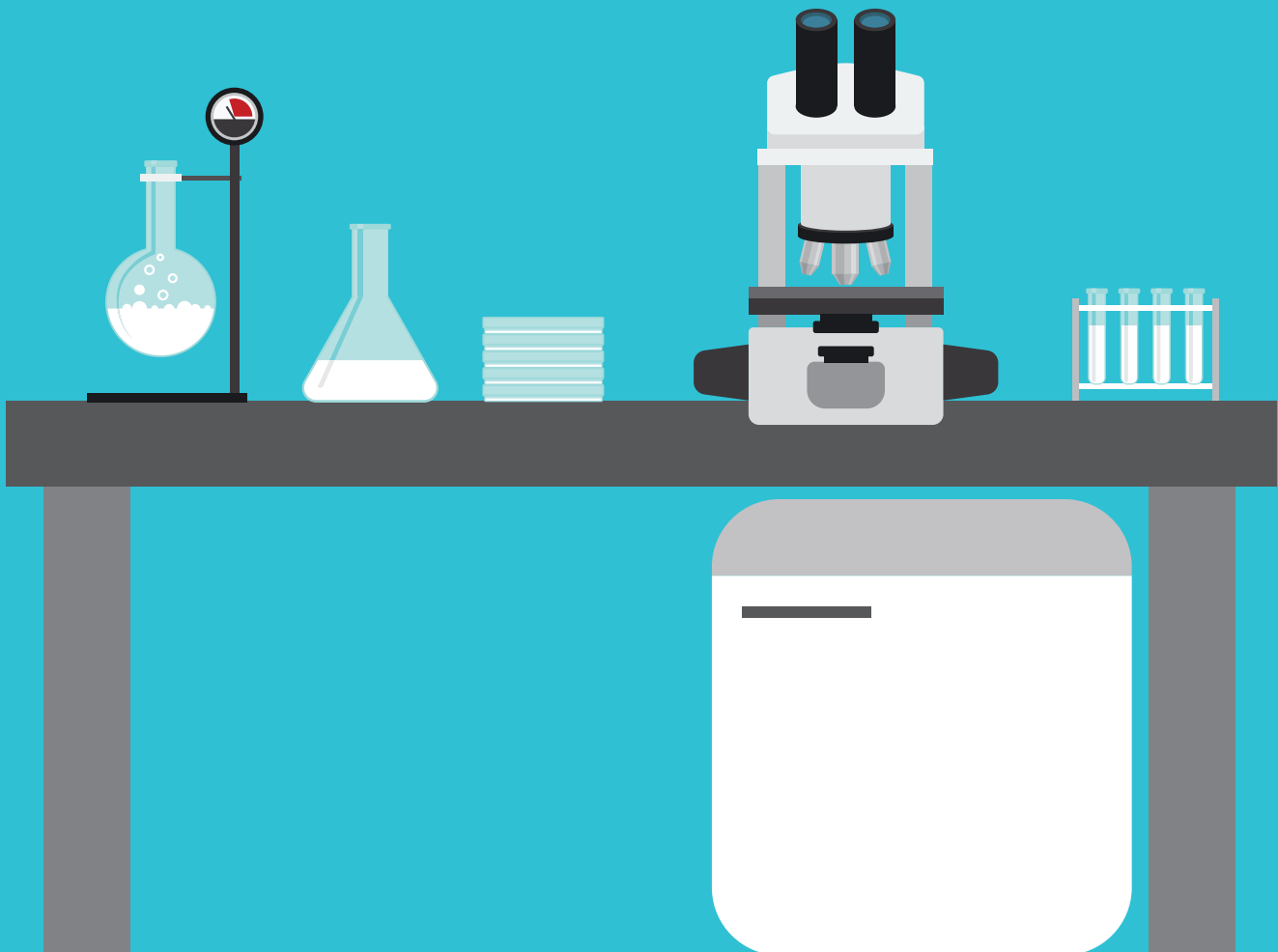


Under the Microscope



What is Yakult?

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

Yakult

www.yakult.com.au

Bacteria We Want

Bacteria play important roles in many aspects of our daily lives. Some are useful and help produce medicines, foods and drinks while others can cause illness or decay.

Useful bacteria include:

- *Lactobacillus bulgarius* – bacteria that turns milk into yoghurt. (lack-toe-bah-sill-us bul-ger-ri-us)
- *Streptomyces* – bacteria from soil used to make streptomycin, an antibiotic used to treat infections. (strep-toe-my-seas)
- *Pseudomonas putida* – one of the many microorganisms used at water treatment plants to clean wastes from sewage water. (sue-doe-moan-us-poo-tea-dah)

Fermented Foods:

- Used for thousands of years as a safe way to store perishable food
- Part of traditional diets in many countries, with evidence that fermented products such as beer, cider, vinegar and soy sauces date back to 4000 BC

Fermentation:

- Chemically converts carbohydrates into alcohol and acids via microorganisms such as bacteria, yeasts and moulds
- Is used to create lactic acid in sour foods such as pickles, sauerkraut, yoghurts, sour cream and fermented milk drinks
- Helps preserve meats such as salami and prosciutto

Fermented foods are popular not just because of their taste and flavour, but also for prolonging shelf-life, nutritional value and health promoting properties. Fermentation has five main roles in food production:

1. Developing flavour, texture and aroma
2. Preserving
3. Improving nutrient availability
4. Inhibiting undesirable microorganisms
5. Reducing cooking time

The fermentation process changes the physical and chemical properties of the original food and has been shown to improve the digestibility of carbohydrates and proteins, as well as increasing the levels of some vitamins and the availability of certain minerals.



Examples of fermented food

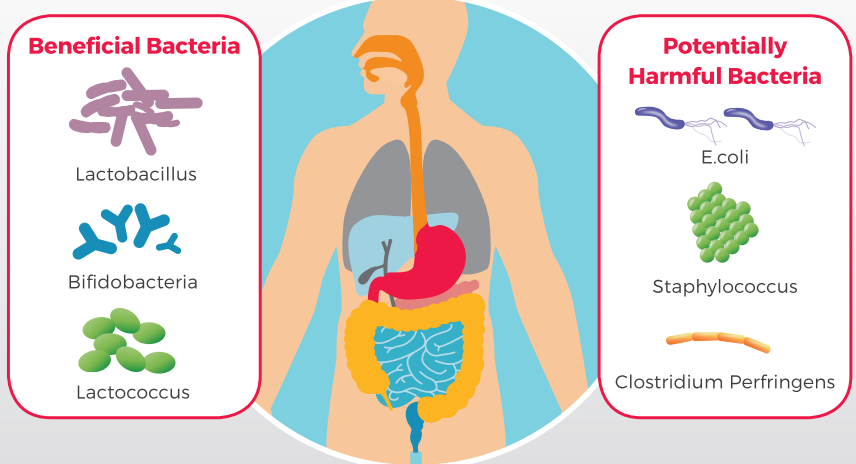
Lactic Acid Bacteria

- Lactic Acid Bacteria (LAB) were discovered by Louis Pasteur in 1857 and are recognised as beneficial bacteria closely associated with digestive balance.
- Elie Mechnikov discovered 'healthy bacteria' in 1908 and developed a theory that ageing is caused by toxic bacteria in the gut and concluded that lactic acid could prolong life. Based on his theory, he drank sour milk every day.
- The term Lactic Acid Bacteria refers to bacteria that utilise sugars, such as glucose or lactose, to produce lactic acid via fermentation.

Microbes for Intestinal Health

Bacteria play a vital role in the digestive system; without them, our systems would not function correctly. The key to optimal digestive function is maintaining 'digestive balance' so numbers of beneficial bacteria outnumber those that are potentially harmful.

Digestive balance can be disrupted by a number of lifestyle factors which deplete the number of beneficial bacteria in the digestive system. These include stress, an unbalanced diet, the natural ageing process and some medications, particularly antibiotics. Digestive imbalance is associated with a range of undesirable digestive symptoms and some digestive disorders.



Beneficial bacteria play a number of important roles in the digestive system including:

- Helping to control the numbers of potentially harmful microorganisms and the toxins they produce
- Regulating bowel movements
- Assisting with digestion and absorption of food
- Synthesising vitamins
- Producing short chain fatty acids
- Stimulating the immune system



What is in Yakult?

Every 65ml bottle of Yakult contains 6.5 billion live *Lactobacillus casei* Shirota strain. The strain is cultured under precise conditions and rigorously tested to ensure high numbers of 'Colony Forming Units' (or the number of bacteria present) are present through all stages of manufacturing.

What are Probiotics?

Probiotics are defined as live microorganisms that, when taken in adequate amounts, provide a health benefit to the host. The benefit of a probiotic is specific to that strain of bacteria. Strains belonging to the Lactobacilli and Bifidobacteria species are the most widely researched probiotic species. Probiotics are available from a number of different sources including fermented milk drinks, yoghurts, capsules and powders.

What's in a name?

- Lacto- relating to milk or in chemistry term, lactic acid
- bacillus- distinctive rod shape
- casei- from casein, a protein found in dairy products
- Shirota- name of the strain discovered by Yakult's founder, Dr Minoru Shirota, and named in his honour

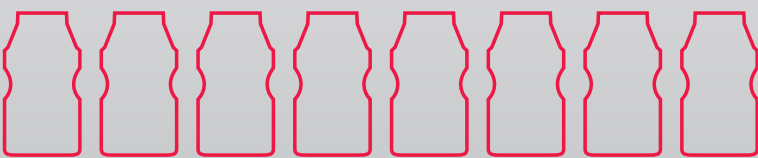
To be considered 'probiotic' these bacteria must meet strict scientific criteria such as being:

- Safe for human consumption
- Able to survive the:
 - Production process
 - Product shelf life
 - Journey through the strong digestive juices to reach the intestines alive
- Alive and viable in the final product
- Present in the final product at a high concentration
- Able to confer a health benefit which has been substantiated by research

- Lactobacillus casei Shirota strain:**
- Is rod shaped and approximately 0.5 µm in diameter and 2.0 µm in length
 - Produces lactic acid as the predominant product of fermentation when grown in a suitable medium with glucose and lactose as the major carbohydrate source
 - Is highly acid resistant and able to survive the journey through the gastric juices and bile to arrive alive in the small intestine, where it helps to maintain the balance between beneficial and potentially harmful bacteria
 - Encourages the growth of beneficial bacteria already present in the intestines
 - Suppresses the growth of harmful bacteria and the toxins they produce



Lactobacillus casei
Shirota strain



Yakult's Quality Control (QC)

QC activities involve sampling, testing and inspection of the product, bottles and packaging. This confirms 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.

More than 100 tests are conducted for every batch of Yakult created.

Raw ingredients 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 is conducted throughout products' shelf life, including:

1. Specific Gravity - measures the density of samples throughout production to ensure the ingredients are mixed properly.

2. Brix - measures the total soluble solid content (i.e. sugars in Yakult) using a refractometer to ensure the palatability of Yakult.

3. Titratable Acidity - measures the level of acid development in the product and is used to monitor growth in numbers of *Lactobacillus casei* Shirota strain.

4. pH Meter - measures the pH throughout the fermentation process as well as the final product.

5. Lactobacillus Enumeration - measures the number of live Shirota strain at the end of the fermentation process and throughout the product life cycle. Samples are systematically diluted, plated on selective agar and then incubated under specific conditions. The colony forming units (CFU's) are then counted to determine the number of live Shirota strain in a sample.

6. Standard Plate Count (SPC) - indicates the presence and level of any contaminating bacteria in samples collected throughout the manufacturing process and final product by using a non-selective agar. SPC is also known as Total Plate Count (TPC) or Total Viable Count (TVC).

7. Yeast and Mould - detects potential contaminating species of yeasts and/or moulds by plating samples on a selective agar and incubating under specific conditions.

8. Coliforms - coliform count is used as a hygiene indicator. Detection of coliforms generally indicates poor hygiene practices during food production. Yakult has a zero tolerance of coliforms in all samples.



Hygiene

Hygiene is a key element in the successful operations of the Yakult factory. It is essential that our product is free from contaminants, physical and microbiological, in order to protect the quality of the product and the health and safety of consumers.

Possible Physical Contaminants

- Objects dropped into products from personnel
- Pieces from manufacturing equipment
- Residue from cleaning or maintenance chemicals

Important Preventative Measures

- Wear protective hair nets and beard nets, if applicable, to enclose all hair
- No jewellery or loose objects on the outer clothing
- Report any possible equipment maintenance problems to supervisors
- Ensure all cleaning procedures are followed accurately

Possible Microbiological Contaminants

- Bacteria
- Fungi
- Viruses

Important Preventative Measures

- Wash hands thoroughly before entering manufacturing areas
- Wear clean protective clothing
- No food, drink or smoking in manufacturing areas
- Have sanitising footbaths at factory entrances
- Thoroughly clean and sanitise all processing equipment before and after use

Extensive sampling and testing throughout all stages of manufacture enable Yakult Australia to ensure:

- Production of consistently high quality products
- Absence of contaminating yeasts, moulds and coliforms
- Presence of probiotic bacteria - at least 6.5 billion *Lactobacillus casei* Shirota strain in each bottle

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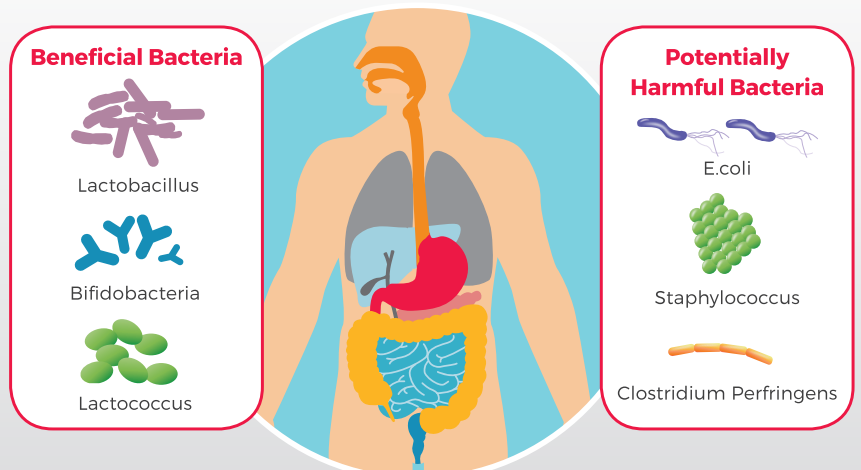
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Food Safety

The Australian New Zealand Food Standards Code incorporates legislation associated with the production, labelling and marketing of foods in Australia. The Code also covers food safety information and current procedures for food handling - from the handling of raw ingredients right through to consumption.

Yakult's manufacture requires documented precautions and procedures to ensure the product is not subject to any hazards that might compromise its safety, hence the use of Hazard Analysis and Critical Control Points (HACCP).



HACCP

- Identifies potential risks at every point of manufacture
- Prevents and controls potential risks
- Implements corrective action
- Monitors all processes

At Yakult, our commitment to quality extends to transportation. We ensure the cold chain is uninterrupted and the temperature in Yakult's refrigerated vans and transport delivery vehicles is between 0-4°C.

There are 7 principles of HACCP

1. Conduct a hazard analysis

Identify all potential hazards that may occur during production. These hazards may be physical, chemical or biological.

2. Determine the Critical Control Points (CCPs)

Determine where control points can be applied and are essential to prevent, eliminate or reduce an identified hazard to an acceptable level.

3. Establish critical limits

Set measurable standards for each CCP.

4. Monitor Critical Control Points

Establish regular or scheduled monitoring of each CCP.

5. Corrective action

Actions to be taken when monitoring indicates that a CCP is not under control.

6. Verification of HACCP plan

Confirms that the HACCP system is working effectively and as planned.

7. Documentation and record keeping

Keeping all information regarding procedures and reports appropriate to HACCP. Documentations are audited by external auditors every year.

Yakult

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