Special Thanks

- Craig Bell – LIC Testlink Manager
- Steve Holdroyd – Fonterra
- Paul Jamieson - SAITL

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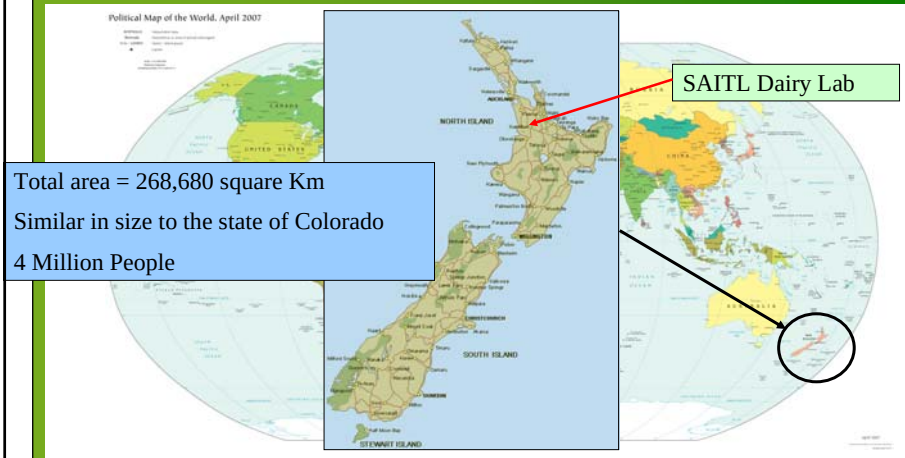
SAITL DAIRY LABORATORY

Where is New Zealand?



Total area = 268,680 square Km

Similar in size to the state of Colorado

4 Million People

New Zealand Dairy Industry – long history

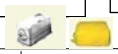
1909 First Herd testing in NZ

1927 Amalgamated Dairies established in London to market New Zealand butter and cheese

1963 New Zealand Dairy Board established

2000 Milk supply by two major companies New Zealand Dairy Group & Kiwi Cooperative Dairies

1800's Dairying in NZ began



1882 SS Dunedin sailed to London with first refrigerated shipment of butter in the world

1930 Many towns have dairy factories in New Zealand

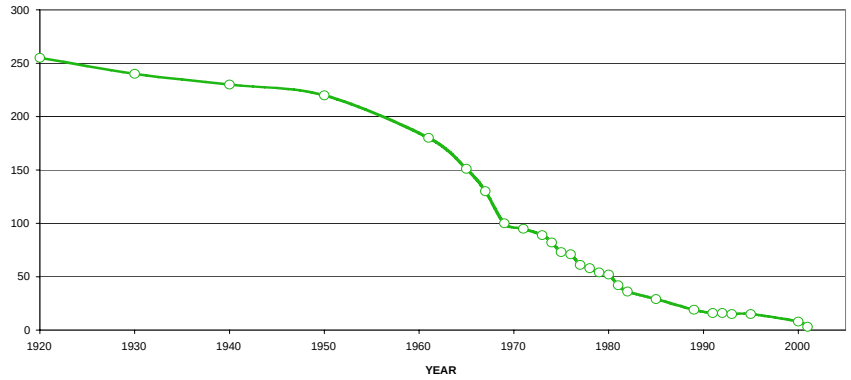
1970-1990 Dairy factories merged

2001 NZ Dairy Board disbanded. Fonterra formed

Fonterra

New Zealand Dairy Industry

- Number of Dairy Companies Operating 1920–2001



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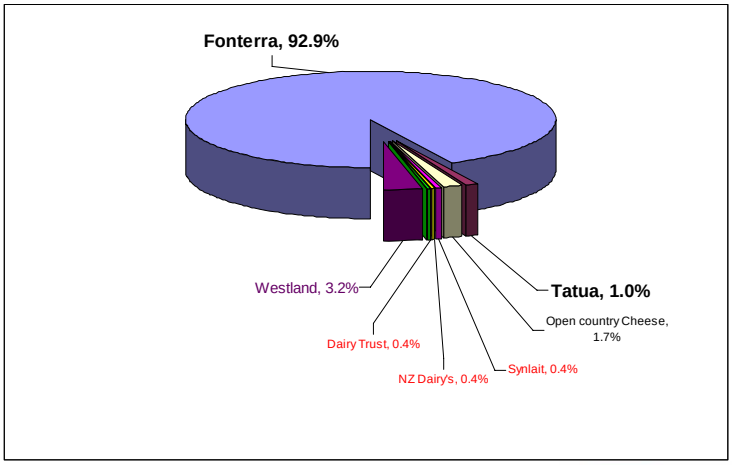
Leading in Milk Testing

Current NZ Dairy companies - 2008



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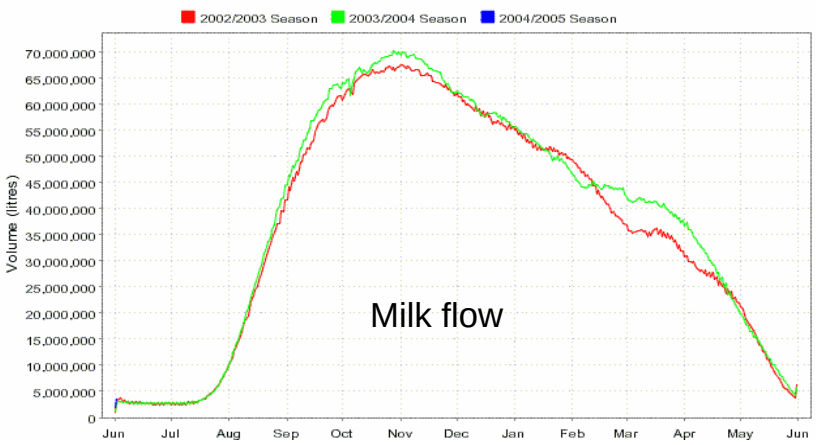
Dairy farming in New Zealand

- Approx 4 million dairy cows
- 11,500 suppliers
- Average herd size approx 350
- Average kg milksolids per cow approx 330
- 20 Billion litres of milk processed each year

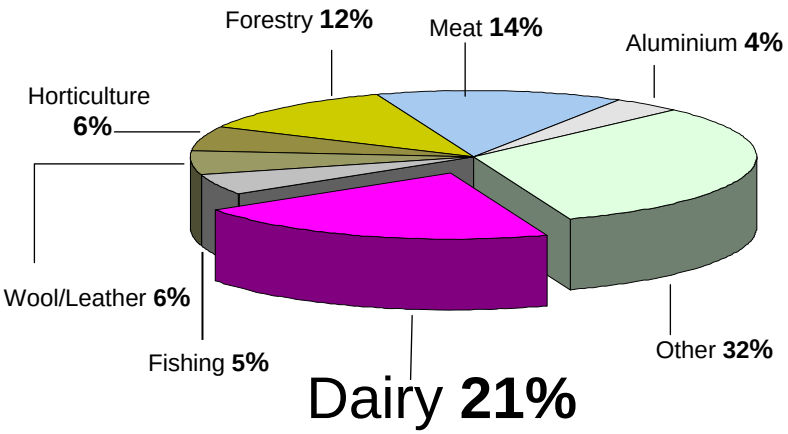
Dairy farming in New Zealand

- Pasture based seasonal milk production
- Temperate climate
- Geographic isolation
- Strict border controls and food safety regulations
- **No subsidies!**

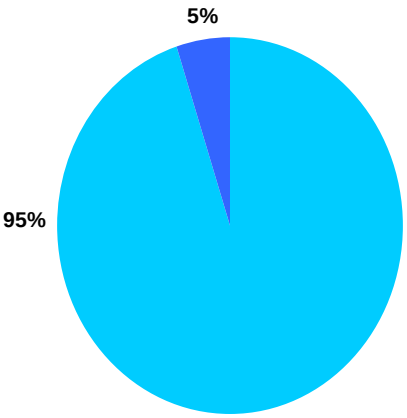
Seasonal milk flow



Dairy exports a vital part of NZ economy



New Zealand Milk Production

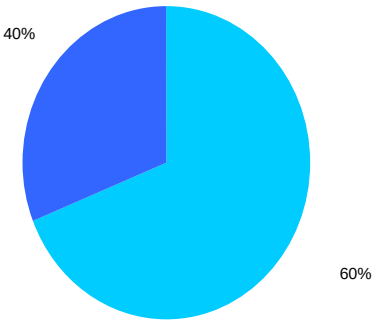


- Consumed Domestically
- Exported

Total New Zealand production is equivalent to 2% of world milk production

Source: Rabobank Global Focus, August 2003

World Dairy Trade

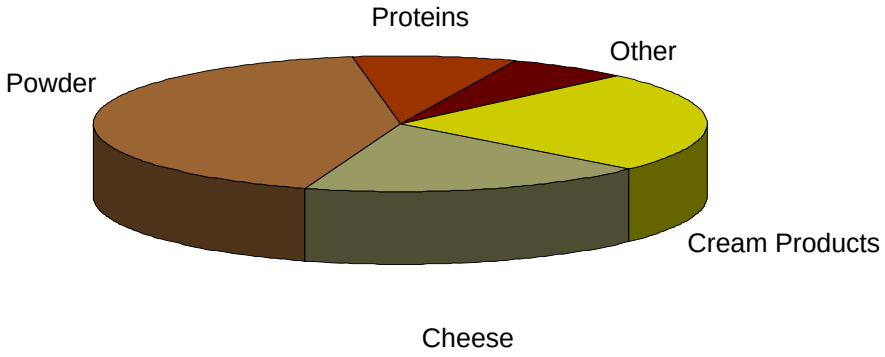


- Fonterra
- World

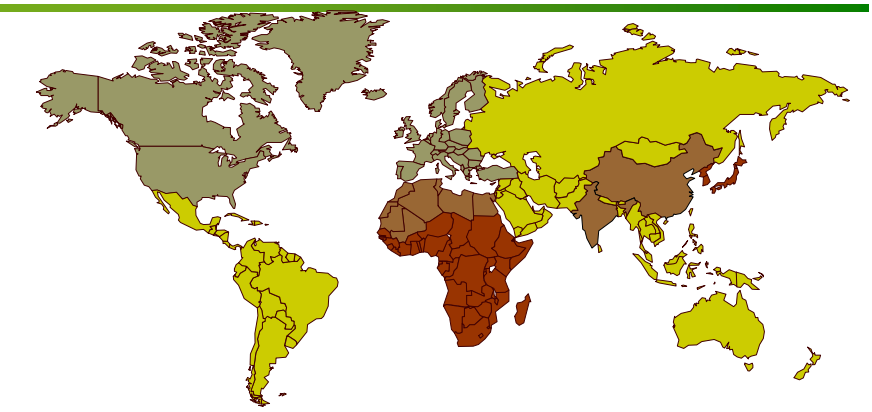
Fonterra provides 40% of all internationally tradable dairy products

Source: Rabobank Global Focus, August 2003

Fonterra's product mix



World Dairy Access and Tariffs



Access All Products / Low Tariffs (0-30%)
Product Specific Access / Medium Tariffs (30-70%)
Product Specific Access / Medium-High Tariffs (70-220%)
Only Butter / Cheese / Protein Quota Access / High Tariffs (>220%)

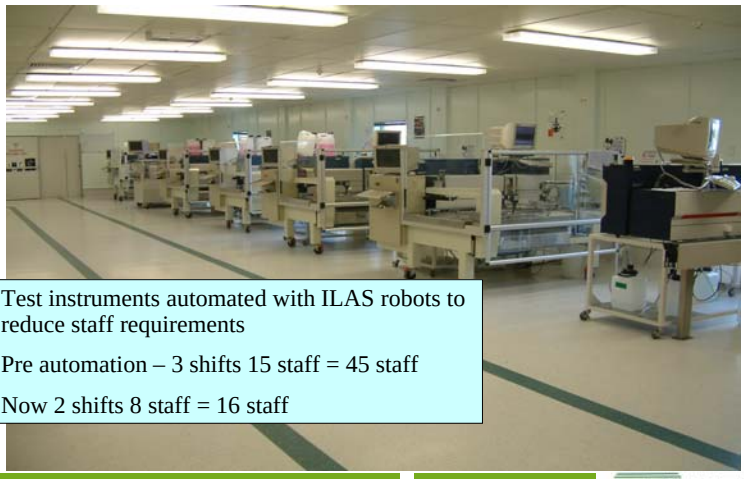
New Zealand Milk Testing Labs

- LIC – Testlink
  - DHI herd testing (> 95% NZ market)
- SAITL Dairy laboratory
  - Farmer payment (> 96 % NZ Farmers)
  - DHI under contract to small NZ player (<5% NZ Market)

LIC – Testlink Labs

- LIC is a dairy farmer owned, farm improvement company providing a diverse range of products and services.
- Test link has two labs
  - 9 CombiFosses in North Island (Hamilton).
  - 5 CombiFosses in South Island (Christchurch).
- Processes over 9 million samples per year.
- Runs two shifts – 8 lab staff per shift (40% permanent rest casual)

LIC Laboratory

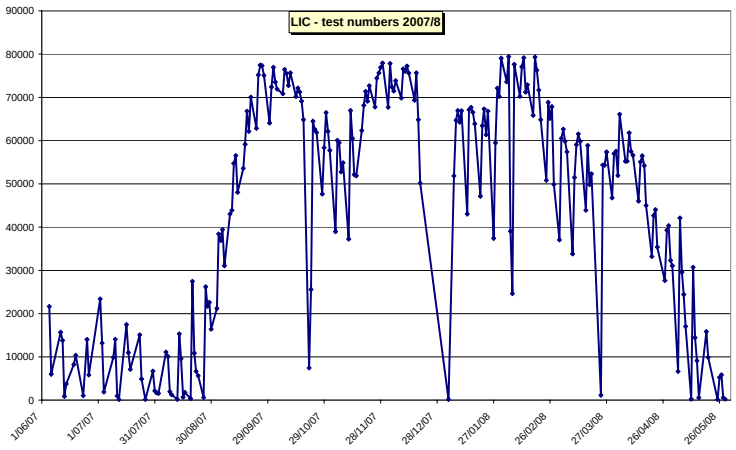


Test instruments automated with ILAS robots to reduce staff requirements

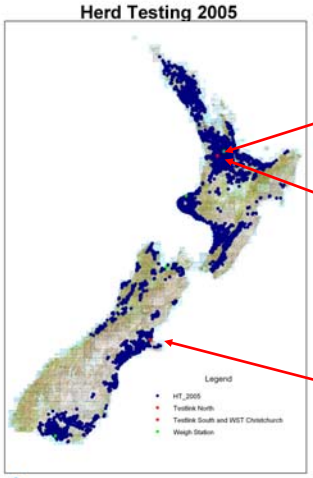
Pre automation – 3 shifts 15 staff = 45 staff

Now 2 shifts 8 staff = 16 staff

LIC Test numbers



LIC herd testing



SAITL Dairy Lab

LIC Testlink North

LIC Testlink South

SAITL Dairy Laboratory

- SAITL = South Auckland Independent Testing Laboratory
- Non Profit Organisation (Industrial Provident Society).
- Provides Farmer Payment services to member Dairy companies
- Established 1984
- Current Member companies
  - Fonterra
  - Tatua

SAITL Dairy Laboratory

- 34 Permanent Staff
- Test samples 365 days per year
- Approx 11,000 Farmers tested – including South Island suppliers.
- 5.5 million samples received each year.
- 96% of all Dairy Farmers in New Zealand
- Provide commercial testing to other Dairy organisations eg. Dairy Goat Co-op, Open Country Cheese, Synlait, NZ Dairies, Dairy Trust, and Ambreed

SAITL Dairy Laboratory Developments

- Completed transition from screw capped vial to flipcap vial in November 2006
- Completed transition from Barcode to RFID in April this year.
- New vial/ RFID enables automation:
  - Automated opening/ closing of vials on Foss instruments.
  - Enabled RFID reading at pipette on Foss instruments
  - Automated inhibitory testing.

Inhibitory Robot

SAITL Dairy Laboratory - Next steps

- 2009/10 Automate Plate counting (Coliforms + Thermodurics).
  - Currently working with a Japanese company who have an automatic plater that meets our requirements.
- 2009/10 Automate test selection process.
  - Have initial concept drawings from a local automation house.

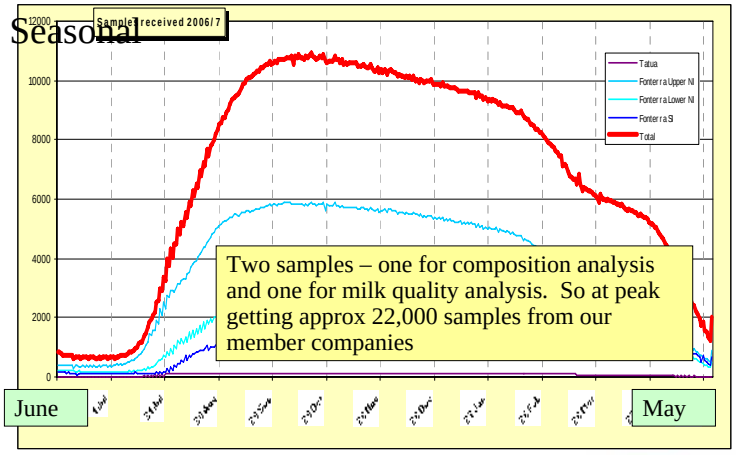
Payment testing

Fonterra 4 head automatic sampler. Other company's range from manual dip systems to semi automated systems.

Vials colour coded – clear for quality testing, Green for composition testing. Tanker composite sample is pink.

SAITL Member company testing

- Seasonal



Two samples – one for composition analysis and one for milk quality analysis. So at peak getting approx 22,000 samples from our member companies

SAITL - Milk Quality Section

Milk Quality tests done on Regime basis – each company slightly different

- Aflato: As requested
- Foreig: Once a Month
- Senses: Once a Month
- IgG te: Start of season
- DDE T: As requested

Twice Month

Thermoduric plating

Once Every 4 days

Antibiotic testing

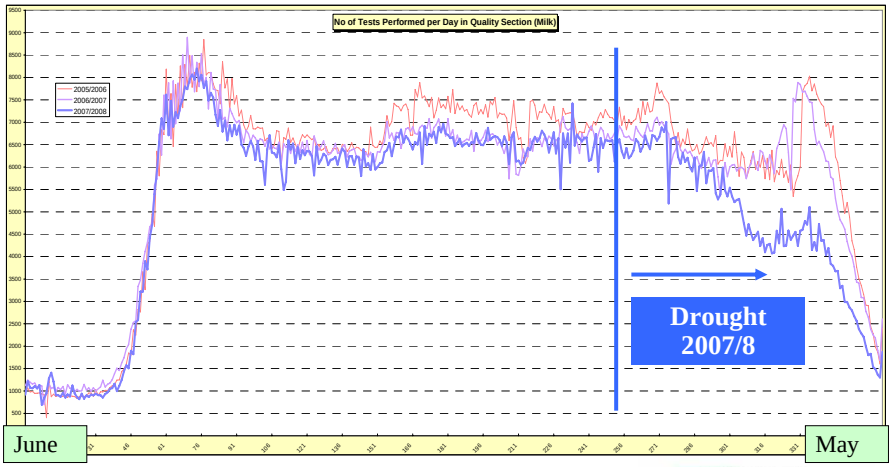
Once every 10 days

Total Bacteria Estimate

Twice Month

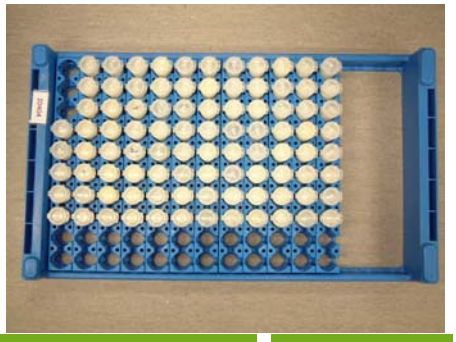
Coliform plating

Milk quality testing

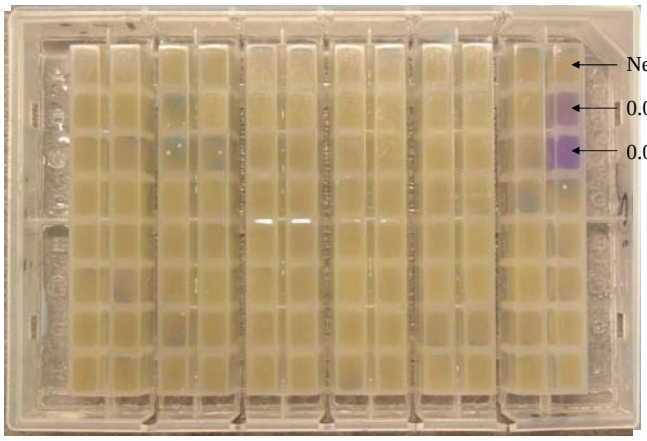


Screening for Inhibitory Substances

- Samples placed into 8x12 matrix
- Plated onto Copan milk test by robotic system



Copan Testing Plate



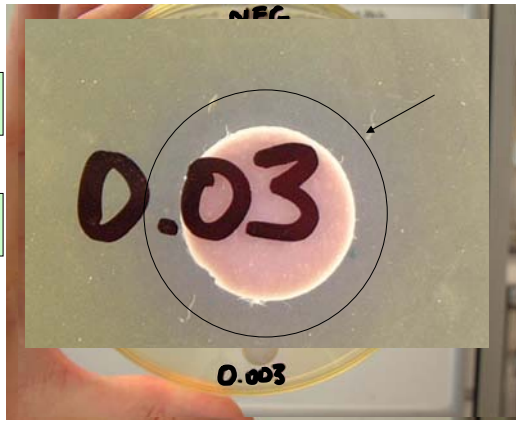
Confirmation Testing

- Plated on both Delvo and Copan.
- Must be positive on both before we issue a positive grade
- Also plated with penase to confirm Beta-Lactam.
- If not Beta-Lactam then carry out other confirmatory tests.
- Also tested on *Bacillus Stearothermophilus* Disk Assay (BSDA) plate for est. concentration.

BSDA Plate

Before Incubation

After Incubation



What do the Inhib Grades Mean

- Grades issued based on estimation of concentration
- (
- (
- (
- >0.03 IU/ml – 100 demerits 500%
- Plus consequential loss.

Less than 0.05% of samples tested are confirmed as positive. Most of these are still below MRL (0.006 IU/ml).

Challenges - Antibiotic testing

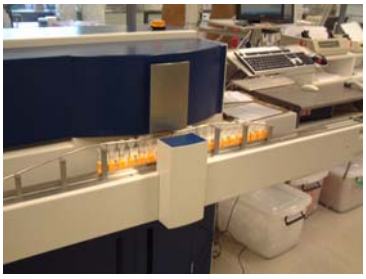
- End of season and start of season higher risk.
  - due to higher incidence of mastitis at end of season, and
  - use of dry cow therapy over the off season.
- Dairy companies manage their risk at these times by increasing testing at the start and end of season – eg. daily testing of all samples for antibiotics.

Challenges - Antibiotic testing

- This extra testing at start/end of season has historically meant hiring extra labour resource to help do the plating.
- Last season the inhibito
  thus eliminating the ne
  resource.

Total Bacterial Estimate - Bactoscan

- 3x Foss Bactoscan
- Process 150 samples an hour
- Replaces reference test that takes 72 hours.
- Calibration samples taken daily for SPC.

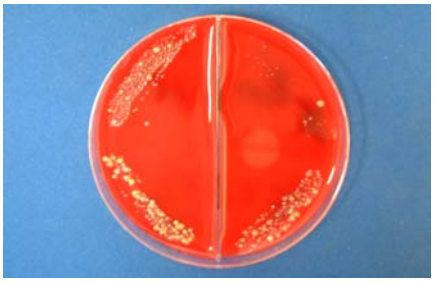


BScan Grades

A+ = Less than 10,000 cfu/ml	0 demerits
A = 10,000 – 19,000 cfu/ml	0 demerit
B = 20,000 – 49,000 cfu/ml	0 demerits
C = 50,000 – 99,999 cfu/ml	1 demerit (5%)
D = 100,000 – 199,999 cfu/ml	2 demerits (10%)
E = 200,000 – 499,999 cfu/ml	4 demerits (20%)
F = 500,000 – 2,999,999 cfu/ml	8 demerits (40%)
R = > 3,000,000 cfu/ml	20 demerits (100%)

Grade Investigation

- Purpose is to indicate if the grade has been primarily due to mastitis or hygiene issues
- Grade investigation carried out on samples with a bacterial count of 50,000 cfu and above.



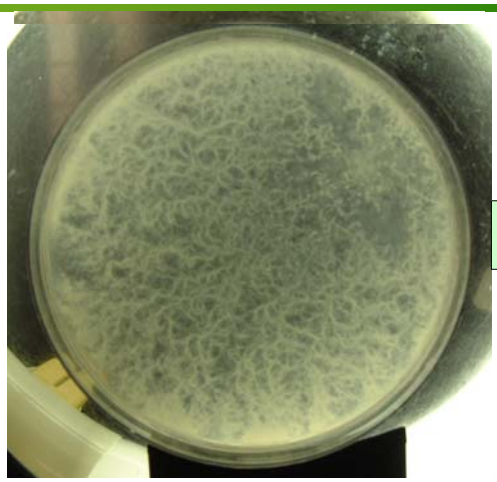
Thermoduric Testing

- Thermoduric organism is any organism that will survive pasteurization
- 72°C for 15 sec or 62.8°C for 30 mins
- Sample added to petri dish and agar added.
- Incubated for 72 hours at 30°C

Thermoduric Grades

- Less than 1,500 — 0 Demerits
- 1,500 – 4,999 — 1 demerit (5%)
- 5,000 – 59,999 — 4 demerits (20%)
- >60,000 — 20 demerits (100%)
- Spreader – a single organism has taken over
- Normally an indicator of
  - A build up of milk stone within the plant.
  - Perished rubber ware.
  - Or may be due to environmental sources.

Spreader

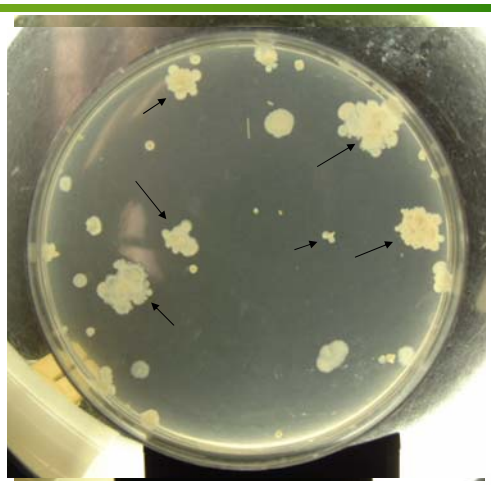


Spreader – a single organism has taken over

Thermoduric Grades

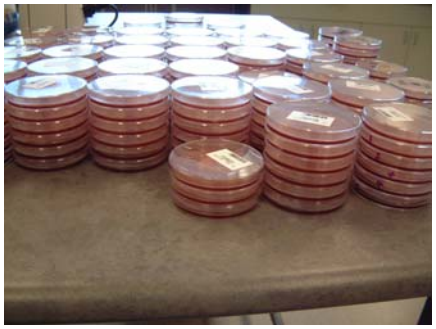
- Spore Forming Organisms
  - Indicated if above 50% of total count on plate.
  - Identified by morphology.
  - Can be an indication of poor quality silage.
  - Normally a Bacillus species.

Spore Forming Organisms

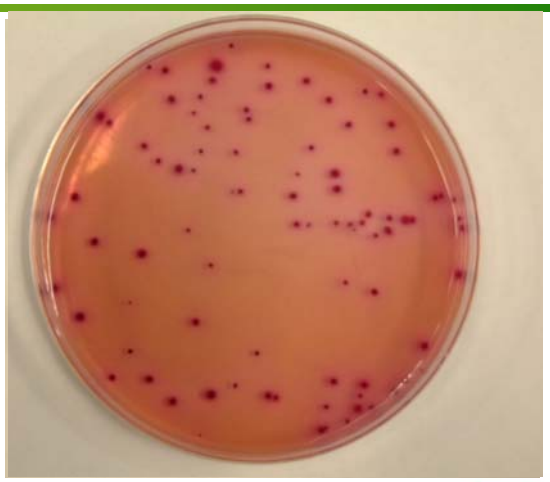


Coliform Testing

- Samples tested for presence of total Coliforms
- Use selective media ie VRBA
- Incubated at 30°C for 24 hours



Coliform Testing



Coliform Grades

- Less than 499 cfu/ml — 0 Demerits
- 500 – 999 cfu/ml — 1 Demerit (5%)
- 1000 – 1,999 cfu/ml — 2 demerit (10%)
- >2000 cfu/ml — 4 demerit (20%)
- Normally an indicator of faecal contamination or poor hygiene (eg. no hot wash or chemical clean).
- Characteristic slimy bio-film build up in the Dairy plant with a distinctive odour.

Organoleptic Testing

- Visually Inspect Milk (physical defects eg blood)
- Smell the Milk and identify off taints.
- Final Grade result of consensus between 2 or more testers on senses panel.

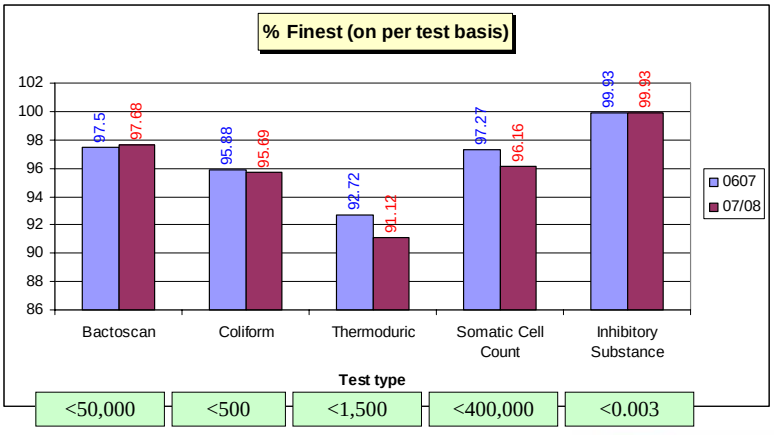
Organoleptic Grades

- Grades cover a range of sensory defects. Including:
  - Cowy, Fishy, Feedy, Skatol, Sour
- In all cases they smell like they are described
- Can also pick up Kiwifruit, Turnips and other feed taints.

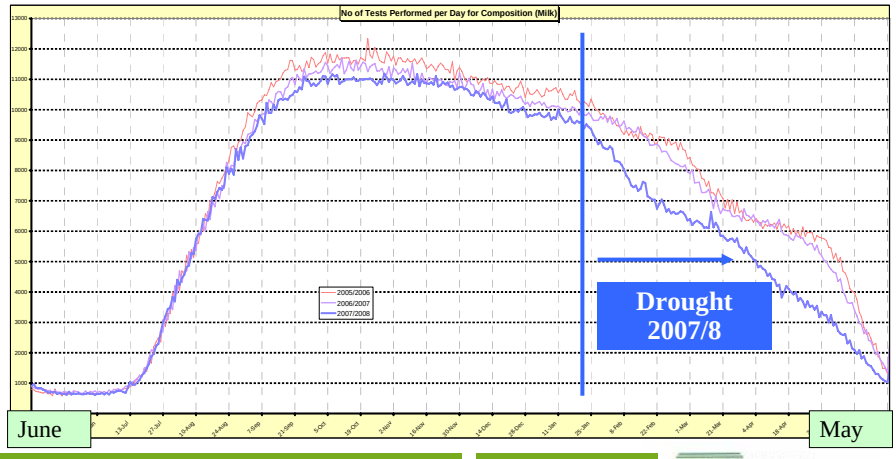
Foreign matter

- Milk Sample passed through a filter (Lintene pad).
- Residue analysed.
- Normally find partly digested plant matter, sand, grit, animal hairs
- Normally indicates that the filter sock is ruptured or full, or that the vat is open.

Grading rates (Fonterra)



Component test numbers



SAITL Composition testing

- 5 CombiFoss instruments – payment
  - 2 x FT6000 + 3 x MSC4000 (1 x FT600+ on way)
- 2 CombiFoss (MSC 4000) instruments - DHI
- Test Fat, Protein, Lactose, Total Solids, Somatic Cells, Freezing Point on all composition samples received.
- NZ Dairy companies tend to payout on “Milk Solids” (ie Fat + Protein).

SAITL Composition testing

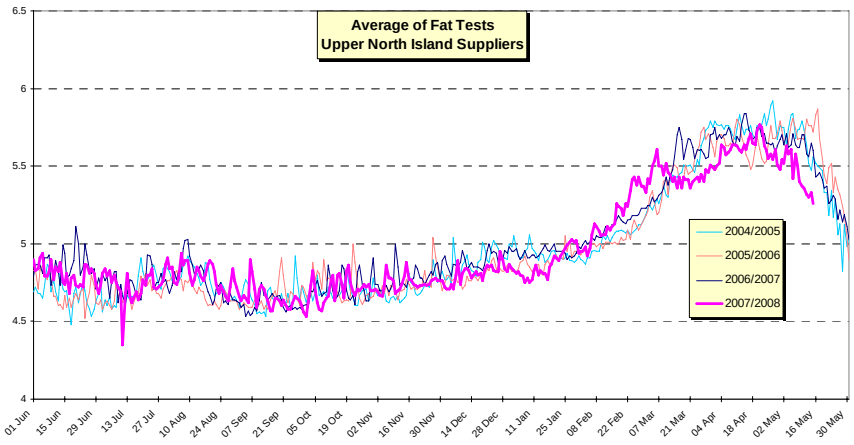
Challenges - Resources

- Need to have enough test equipment and labour to meet requirements at peak.
  - Very inefficient use of resources!!
- For example the lab needs 5 CombiFoss instruments at peak to do 12,000 tests
- However in the off season when we are doing 800 tests only need 1 instrument for a couple of hours.

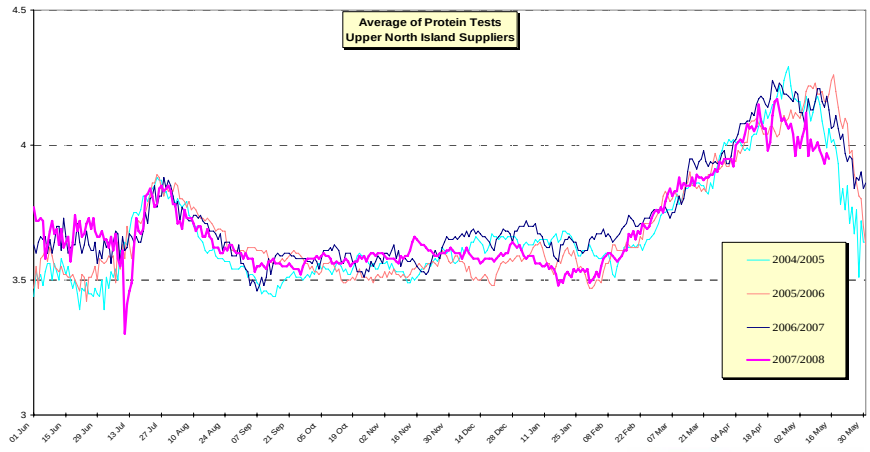
Challenges – Milk composition

- The composition of the milk changes throughout the season.
  - Calibration issues – milk matrix changes through season and also season to season.
  - Lactation issues – eg start of season potential Colostrum contamination.
  - Unexpected matrix issues due to environmental effects – eg Drought, flooding etc.

Milk Composition - Fat



Milk Composition – Crude Protein



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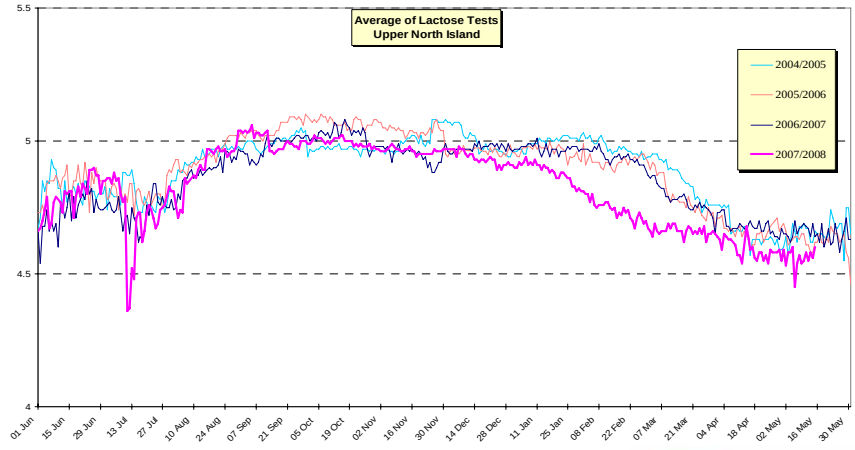
Milk Composition - Lactose



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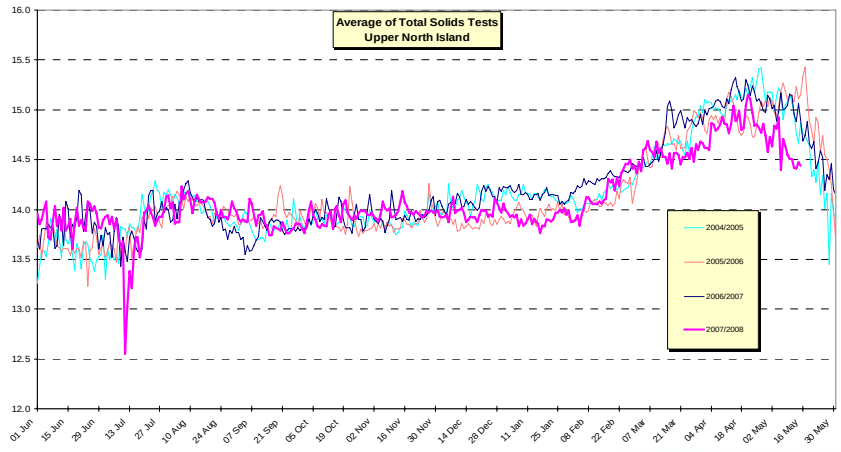
Milk Composition



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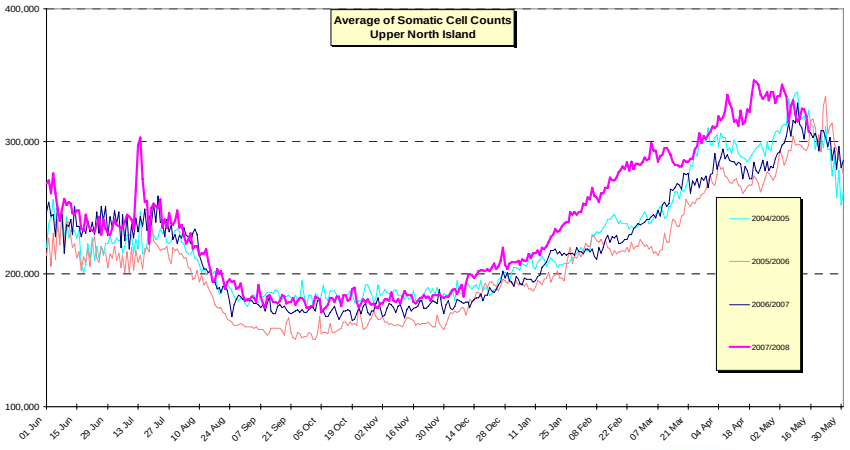
Milk Composition – Somatic Cells



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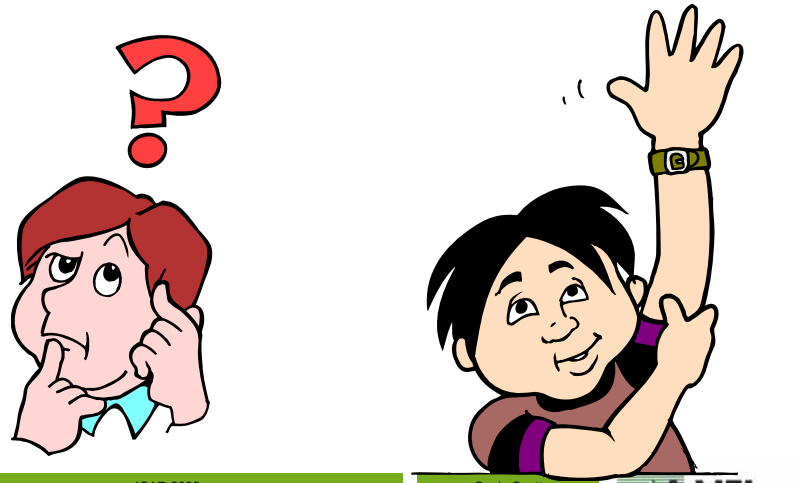
Questions?



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