Made Fresh For You

Manufacturing process of **Yakult**

What is Yakult?

Yakult is a fermented milk drink containing our unique probiotic bacteria, the ***Lacticaseibacillus paracasei*** **Shirota (LcS)**.

How Yakult is Made

- Yakult is produced in a purpose-built factory incorporating the state-of-the-art manufacturing processes, equipment and on-site Quality Control Laboratory.
- Yakult production uses a variety of lean management strategies, including forecasting, takt time, automated one-piece flow production, and 5S workplace organisation, to optimise efficiency, reduce waste, and meet customer demand.
- More than 450,000 bottles are produced daily to supply both Australian and New Zealand markets.

1 Quality Control (QC)

- QC activities involve sampling, testing and inspection of the product, bottles and packaging - confirming that the Quality Assurance (QA) measures have been effective.
- Individual bottles are routinely inspected along the production line to check for incorrect printing, undesirable markings and lid sealing.
- Raw ingredient samples are tested for quality prior to purchasing a batch.
- The high quality of Yakult is ensured through an extensive variety of tests that include microbiological quality, composition and taste. Once approved, the product is ready to be released to stores.
- More than 100 tests are conducted for every batch of Yakult created.

QC testing is conducted throughout products' shelf life, including:

1. Specific Gravity – measures the density of ingredients in Yakult throughout production.
2. Brix – measures the total soluble solid content (i.e. sugars in Yakult) using a refractometer.
3. Titratable Acidity – measures the level of acid development in the product and is used to monitor growth conditions of *Lacticaseibacillus paracasei* Shirota (LcS).
4. Microbiological tests – measures the number of LcS within the samples and ensures negligible to zero levels of contaminating bacteria.

2 Dissolving and Sterilisation

- Water used is filtered by reverse osmosis to remove the trace components.
- Skim milk powder, sucrose and dextrose are blended with the filtered water and produce a batch of milk which is then sterilised using High Temperature Short Time (HTST).
- HTST takes place at a high temperature for a short time and kills any bacteria potentially present.
- The high temperature used for sterilisation also produces Yakult's natural colour as milk proteins and sugar undergo Maillard reaction.

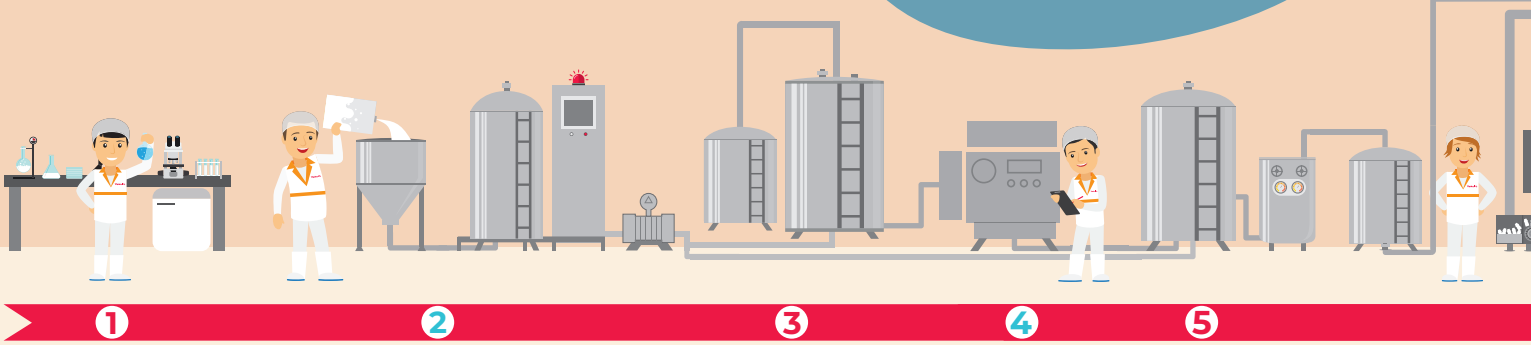
Raw Ingredients

Each 65ml bottle of Yakult contains:

- 6.5 billion live LcS
- Skim milk powder
- Sugar – sucrose and dextrose
- Flavouring
- Water

Yakult LIGHT contains less sugar than Yakult Original.

Yakult LIGHT is bottled and packaged on the same production line at a different time or day to Yakult Original.



3 Yakult Culturing & Fermentation

- Once the milk solution is prepared, it is transferred to a fermentation tank through a closed system of pipes and valves, where the temperature is lowered to an appropriate level.
- After inoculating the milk solution with the LcS starter culture, the bacteria multiples during the fermentation process.
- LcS performs fermentation on the milk solution to break down lactose, the predominant carbohydrate in milk, into lactic acid, which produces energy for the bacteria.

4 Homogenisation

- Following the fermentation period, the milk solution undergoes homogenisation, a process where the fermented milk is passed through a structure with small holes under high pressure to create a smooth consistency.

5 Blending, Mixing & Storage

- After blending the fermented milk solution with a unique flavour, the mixture is transferred to a large storage tank containing sugar syrup, which creates the Yakult concentrate.
- The Yakult concentrate is then chilled and mixed with filtered, sterilised water.
- The final Yakult product is now ready to be bottled.

6 Bottle Making and Storage

- Yakult's unique-shaped plastic bottles, made from triple food grade polystyrene code 6 recyclable pellets, are produced on-site using injection blow-moulding machines.
- Pellets are melted and injected under pressure onto core rods.
- Filtered sterile air is blown through each core, into the mould creating the bottle's shape.
- Each of the 3 machines on-site can produce up to 11,000 bottles per hour.
- The empty bottles are then transported by air pressure to the bottle storage tanks, which can hold over one million bottles until they are ready to be labelled, filled, capped, and sealed.

7 Bottle Filling, Capping and Sealing

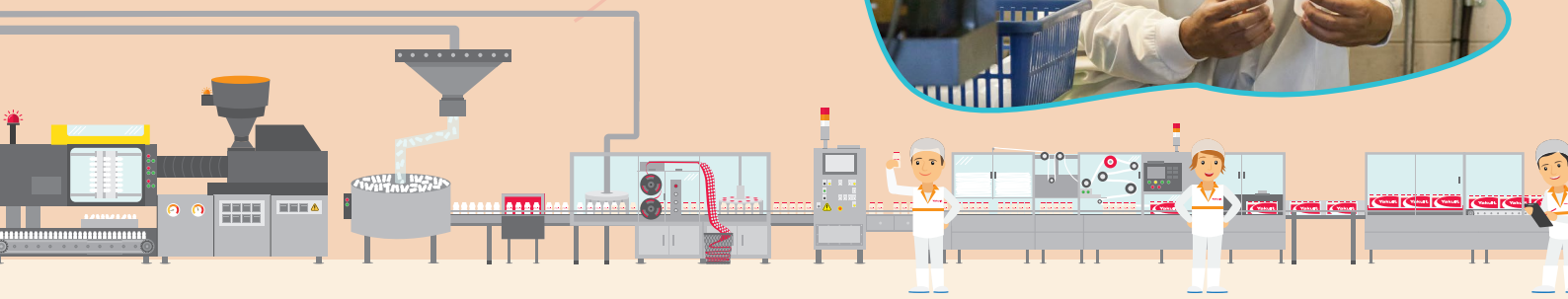
- Empty bottles are unscrambled by a machine and placed upright on the filling line, forming a continuous line.
- Labels are printed on the Yakult bottles with quick drying, non-toxic red ink, while Yakult LIGHT bottles have a film wrap that is heated to shrink onto the bottle.
- The use-by date and batch code are printed on the waist of each bottle.
- After filling with 65ml of fresh Yakult, each bottle is capped with a foil lid and sealed by a high frequency oscillator before travelling via a conveyor belt to the packaging area.
- The bottling line can produce 45,000 bottles per hour.

8 Control Panel

- Yakult's automated production is managed by Computer Integrated Manufacturing (CIM), which controls the production line through a control panel.
- Information such as bottle count, capacity and operating time is retrieved from the panel.

9 Packaging

- After being sorted into groups of five or ten, bottles of Yakult are wrapped in polypropylene film and rapidly passed through a heat tunnel to tightly seal the packaging.
- The wrapped bottles are automatically combined to form slabs of 50 bottles each, which are wrapped in polyethylene film and heat shrunk.
- The packages are checked to ensure they meet the quality control standards.
- A robotic arm stacks the slabs onto pallets, which are then stored chilled.



Robotic arm

- Yakult pallets are stacked in preparation for distribution, with a fully stacked pallet containing 8,400 bottles of Yakult completed in just 15 minutes.
- Once completed, a forklift is used to transfer the pallet to the cold storage facility.

10 Cold Storage

- Yakult pallets are placed on automated moving racks and are stored below 4°C.
- The automated moving racks can hold over 300 pallets of Yakult, effectively optimising space by minimising the gaps between shelving racks until forklift access is required.
- The installation of energy-efficient LED lighting is integrated and synchronised to turn on and off with the moving racks. Therefore, only the rows of lights over open aisles turn on when in use.

11 Quality Assurance (QA)

QA measures maintain excellence in:

- Personnel and factory hygiene standards.
- Equipment cleaning.
- Processing methods.
- Product handling.
- Purchasing raw materials.
- Food hygiene training for staff.
- The provision of equipment and premises.

QA utilises 'Hazard Analysis and Critical Control Points' (HACCP) principles, an internationally recognised program for achieving food and public health specifications. The entire manufacturing process is controlled to identify possible hazards and to implement hazard prevention measures.

Yakult also complies with the requirements of the International Organisation of Standardisation (ISO 9001:2015).

- ISO covers the quality management for the manufacturing, sale, and distribution of fermented milk products, ensuring our products and services meet the highest international food manufacturing standards.
- To maintain this certification, all company procedures are documented and are subject to routine auditing by external groups.

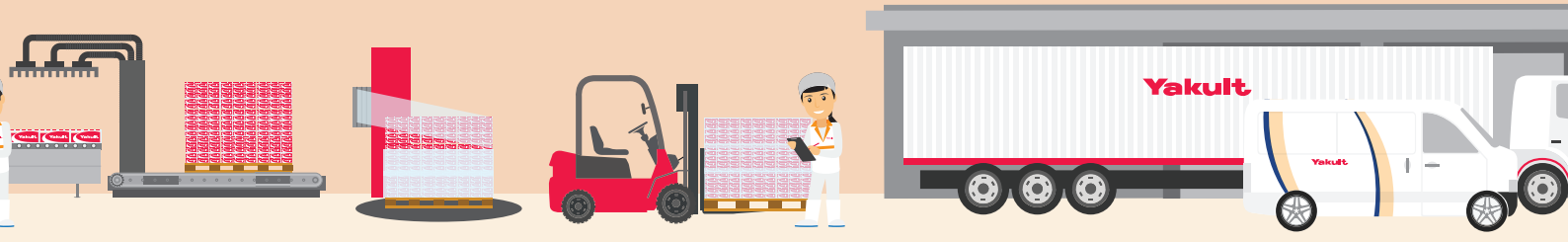
12 Cold Chain Distribution

Once Yakult is ready to leave the factory, it is distributed through the following methods:

1. Corporate Delivery: Refrigerated trucks deliver Yakult to major warehouse for Coles, Woolworths, and regional areas.
2. Route Delivery: Yakult Sales Consultants use refrigerated vans to deliver Yakult directly to independent supermarkets, Asian grocers, and other outlets.
3. Refrigerated transportation is utilised for interstate and overseas distribution, including delivery to New Zealand.

Material Management Strategies

- Forecasting is used for overall production of Yakult, relying on past and present sales data. Forecasting helps predict future material demand, enabling better planning and inventory management. Accurate demand forecasts facilitate timely procurement and prevent material shortage or excess.
- Material Requirements Planning (MRP) is utilised to manage materials and production schedules based on demand forecasts. It ensures the availability of materials at the right time and in the right quantities.
- Master Production Schedule (MPS) is a comprehensive plan that determines the quantity and timing of production for each item to meet customer demand while optimising resources and maintaining inventory levels.



Did you know there are more than 100 trillion bacteria throughout the human digestive system?

What are Probiotics?

Probiotics are defined as live microorganisms which, when consumed in adequate amounts, provide a health benefit to the host. Strains belonging to the Lactobacilli and Bifidobacteria species are the most extensively studied probiotics in medicines and foods, including fermented milk drinks and yoghurts. Probiotics must meet safety standards for human consumption, be non-pathogenic, and have demonstrated health benefits.

The Shirota strain:

- Is highly acid resistant, surviving the journey through the digestive system.
- Arrives alive in the small intestines.
- Helps maintain the balance between beneficial and potentially harmful bacteria present in our digestive system.
- Encourages the growth of beneficial bacteria in the intestines such as Lactobacilli and Bifidobacteria.
- Suppresses the growth of potentially harmful bacteria that produce substances detrimental to our health.
- Improves digestive balance and intestinal health by promoting bowel regularity.

What's in Yakult?

Every 65ml bottle of Yakult contains 6.5 billion live ***Lacticaseibacillus paracasei* Shirota (LcS)**.

The strain is cultured under precise conditions and rigorously tested to ensure high numbers of 'Colony Forming Units' throughout all stages of the manufacturing process.

What's in a name?

- ***Lacticaseibacillus*** – Genus, like a big family that groups together similar bacteria.
- ***paracasei*** – Species, like a first name that helps us differentiate between different bacteria within the same genus.
- **Shirota** – Strain, like a special nickname that helps us distinguish between different types of the same bacterial species. Since this strain was discovered by our founder, Dr Minoru Shirota, the Shirota strain is named in his honour.

Each millilitre of Yakult contains 100,000,000 *Lacticaseibacillus paracasei* Shirota (LcS).

Cleaning and Sanitising

- Cleaning and sanitising are vital to maintaining hygienic manufacturing equipment.
- Yakult follows a comprehensive cleaning program called 'Cleaning in Place' (CIP).
- Cleaning removes visible soiling from surfaces and is performed using biodegradable detergent solutions in conjunction with heat, scrubbing, high-flow circulation, or foaming.
- Cleaning foam is sprayed on all floor surfaces at the end of each day.
- Sanitising kills any bacteria remaining on surfaces after cleaning.
- Steam is used to sterilise the pipe system and tanks.
- Food-grade chemicals are used in specific areas.
- A sanitising spray is used around equipment in the bottling area and for staff hand hygiene.

Waste Management and Recycling

- Effective waste management strategies contribute to a cleaner and less wasteful facility. 99% of Yakult's raw ingredients end up in the bottle, leaving no by-products.
- Cleaning waste is processed in the on-site water treatment facility.
- The acidity/alkalinity of collected water is adjusted, if necessary, to meet Melbourne Water standards.
- The high temperature used for sterilisation also produces Yakult's natural colour as milk proteins and sugar undergo Maillard reaction.
- Recycling of packaging materials takes place where it is economically and environmentally viable:
  - Paper products, such as skim milk powder bags, are recycled.
  - Bottles can be collected for recycling and crushed. They are then mixed with other resin to create repurposed products, such as chairs and tables.

Energy Management

Yakult is committed to minimising environmental impact and incorporates energy-efficient practices, including:

- Keeping equipment well-maintained.
- Heating liquids with heat exchange plates to minimise energy loss or waste.
- Avoiding the use of chlorofluorocarbons (CFCs) in cooling or refrigeration.
- Utilising off-peak rates for utilities whenever possible.
- Employing a natural gas boiler for short periods, which does not pollute the air.
- Using LED lights.
- Installing inflatable insulated curtain panels in the Cool Storage Room to reduce cold air escaping while loading Yakult onto trucks.
- Utilising movable storage shelves in the Cool Storage Room to store Yakult pallets closer together, resulting in reduced cooling requirements.

Ethical and Social Responsibilities

- Staff regularly undergo training to ensure appropriate operation of machinery.
- Regular hearing checks for production workers.
- Community involvement in public education services.
- Health professional scientific communication.
- Commitment to waste reduction.
- Supporting local Australian industries by sourcing local ingredients.
- Corporate sponsorship.
- Conducting free-of-charge educational tours of the factory.

Yakult

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