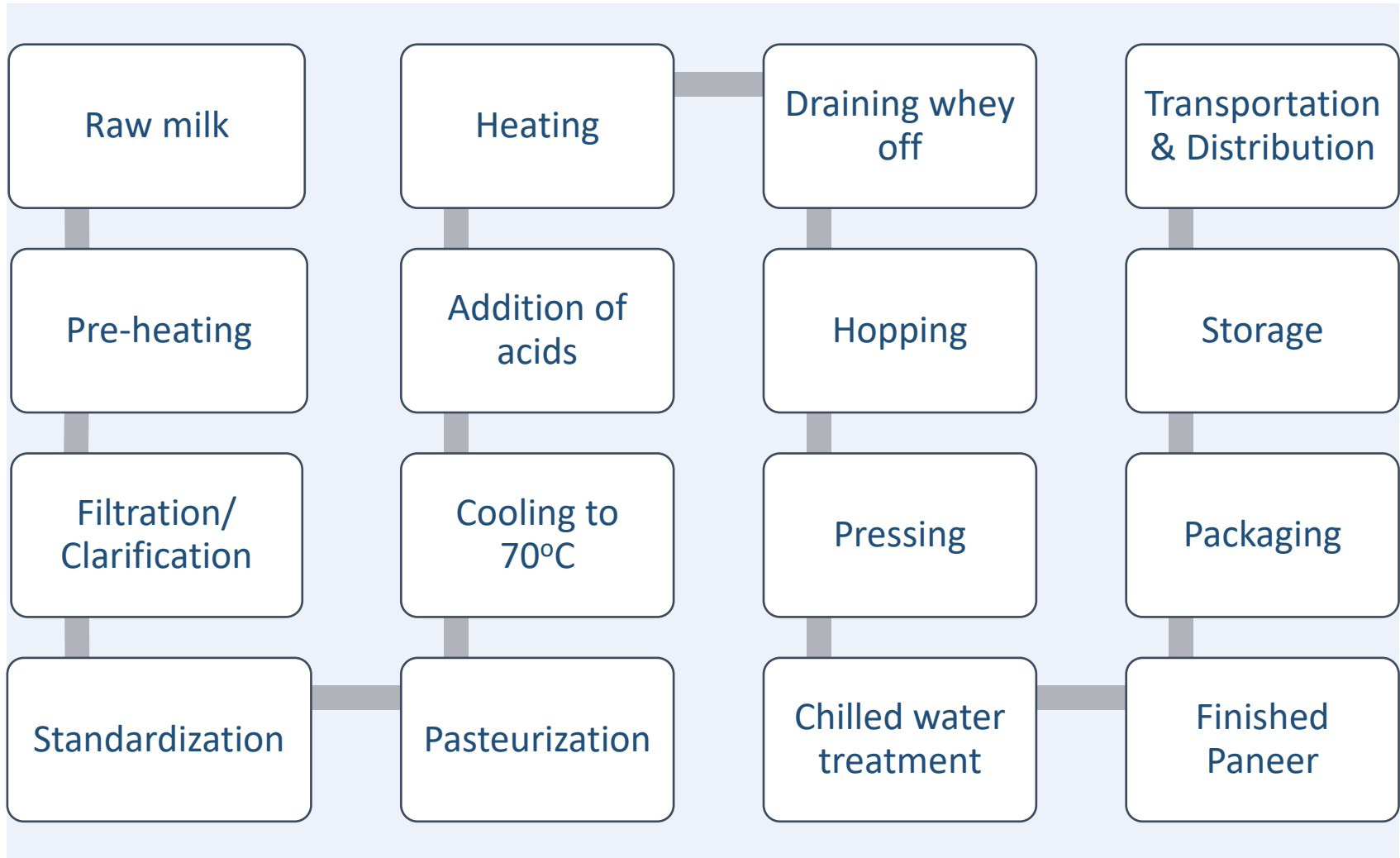
- In addition, rich in essential nutrients such as calcium, phosphorus, vitamins B & D, and essential fatty acid like omega-3 and omega-6 fatty acids.

2. Raw Material

1. **Milk:** Buffalo milk, cow milk, mixed milk, standardized milk, etc.
2. **Acid:** citric acid, lactic acid, tartaric acid, alum or sour whey.



3. Paneer Processing



3(a). Milk

- The paneer made from using following milk may leads to below mentioned characteristics:
 - **Buffalo milk (Preferred):** harder and rubbery body as it has higher casein and minerals content esp. calcium and phosphorus
 - **Cow milk:** soft and soothing quality.
- To obtain excellent quality of paneer, mixed milk can be used with $\frac{2}{3}$ rd buffalo and $\frac{1}{3}$ rd cow milk composition.
- Protein efficiency ratio (PER) and biological value (BV) of paneer prepared from buffalo milk is 3.4 and 86.56.



3(b). Standardization

- Ideally milk is standardized using **skim milk**, **fresh cream** and **SNF powder** to obtain fat desired composition of fat and SNF in milk.
 - **Fat:** 5.8-6%
 - **SNF:** 9-11%
- Fat present in milk leads to have following characteristics in paneer
 - **Smoother body,**
 - **Richer and creamier texture and,**
 - **Nice mouthfeel.**



Standardization Machine

3(c). Pasteurization and Cooling

- To pasteurize milk, heating is done at 82°C for 5 min or at 90°C without holding by immediate cooling at 70°C
- It doesn't affect characteristic of paneer, but it delays microbial spoilage up to 4 weeks when stored properly at 4°C



Milk Pasteurizer

3(d). Coagulation of Soymilk

- Done using acidifying milk of pH 5.3 - 5.35 and continuous heating at 70°C with constant stirring.
- To coagulate milk protein esp. casein, present in milk.
- Coagulants added @1% using either
 1. **Acid** such as citric acid
 2. **Salts** like CaCl_2 , etc.



Coagulating Vat



3(e). Hopping/ Pressing

- **For Hooping**, the curd is placed in muslin or cheese cloth Lining of the hoops, (having openings on every side to aid in the whey's discharge).
- **Pressing** is done to remove excess whey off by applying pressure @0.5 to 1kg/cm² for 10-20 min on it, producing paneer blocks.
- Pressing can be done using
 - Hand-turned screw presses or simple lever presses
 - Hydraulic presses.



Hydraulic presses

3(f). Cooling/ Packaging & Storage

- The finished paneer to be cooled at refrigeration temperature to maintain optimal freshness.
- For packaging of tofu generally two types of packages are used:
 1. Vacuum-sealed Containers (Have Longer Shelf Life)
 2. Water-filled Packages
- **SKUs used:** plastic containers & 3 sided sealed pouches.
- Appropriate packaging & storage helps to preserve the flavor and texture of paneer.
- At industry level, paneer is being stored at cold storage room below 4°C but at retail level it is recommended to store it in refrigerator.



4. Health Benefits

- Aids in building **stronger bones** and teeth
- It have blood pressure lowering properties and keep heart muscles healthy,
- Aids smooth **nerve functioning**.
- Good for diabetic people being low in carbohydrate.
- Helps in **weight loss**, due to improved metabolism, and
- Can fight against rheumatoid arthritis.



5. New innovations

1. **Product based innovated paneer:** Skim milk paneer, low-fat paneer, reduced-fat paneer, fiber-enriched paneer, vegetable impregnated paneer, paneer spread, pickle, spiced, masala, fruit, cubes added paneer.
2. **Process based innovated paneer:** ultrafiltered paneer, packed paneer, and processed paneer.



6. References

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