

ACTIVITY EXAMPLE



Cambridge
High School

KEY WORDS

pH | acids & bases | temperature | dairy | milk | cheese |
cheesemaking | pasteurisation | protein | fat | weight | mould |
microbes

ALSO USEFUL FOR

Business studies | Food Technology | Agriculture | Agribusiness | Maths

PROGRAMME OUTLINE

3 POINTS OF CONTACT

- Staff come into classroom (x2)
- Workplace visit (x1)

EXAMPLE

1. Staff come into classroom, introduce themselves, background to cheesemaking, their careers and how science is used in the industry.
2. Workplace visit. Students see the Fonterra factory 'behind the scenes', meet various Fonterra staff and cheese tasting session.
3. Staff come into classroom. **Student Activity:** make mozzarella.



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About Me

- Born & raised in Waikato, grew up on dairy farms
- Moved to Palmerston North in 2002
- Studied at Massey University & University of Idaho



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About Me

- May 2012 started working at Fonterra Hautapu as a Cheese Technologist
- Feb 2018 I was a cheese judge at the NZ cheese awards



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ACTIVITY EXAMPLE



What is Fonterra?

WE'RE A WORLD-LEADING DAIRY EXPORTER, SHARING THE GOODNESS OF DAIRY WITH THE WORLD.

PROCESSING

We processed more than 23.7 billion litres of milk*

23.7 billion

WORLD'S LARGEST DAIRY EXPORTER

EXPORTS

We have products in over 140 markets

140

*As at 31 July 2016

FARM

- We have 10,000 New Zealand Farming Families who own Fonterra.
- We collect 30 billion litres of milk in New Zealand, and 5 billion litres across the rest of the world.

MILK COLLECTION

- A milk tanker can hold about 25,000 litres of milk.
- At peak, more than 500 milk tankers collect up to 85 million litres of milk per day.

MANUFACTURING

- We have 11 manufacturing sites in New Zealand, with extensive processing capacity in the Middle East, Sri Lanka, Malaysia, Australia and South America.
- We have the largest plant in the world, capable of processing 200,000 litres of milk every hour.

INGREDIENTS

- Our natural ingredients can be made straight from milk, in one day rather than a couple of months taken in conventional processes.
- Our ingredients are used in various products, from baby formula to specialised products for sports and nutritional beverages.

CONSUMER AND FOODSERVICE

- Our new macadamia plant creates enough cheese to top more than 300 million pizzas a year.
- We have leadership positions in our consumer and foodservice business in key categories in New Zealand, Malaysia, Sri Lanka and China.

MILK COLLECTION

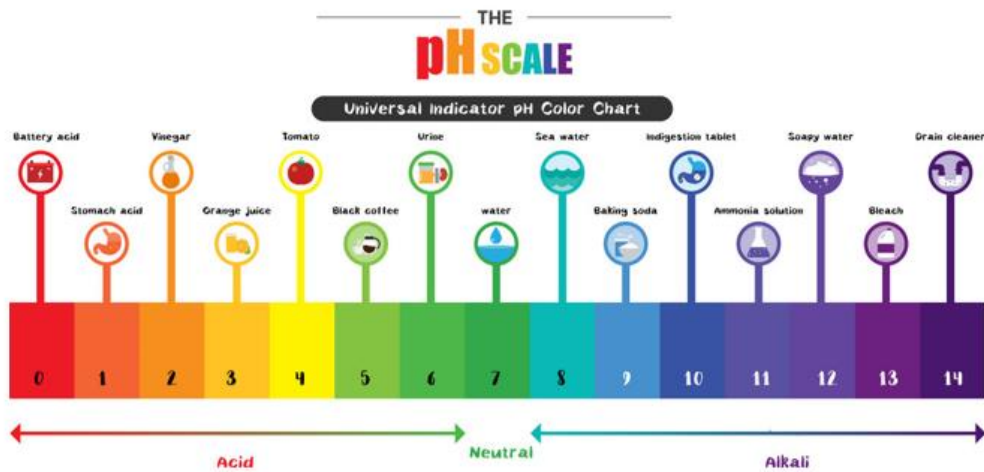
We collect 85% of the milk in New Zealand*

85%

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Where does milk sit on the pH scale?



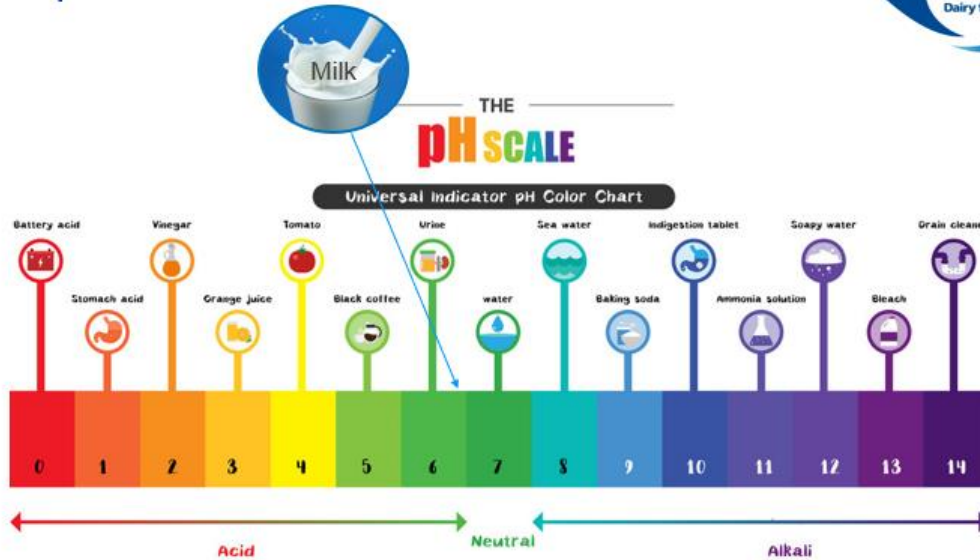
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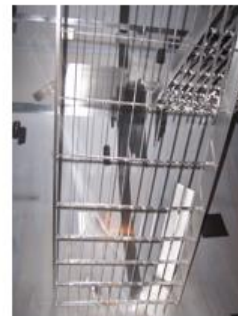
Milk pH 6.5-6.7



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How to make cheese

- Rapidly heat and then cool the milk (Pasteurisation)
- Balance the milk for the Protein:Fat ratio (Standardisation)
- Fill the vats
- Add the Starter bacteria (eat lactose and convert it to lactic acid)
- Add the Rennet to set the milk (Coagulation, cleave kappa casein proteins exposing hydrophobic ends)
- Cut the set product with large knives to get curds and whey
- Stir well in the vats and then heat the vat to cook the curds
- Drain off the whey
- Let it chill out for a little while to bind together
- Cut it up and add salt
- Press in to shape, pack in bag and box
- Rapid cool, transfer to the cool/warm store.
- Mature the cheese for 2-36 months



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ACTIVITY EXAMPLE

Final Pallet of cheese – how much does it weigh?



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Brine Bath



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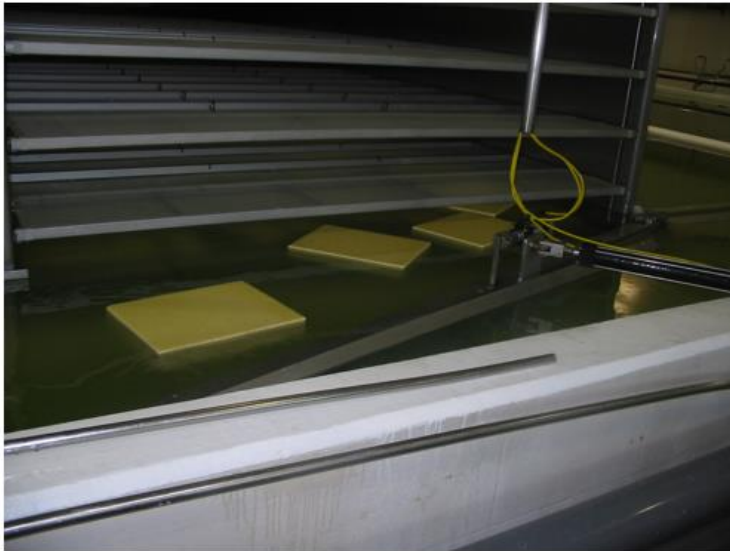
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ACTIVITY EXAMPLE

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Loading into cage



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Fonterra doesn't just make cheese...



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100kg Bucket of milk



100kg Milk

- Protein = 3.5kg
- Fat = 4.7kg
- Lactose = 5kg
- Minerals = 1kg
- Water = 85kg

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How much cheese do we make from 100kg of milk?



100kg Milk

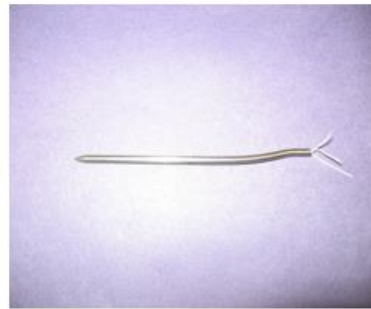
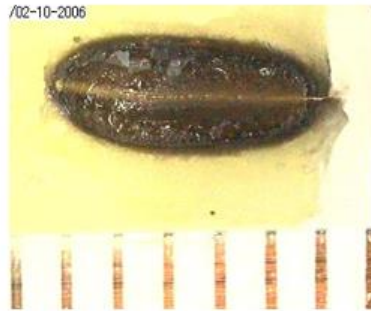
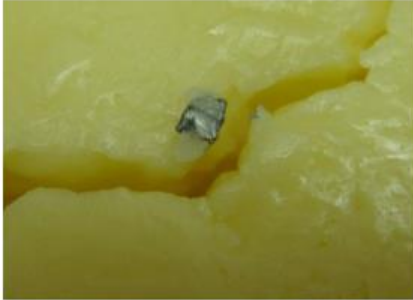
- Protein = 3.5kg
- Fat = 4.7kg
- Lactose = 5kg
- Minerals = 1kg
- Water = 85kg

- **10kg of Cheese**

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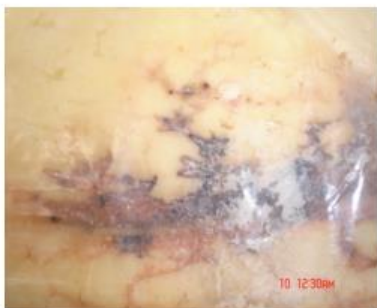
Foreign Matter



Page 18



Mould



Page 19





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