



Ice Cream & Dairy Products Execution Structure (ERP + AI TicketingOS)

Milk · Curd · Paneer · Ice Cream · Butter · Ghee · Lassi · Yogurt

Cold chain · Batch traceability · Fat/SNF control · FSSAI · AI quality & shelf-life

1. Master Dairy Manufacturing Execution Flow (Batch/Lot-Driven)

ID	Department	Process	Activity	Action	Progress %
7001	Sales	ORDER	Customer PO	Order for milk / curd / ice cream (litres/kg, pack size)	5
7002	Procurement	RAW MILK	Milk collection	Farm / bulk cooler arrival, quality check (clot on boiling, alcohol test)	10
7003	QA/QC	INWARD	Milk testing	Fat %, SNF %, acidity, antibiotic residue, somatic cell count	12
7004	Production	PASTEURIZATION	HTST / UHT	72°C/15 sec (HTST) or 135°C/4 sec (UHT) for extended shelf-life	20
7005	Production	HOMOGENIZATION	Fat globule reduction	Prevents cream separation, improves mouthfeel	25

ID	Department	Process	Activity	Action	Progress %
7006	Production	SEPARATION (optional)	Cream / skimmed milk	Centrifuge – cream for butter/ghee, skimmed for toned milk	30
7007	Production	CULTURING (for curd/yogurt/lassi)	Inoculation & fermentation	Starter culture (Streptococcus, Lactobacillus) → 42°C / 4-6 hrs → pH 4.5	35
7008	Production	PANEER (coagulation)	Heat + citric acid / vinegar	Milk protein coagulation → pressing → chilling → cutting	35
7009	Production	ICE CREAM MIX PREP	Milk + cream + sugar + stabilizers	Blending, pasteurization, aging (4°C / 4-24 hrs)	40
7010	Production	ICE CREAM FREEZING	Continuous / batch freezer	Overrun (air incorporation) → 80-100%, exit temp -6°C	50
7011	Production	HARDENING / FROZEN STORAGE	Blast freezer (-40°C)	Core temperature reaches -18°C quickly to prevent ice crystal growth	55
7012	Production	BUTTER / GHEE	Churning → clarification	Cream → butter churn → ghee by boiling butter (moisture removal)	50
7013	Production	FILLING & PACKING	Pouch / cup / tub / brick	Automatic filling, sealing, weight check	65
7014	Production	LABELLING & CODING	Batch, expiry, MRP	Inkjet / thermal transfer printer – FSSAI license no.	70
7015	QA/QC	FINAL INSPECTION	Microbial & sensory	Coliform, yeast & mould, taste, body & texture	75

ID	Department	Process	Activity	Action	Progress %
7016	Warehouse	COLD STORAGE	Chilled (2-4°C) or frozen (-18°C)	Milk/curd/paneer chilled; ice cream frozen	85
7017	Dispatch	COLD CHAIN LOGISTICS	Reefer van / insulated truck	Temperature data logger – mandatory for ice cream & milk	90
7018	Distribution	DELIVERY	To retailer / distributor	Proof of delivery + temperature report	95
7019	Finance	INVOICE & PAYMENT	Final settlement	Credit terms (7-30 days for daily milk, longer for ice cream)	100

2. Product Wise Dairy Manufacturing Workflow

Liquid Milk (Toned / Full Cream / Skimmed)

Raw milk → Clarification → Pasteurization (HTST) → Homogenization → Chilling (4°C) → Filling (pouch/

Ice Cream (Vanilla / Chocolate / Fruit)

Milk + cream + sugar + stabiliser → Pasteurize → Homogenize → Age (4°C) → Flavour + colour → Freeze

Curd / Yogurt / Lassi

Standardize milk (fat 3-5%) → Pasteurize → Homogenize → Cool to 42°C → Inoculate culture → Incubate (4-6 hrs) → Break curd

Paneer (Indian cottage cheese)

Milk → Heat to 85°C → Add coagulant (citric acid/lime juice) → Drain whey → Press in mould → Chilling → Cut

Butter & Ghee

Cream (30-40% fat) → Pasteurize → Ripen (optional) → Churn → Butter granules → Wash → Salt → Pack (butter) → Or heat butter →

bottle) → Cold storage

(overrun) → Fill cup/tub → Harden (-40°C) → Store (-18°C)

(for lassi) → Cool to 4°C → Pack

cubes → Pack in water filled pouch

Clarify → Filter → Pack (ghee)


Critical Quality Parameters (FSSAI / CODEX)

- **Milk** – Fat %, SNF %, acidity (0.13-0.15% lactic acid), alcohol stability, antibiotic negative
- **Curd/Yogurt** – pH 4.5, titratable acidity, live counts ($> 10^7$ cfu/g), no syneresis (water separation)
- **Ice Cream** – Fat (10-15%), MSNF (8-12%), overrun (80-100%), hardness, melt down resistance
- **Paneer** – Moisture (max 60%), fat on dry matter (min 50%), no discoloration
- **Ghee** – Moisture (<0.3%), free fatty acids (<0.3%), BHA/BHT limits, Reichert-Meissl value
- **Butter** – Fat min 80%, moisture max 16%, salt (salted), diacetyl content

3. Milestone-Based Payment Release (Dairy Industry)

Stage	Release Condition	Payment %	Applicable For
Raw milk procurement (daily)	Milk tanker inward – quality accepted	75% within 7 days (co-operative model)	Liquid milk
Pasteurization & packing completed	Batch release certificate	10% (next cycle)	Milk, curd

Stage	Release Condition	Payment %	Applicable For
Ice cream mix aging & freezing	Overrun & sensory approved	20% advance on raw material + 30% on freezing + 30% on dispatch + 20% on delivery	Ice cream (long-credit terms)
Paneer & curd dispatch	Cold chain temperature log verified	90% against invoice, 10% retention	Short shelf-life products
Ghee / butter bulk dispatch	Fat analysis & packing seal	100% against LC / advance (commodity)	Export & bulk B2B

 Ice cream payments are typically 30% advance, 40% against dispatch, 30% after 30-45 days (retail chains).

4. ERP Module Mapping (Dairy Manufacturing)

 **Raw Milk Procurement**

– Farmer / bulk supplier management, milk quality at gate, automatic deduction for fat/SNF variance



Production (Batch Management)

– Pasteurizer log, homogenizer pressure, ageing time, freezer parameters



QA/QC (LIMS) – Fat, SNF, cryoscopy, antibiotic tests, microbial plates, shelf-life simulation



Cold Chain & Warehouse

– Temperature & humidity monitoring, blast freezer scheduling, FEFO for curd/paneer





Packaging & Labelling

– Roll stock, cup, lid inventory, inkjet coding, FSSAI compliance



Logistics TMS – Reefer van assignment, route temperature tracking, retailer POD


 **Finance** – Milk procurement payout (daily/weekly), GST (5% for milk? 12% for ice cream/ghee), export benefits


 **AI & Analytics** – Yield forecasting, spoilage prediction, dynamic pricing, demand sensing


5. AI-Based Dairy & Ice Cream Automation (TicketingOS)

Function	AI Automation
Milk composition prediction	Near-infrared (NIR) sensor at milk intake → AI predicts fat/SNF instantly, auto calculates farmer payment
Spoilage prediction (curd/paneer)	Temperature history + pH trend → AI predicts remaining shelf-life in hours, triggers markdown alert
Ice cream overrun optimisation	AI adjusts freezer air injection for consistent overrun, reducing giveaway (product weight)
Cold chain anomaly detection	Reefer temperature deviation → AI sends SMS to driver, dispatcher, customer – auto logs non-compliance
Butter churning endpoint detection	Sound / torque AI detects when butter grains separate – stops churn at optimum yield
Ghee clarity / moisture vision	AI camera checks ghee colour & sediment before packing → auto reject if turbid
Predictive cleaning (CIP)	AI schedules cleaning cycles based on run hours and product type (ice cream vs milk) to reduce downtime
Demand forecasting for ice cream	Weather + season + day of week + promotion → predicts SKU-wise requirement for distributors
Farmer milk procurement fraud detection	Compares historical fat/SNF pattern, alerts if repeated high water addition suspected
Automatic batch recall	Any quality fail in raw milk batch → AI traces all finished goods (curd/paneer) made from that batch and blocks dispatch

6. Final Dairy & Ice Cream ERP + TicketingOS Architecture

 **Customer / Order Side** : Retailer / Distributor PO → Bulk milk schedule / ice cream batch → Production → Cold storage → Reefer dispatch → Delivery → Settlement


 **Internal ERP Side** : Milk procurement → QA → Pasteurization → Homogenization → Product specific (culturing / freezing / churning) → Packing → Cold chain → Logistics → Finance


 **AI TicketingOS Side** : AI Fat/SNF prediction → AI Spoilage alert → AI Overrun control → AI Cold chain monitoring → AI CIP scheduling → AI Recall traceability


Batch Traceability (FSSAI Mandate for Dairy)

 **Raw milk batch** – Farmer ID, collection time, fat/SNF, antibiotic test result

 **Processing batch** – Pasteurizer run #, time, temperature profile

 **Ice cream batch** – Mix batch, freezing date, overrun %, harden tunnel ID


 **Final pack coding** – Batch number + manufacturing date + expiry printed on each unit (QR optional)

 **Recall ready** – System can trace back from finished product to specific tanker of milk in seconds

Dairy Manufacturing Dashboards

- Milk procurement volume & fat/SNF weighted average
- Pasteurization yield (litres of finished milk vs raw milk)
- Curd / yogurt set failure rate (due to culture activity)

- Ice cream overrun variance (target vs actual)
- Cold chain temperature compliance % (time in range)
- Product shelf-life attainment (actual days before spoilage vs committed)
- Energy & water consumption per kg of product (CIP efficiency)
- Retailer complaint rate (leakage, melt, off-flavour)

 Ice Cream & Dairy Manufacturing ERP – Fully integrated with batch traceability, cold chain AI, and FSSAI compliance.
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