Quality Control & their CCPs

Milk processing

CONTENTS

1. Introduction

Milk quality control involves processes to measure quality of milk at various processing stages.

- ✓ **Purpose:** Ensure safety, healthfulness, and adherence to required criteria for milk and milk products.
- ✓ **Components of testing:** Chemical composition, purity, and the presence of bacteria and other microorganisms.
- ✓ **Stakeholders involved**: Milk collectors, processors, and marketing organizations.
- ✓ **Focus:** Quality assurance through proper procedures.
- ✓ **Key criteria:** Safety, healthfulness, chemical composition, purity, and absence of harmful microorganisms.

1.1 Milk Processing

- Milk processing involves conversion of raw milk into -
  - ✓ Pasteurized milk
  - ✓ Milk products like powder, cheese, butter, and yogurt, etc.

- Processing done using semi-automated and automated machinery.

- An excellent control over quality is highly desirable, as milk is the only product which is consumed by all from infant/ children to senior citizens.

2. Quality & Safety Management Systems

For effective control over quality and safety of the milk products, the food sector employs several quality and safety management systems, including.

- Hazard Analysis and Critical Control Point (HACCP)
- Total Quality Management (TQM)
- ISO 9000, and others

2.1 Benefits of quality control system

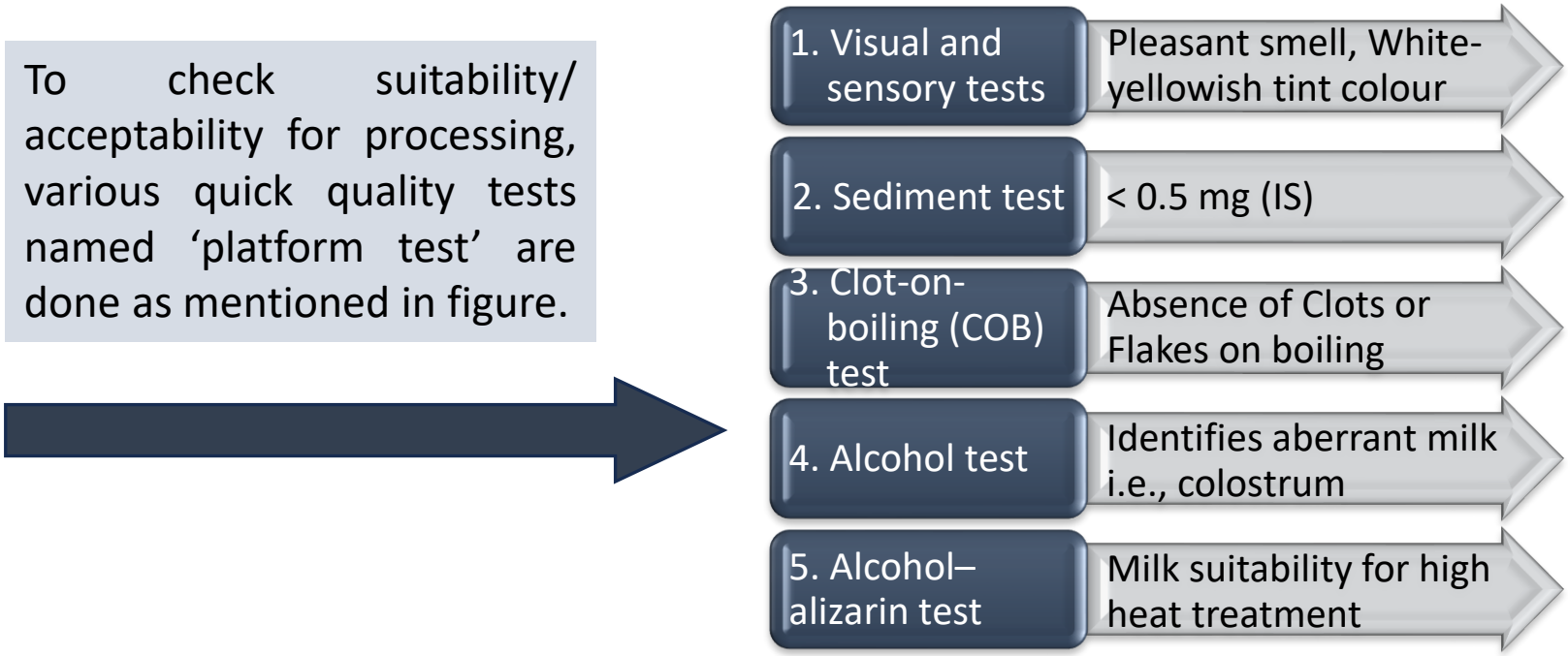
Milk Producers	Milk processors	Consumers	Government bodies
Farmers can get fair prices	Conformity of milk quality	Fair payment as per quality of milk	Ensures •Consumer health •Fair pricing •Product s

3. Quality assessment

3.1 Platform test for Raw Milk

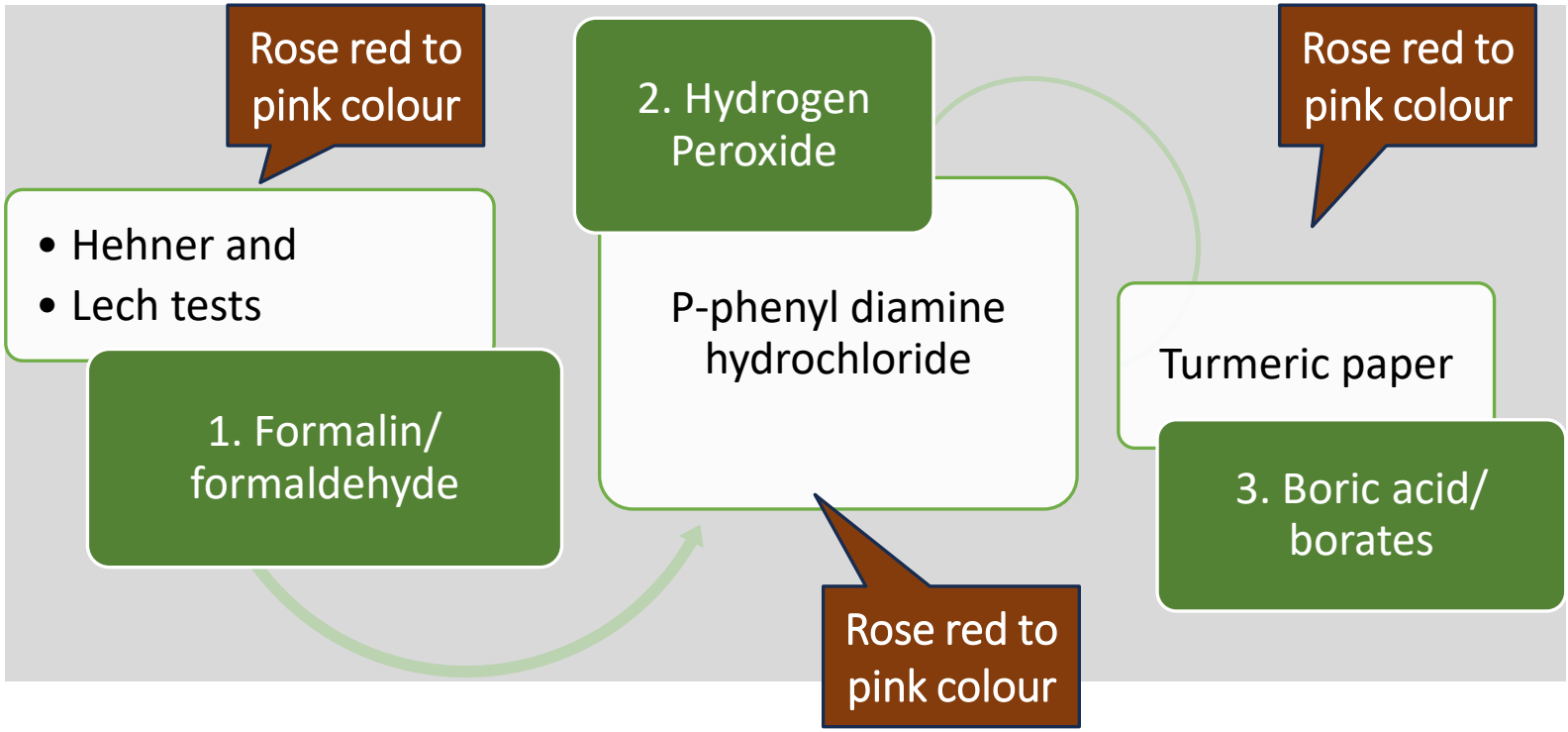
- Dairy Product Quality is influenced by -
  - ✓ Quality of raw milk used in manufacture, processing, and handling.
  - ✓ Poor socio-economic conditions in rural producers

To check suitability/ acceptability for processing, various quick quality tests named 'platform test' are done as mentioned in figure.



3. Quality assessment

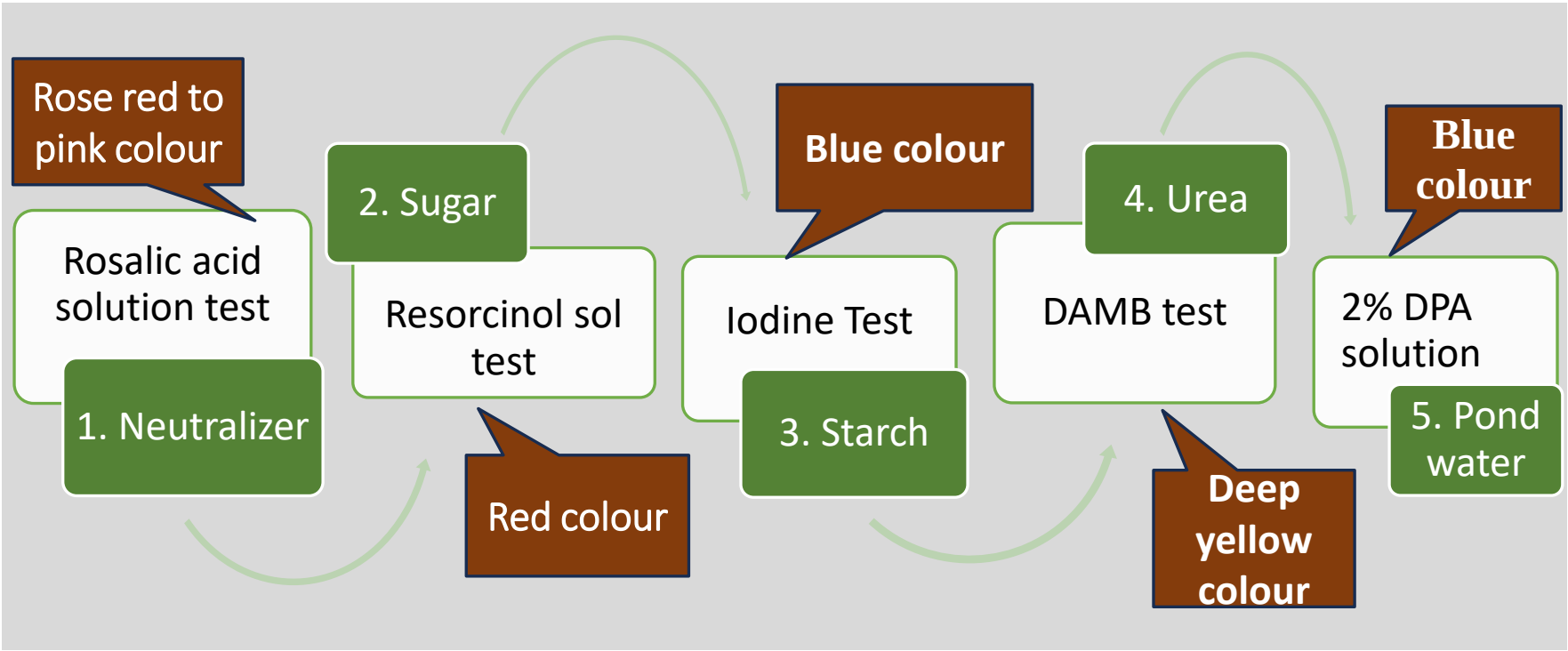
3.2(a) Adulteration Test: Detection of preservatives



- Done for both raw milk and processed milk
- Any kind of preservative/neutralizing agents shouldn't be present, but some of additives can be present only if mentioned on label in various milk products

3. Quality assessment

3.2(b) Adulteration Test: Detection of other adulterants



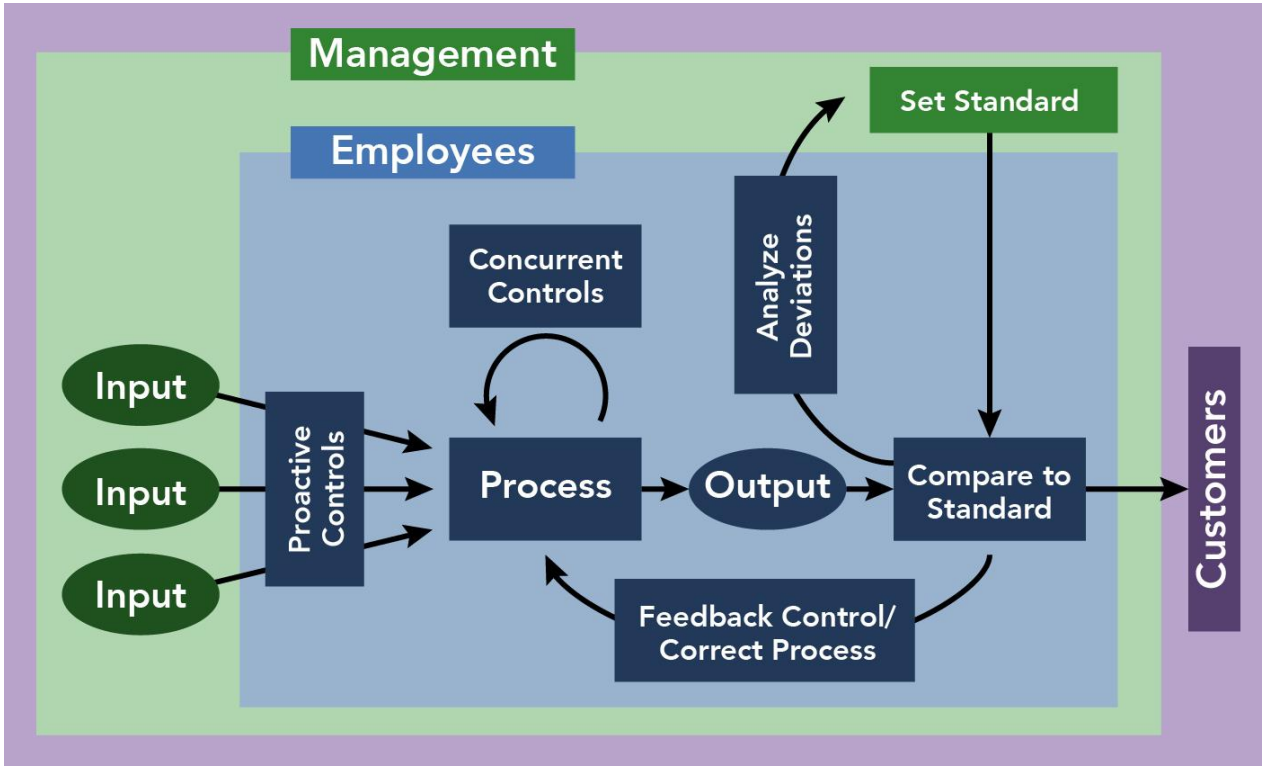
3. Quality assessment

3.3 Microbial Test

- Quality of milk and milk products also lie on the microbial status
- In case of milk,
  - ✓ presence of *Coxiella Burnetii* indicates faults in pasteurization
  - ✓ Presence of coliform microorganism esp., *E.coli* indicates ineffective CIP

As a results, products quality may degrade before the general shelf life of the products

4. Quality verification/ validation

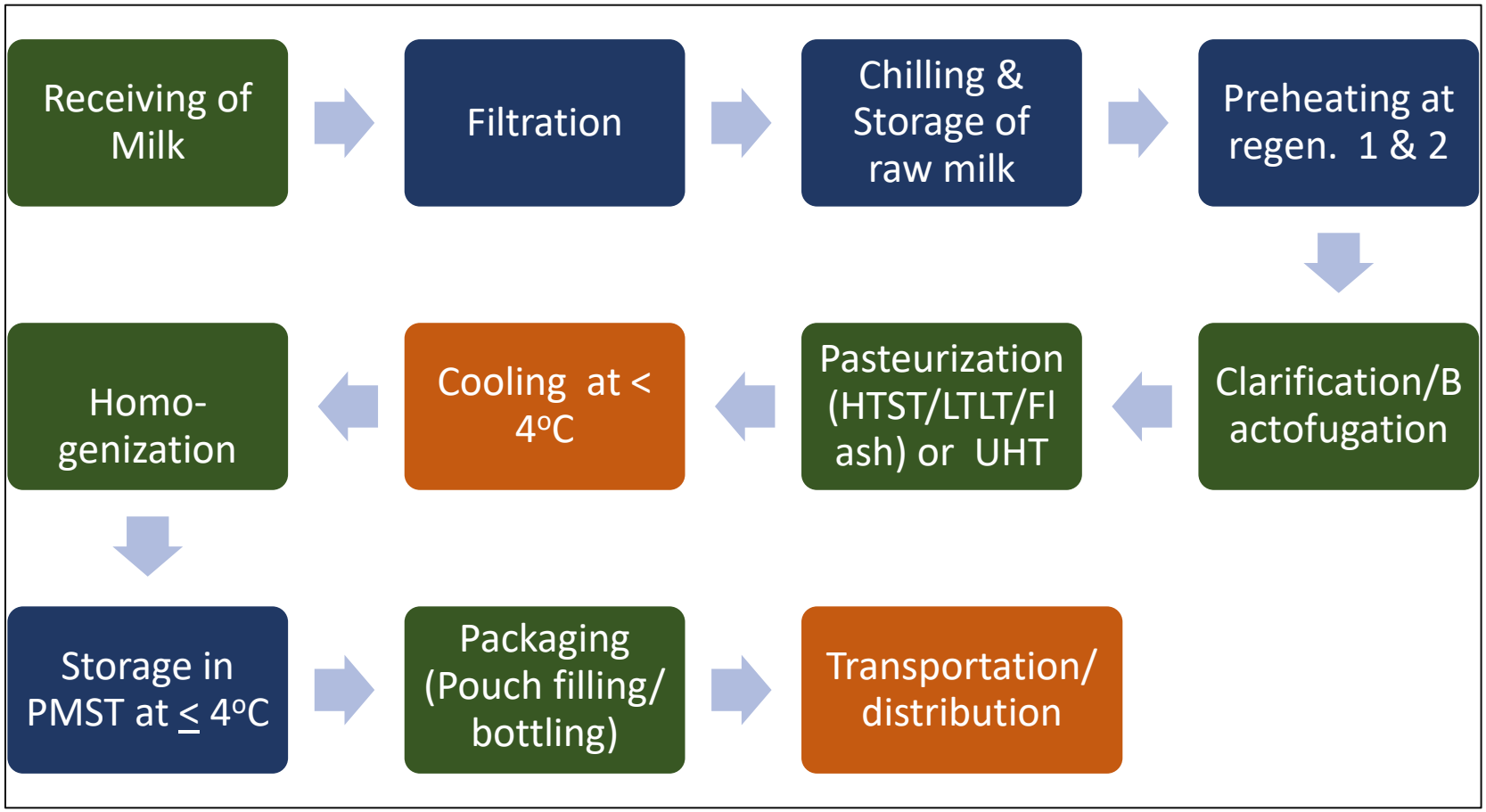


- After quality assessment of milk, quality, verification and validation of output as per the standard guidelines, is essential part of quality control.
- In India, FSSAI rules and regulation, & CODEX guidelines are recommended by government for result validations.

5. CCPs in Milk Processing

Definition	Effect	Common CCPs	Identifying and Monitoring
Specific stage where safety precautions are taken to avoid, remove, or lessen any risks.	• Crucial point to ensure milk product quality & safety	CCPs include • Pasteurization, • Fermentation and, • Packaging	• Maintaining quality, • Preventing contamination, • Guaranteeing safe, • wholesome milk production

5.1 Process flow chart of Milk Processing with CCPs



5.2 CCPs in Milk Processing with critical limit

Processing Step/ Stage	CCPs	Issues (If CCPs not meet)	Monitoring & correction measure	Critical Limit
Receiving of Milk	**CCP 1**: **Raw Milk** a. pH b. Specific gravity c. Temp. d. Freezing Point e. Microbial load	a. Milk clotting on boiling b. Quality degradation c. Shorter shelf life d. Chances of adulteration e. Higher processing condition required	• Checked by pH meter, lactometer, thermometer, freezing test, milko scan • Rejection of lot, accept if all condition meets.	a. pH: 6.6-6.8 b. s. g: 1.028 -1.032 c. Temp: $\leq 4^{o}C$ d. F.pt: -0.53 to $0.575^{o}C$ e. Microbial load:- • Total bacteria: 30,000/mL • Somatic cell count: $\leq$ 750,000/mL

5.2 CCPs in Milk Processing with critical limit (cont.)

Processing Step/ Stage	CCPs	Issues (If CCPs not meet)	Monitoring and correction measure	Critical Limit
Clarification & Bactofugation	**CCP 2:** Filtered raw milk a. Filter pore size b. Microbial load	a. Pump clogging b. Shorter shelf life	1. Checked by Sampling, testing (including adulteration test, microbial test), 2. Faults corrected by re-processing etc.)	a) Filter pore size: 100 – 200 µm b) TPC: 1.81 ± 0.72 log cfu/mL or 95.3 – 99% reduction.
Pasteurization	**CCP 3:** Pasteurized milk a. Process condition b. Target microbe	a. Shorter shelf life b. Food borne illnesses	1. Checked by Sensor based thermo-meter & sampling and testing, 2. Corrected by re-pasteurization	a) Conditions: - • 63°C/30min, • 72°C/15 sec, • 135°C/2- 3 sec b) *Coxiella burnetti*: absent

5.2 CCPs in Milk Processing with critical limit (cont.)

Processing Step/ Stage	CCPs	Issues (If CCPs not meet)	Monitoring/ correction measure	Critical Limit
Homogenization	**CCP 4:** Homogenized milk •Fat globule size	• Non uniformity in milk constituent, • cream may separate out from milk	1. Monitoring done by sampling and testing fat globule size 2. Correction done by re-homogenization	Fat size: 0.2 – 2 µm
Packaging	**CCP: 5** Packed milk •Packaging material	• Process contamination, • Shorter shelf life	1. Monitoring whole process of sterilization of packaging material and their processing environment, 2. Usage of food grade packaging material	1. Food grade packaging material 2. Food grade sterilizing components

6. Reference

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