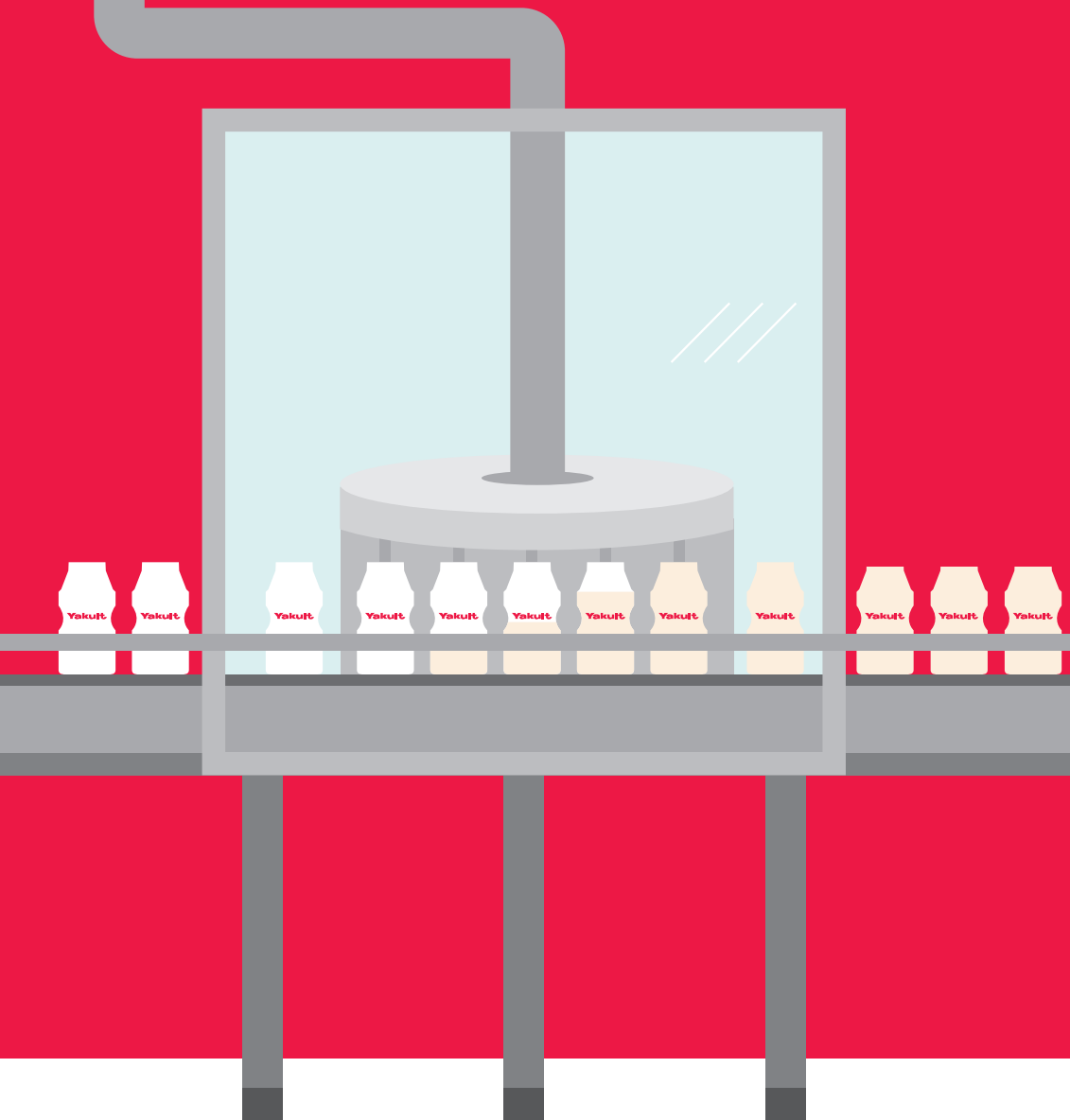


Made fresh for you

Manufacturing process of **Yakult**



What is Yakult?

Yakult is a fermented milk drink containing our unique probiotic bacteria, the *Lactobacillus casei* Shirota strain.

www.yakult.com.au

How Yakult is Made

- Yakult is produced in a purpose built factory incorporating the latest state-of-the-art manufacturing processes, equipment and on-site Quality Control Laboratory.
- Production of Yakult is managed using the just in time (JIT) system.
- The method of making Yakult uses an automated one way process to transfer Yakult through a closed system of pipes, valves and filters. This provides protection from potential contaminants.
- Strict sterility and hygiene controls apply for the factory and staff.
- 300,000 – 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 randomly inspected along the production line to check for incorrect printing, undesirable markings and lid sealing.
- Approximately 100-200 product samples are collected and tested for every batch of Yakult created.
- 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.

QC testing includes more than 200 assessments comprising:

1. Specific Gravity – measures the density of a liquid using a density meter.
2. Brix – measures the sugar concentration of foods using a refractometer.
3. Titratable Acidity – measures the level of acid development in the product and is used to monitor growth numbers of *Lactobacillus casei* Shirota Strain.
4. Microbiological tests – measures the number of the *Lactobacillus casei* Shirota strain within the samples and ensures negligible to zero levels of contaminating bacteria.

Raw Ingredients

Each 65ml bottle of Yakult contains:

- 6.5 billion live *Lactobacillus casei* Shirota strain
- Skim milk powder
- Sugars – 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.

2 Dissolving and Sterilisation

- Water used is filtered by reverse osmosis to remove the chlorides and flourides, it is then sterilised using ultraviolet light and stored in a 25,000 litre holding tank.
- Skim milk powder, sucrose and dextrose are blended with the sterilised water to produce a batch of milk which is then sterilised using High Temperature Short Time (HTST).
- HTST takes place at a high temperature (above 100°C) 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 sugars undergo a caramelisation reaction.



3 Yakult Culturing and Fermentation

- The milk solution is transferred via a closed system of pipes and valves to a fermentation tank where the temperature is decreased to 37°C.
- A starter culture of the *Lactobacillus casei* Shirota strain is inoculated into the milk solution. The bacteria multiplies during the fermentation process until ideal numbers are reached.
- Fermentation is a chemical reaction which bacteria perform to break down carbohydrates, in order to release energy. In this process the *Lactobacillus casei* Shirota strain produces lactic acid from the breakdown of lactose, the predominant form of carbohydrate in milk.

4 Homogenisation

- After the fermentation period, the milk solution undergoes a process known as homogenisation. The fermented milk is placed under high pressure while passing through a structure with small holes creating a smooth consistency.

5 Blending, Mixing and Storage

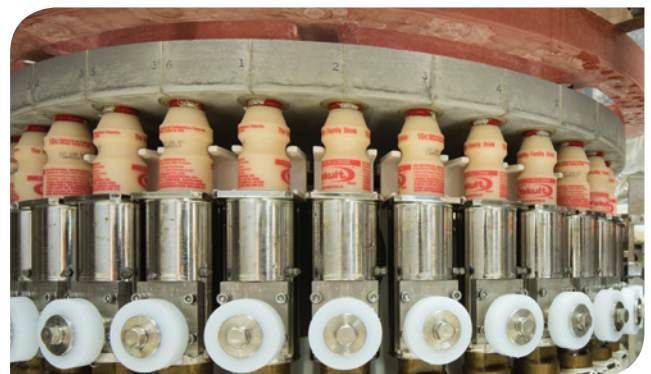
- The fermented milk solution is then blended with a citrus flavour and is transferred to a large storage tank containing sugar syrup, creating Yakult concentrate.
- 'Yakult concentrate' is chilled to below 4°C and is then mixed with equal amounts of filtered, sterilised water.
- The final product of Yakult is now ready to be bottled.

6 Bottle Making and Storage

- Yakult's unique-shaped plastic bottles are produced on-site from triple food grade polystyrene code 6 recyclable pellets using injection blow-moulding machines.
- Pellets are melted and injected under pressure onto 'core' rods.
- Cool sterile air is blown through each 'core', into the mould creating the bottle's shape.
- Each of our 3 machines can produce 11,000 bottles per hour.
- Sterile air transports the empty bottles to 1 of 2 750,000 capacity storage tanks where they are kept until ready to be labelled, filled, capped and sealed.

7 Bottle Filling, Capping and Sealing

- Empty bottles are released from the storage funnel into a 'selector' machine, which places the bottles in an upright position before being released onto the filling line.
- Bottles travel along in one continuous line and are printed with required label information. A quick drying, non-toxic, red ink is used to label the Yakult Original bottles. Yakult LIGHT has a label film covering the outside of the bottle, which is heated to shrink the film wrap directly onto the bottle.
- The use-by date and batch code is printed on to the waist of the bottle.
- Bottles are filled with 65ml of fresh Yakult, capped with a foil lid which is electromagnetically sealed before travelling via a conveyor belt to the packaging area.
- The bottling line has the capacity to produce between 40,000 – 45,000 bottles an hour.



8 Control Panel

- The automated processes and production of Yakult is managed by Computer Integrated Manufacturing (CIM).
- The automated production line is controlled through the control panel.
- Information retrieved from the control panel includes, bottle count, capacity and operating time.

9 Packaging

- Two packaging lines sort bottles of Yakult into groups of five or ten, which are wrapped in polyethylene film.
- The bottles quickly pass through a heat tunnel creating a tight wrap around the Yakult packages.
- Packages are then automatically grouped together to form a 'slab' of 50 bottles, wrapped in polyethylene film and heat shrunk.
- Packs are checked to ensure they pass quality control.
- Slabs are stacked onto a pallet by a robotic arm and stored between 0-4°C.



Robotic arm

- Pallets of Yakult are stacked in preparation for distribution
- The robotic arm takes 3 seconds to pick up 3 slabs of Yakult and place them on a pallet
- In 13-15 minutes a fully stacked pallet of Yakult is completed containing 8,400 bottles
- The pallet is then wrapped in a clear film and cardboard corners are included for stabilisation
- A forklift then transfers this 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 are capable of holding 330 pallets of Yakult.
- This innovative racking system is the first of its kind in Australia, minimising the space between shelving racks until forklift access is required.
- This storage method reduces the energy otherwise required to cool a storage facility of this size.
- 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.

Quality Management System (QMS)

- Yakult's QMS complies with the requirements of the International Organisation for Standardisation (ISO 9001:2008).
- ISO covers the QMS for the manufacturing, sale and distribution of fermented milk products and ensures 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.

Possible Physical Contaminants	Important Preventative Measures
Objects dropped into product from factory personnel	Wearing protective hair nets and beard nets if applicable to enclose all hair. No jewellery or loose objects on the outside of clothing. No top pockets on uniforms.
Objects dropped into product from manufacturing equipment	Ensuring external factory doors remain closed when not being used. Reporting any possible equipment maintenance problems to supervisors.
Insects or pests	Having insect or pest control at the factory boundaries.
Residue from cleaning or maintenance chemicals	Ensuring that all cleaning procedures are followed accurately to prevent cleaning chemicals from remaining in equipment.

12 Cold Chain Distribution

Once Yakult is ready to leave the factory, it is distributed by:

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



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

Lactic Acid Bacteria (LAB)

LAB are beneficial bacteria associated with digestive balance. LAB utilise lactose to produce lactic acid that:

- Promotes food preservation – lactic acid helps minimise numbers of detrimental bacteria, prolonging shelf life.
- Provides flavour and taste – lactic acid produces the characteristic sour taste of fermented milk drinks, yoghurts and other foods.
- Promotes health – lactic acid assists in preventing the growth of detrimental bacteria and production of damaging substances in the intestines.
- Assist in regulating bowel activity – lactic acid stimulates bowel movement to assist with food digestion and nutrient absorption.

What are Probiotics?

A probiotic is defined as a live microorganisms which, when taken in adequate amounts, provides a health benefit to the host. Strains belonging to the Lactobacilli and Bifidobacteria species are the most widely researched probiotic in medicines and foods such as fermented milk drinks and yoghurts. Probiotic bacteria is required to be safe for human consumption, be non-pathogenic and have proven health benefits.



What's in Yakult?

Every 65ml bottle of Yakult contains 6.5 billion live ***Lactobacillus casei*** Shirota strain.

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

What's in a name?

- **Lacto** – a bacteria's ability to ferment sugars to produce lactic acid
- **bacillus** – distinctive rod-shape
- **casei** – from casein, a protein found in dairy products
- **Shirota strain** – discovered by our founder, Dr Minoru Shirota, and named in his honour

Specifically the *Lactobacillus casei* Shirota strain:

- Is highly acid resistant surviving the journey through the digestive system
- Arrives alive in the small intestine
- Helps maintain the balance between other beneficial and potentially harmful bacteria
- Encourages the growth of beneficial bacteria in the intestines such as Lactobacilli and Bifidobacteria
- Suppresses bacteria that produce substances which are detrimental to our health



Cleaning and Sanitising

- Cleaning and sanitising are vital to maintain 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 and 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 sanitise the pipe system and tanks.
- Food grade chemicals are used in particular 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 – 99.5 % of Yakult's raw ingredients end up in the bottle. There are no by-products.
- Cleaning waste is processed in the on-site water treatment facility.
- The acidity/alkalinity of collected water is adjusted, if required, to meet Melbourne Water standards.
- Recycling of packaging materials occurs where it is economically and environmentally viable:
 - Paper products such as skim milk powder bags are recycled.
 - Bottles can be collected for recycling. They are able to be crushed and mixed with other resin to be repurposed into products such as chairs and tables.



Each millilitre of Yakult contains
100,000,000 **Lactobacillus casei**
Shirota strain bacteria.



Energy Management

Yakult is aware of minimising environmental impact and incorporates energy efficient practices such as:

- Keeping equipment well maintained
- Heating liquids with heat exchange plates so that energy is not lost or wasted
- Not using chlorofluorocarbons (CFC) in cooling or refrigeration
- Using off peak rates for utilities where possible
- Using a natural gas boiler for short periods which does not pollute the air
- Use of LED lights

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
- A signatory of the Australian Packaging Covenant
- Supporting local Australian industries by sourcing local ingredients
- Corporate sponsorship
- Conducting free of charge educational tours of the factory

Yakult

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