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Latest rapid ultimate methods to monitor and improve milk quality and value within the dairy chain

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ICAR Technical Workshop 2013-Aarhus,
Denmark, 29. - 31. May 2013

Presentation Outline

- **Rapid Determination of Milk Composition and Profile by FTIR Spectroscopy**
  - Bentley FTS/DairySpec Milk FTIR Analyzers
- **Rapid Milk Bacteria contamination detection & characterization**
  - **Bentley BactoCount** IBC/IBCM (Total Flora/Somatic Cells)
  - **New Pathoproof PCR Test** for the simultaneous detection of the 16 most prevalent mastitis bacteria
  - **New Oculer test** for the rapid detection of thermoduric bacteria
- **Conclusions**

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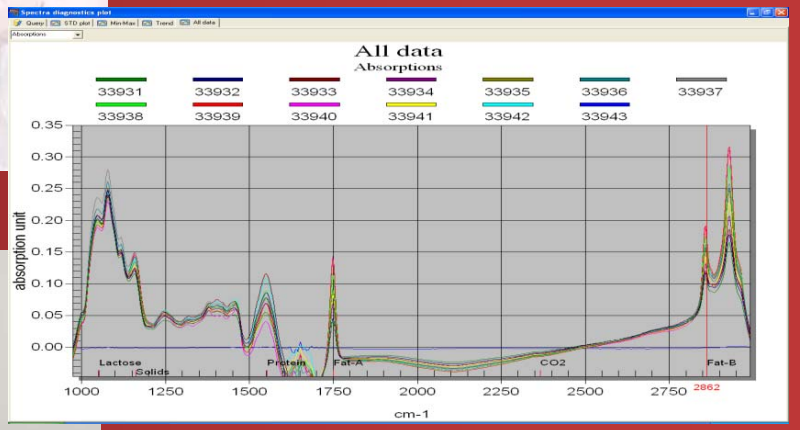
Bentley CombiFTS & DairySpec FT

Rapid Determination of Milk Chemical Composition & Profile

Bentley
FTS/FCM

PRODUCT OVERVIEW



Bentley
DairySpec FT

PRODUCT OVERVIEW

Full Power of FTIR Spectroscopy finally released

ICAR Technical Workshop 2013-Aarhus,
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Bentley FTS / DairySpec
On-going & Future Developments

1) Standards Components:

- Fat, Protein,Casein, Lactose, SNF, TS, MUN, FPD…

2) New calibrations/applications

- Fatty Acids 1 : Saturated, Unsaturated, Mono & Poly Unsaturated, Oleic, Stearic & Palmitic
- Fatty Acids 2 : C14:0, C4:0, C6:0, C8:0, C10:0, C12:0, C18:3, C18:3n-3
- FFA, ketones bodies, Minerals, Lactoferin….

3) Rapid determination of milk adulteration (spectral approach)

- by contaminants
- by milk from different animal species

4) Detection of abnormal samples:

- Outside the calibration range
- **Outside laboratory spectral database (national, local, herd, cow…)**

5) Use of 3rd party calibration/models (Phenofinlait, Optimir)

6) Development of new indicators (spectral approach)

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BactoCount IBC/IBCM

Rapid & Highly Accurate Determination of Raw Milk Hygienic Quality

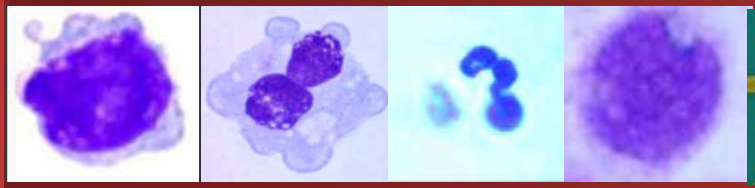
Bacteria & Somatic Cells

Bactocount
IBC 50, IBC 100,
IBC 150

PRODUCT OVERVIEW

BactoCount
IBCm

PRODUCT OVERVIEW



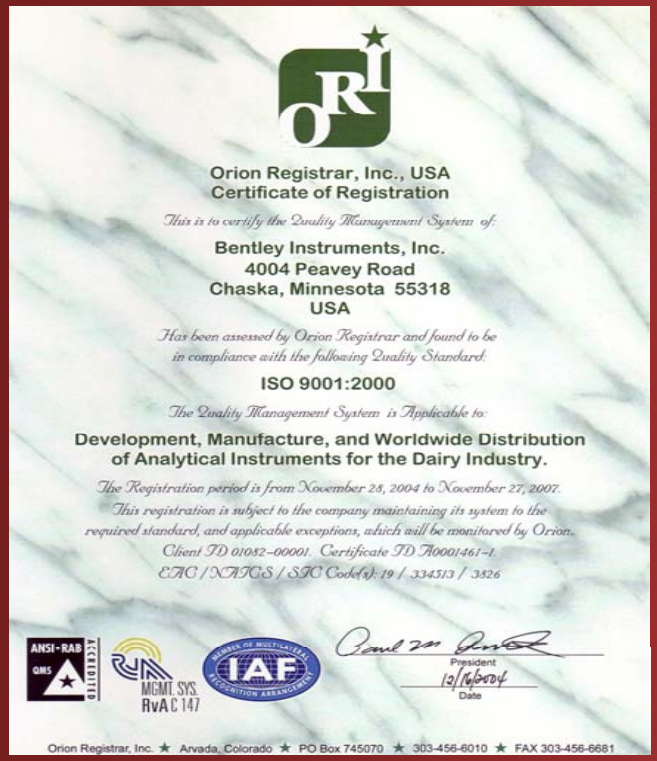
BactoCount IBC / IBCM

Real-time detection of potential contaminations in raw milk

- **Rapid (10') and highly accurate determination of bacteria contamination in raw cow milk, bulk tank, milk tankers…**
- **Rapid and highly accurate determination of somatic cells content**
- Rapid control of the milk tankers (composite, compartments…) before unloading to avoid silos contamination and optimize milk segregation
- Rapid control of the milk before processing (adjustment of the pasteurization process based on milk quality, detection of accidental psychrotrophic bacteria contamination…)

BactoCount
A highly standardized method

ISO 9001 2008 Certification



Orion Registrar, Inc., USA
Certificate of Registration

This is to certify the Quality Management System of:

Bentley Instruments, Inc.
4004 Peavey Road
Chaska, Minnesota 55318
USA

Has been assessed by Orion Registrar and found to be in compliance with the following Quality Standard:

ISO 9001:2000

The Quality Management System is Applicable to:

Development, Manufacture, and Worldwide Distribution of Analytical Instruments for the Dairy Industry.

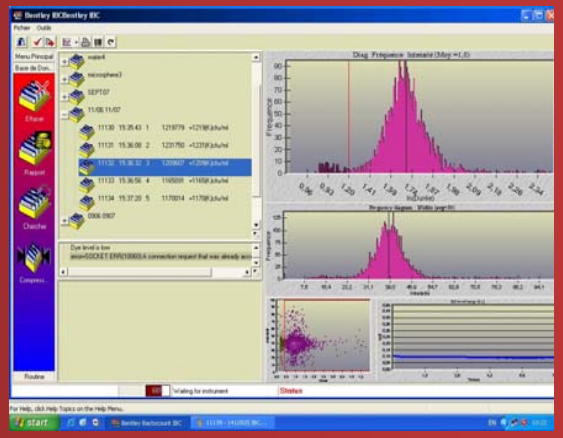
The Registration period is from November 28, 2004 to November 27, 2007.
This registration is subject to the company maintaining its system to the required standard, and applicable exceptions, which will be monitored by Orion.
Client ID 01052-00001. Certificate ID A0001461-1.
EAC / NAICS / SIC Code(s): 19 / 334513 / 3826

ANSI-RAB QMS ACCREDITED
RVA MGMT. SYS. RvA C 147
IAF MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

President
12/16/2004
Date

Orion Registrar, Inc. ★ Arvada, Colorado ★ PO Box 745070 ★ 303-456-6010 ★ FAX 303-456-6681

Lyophilized bacteria standard



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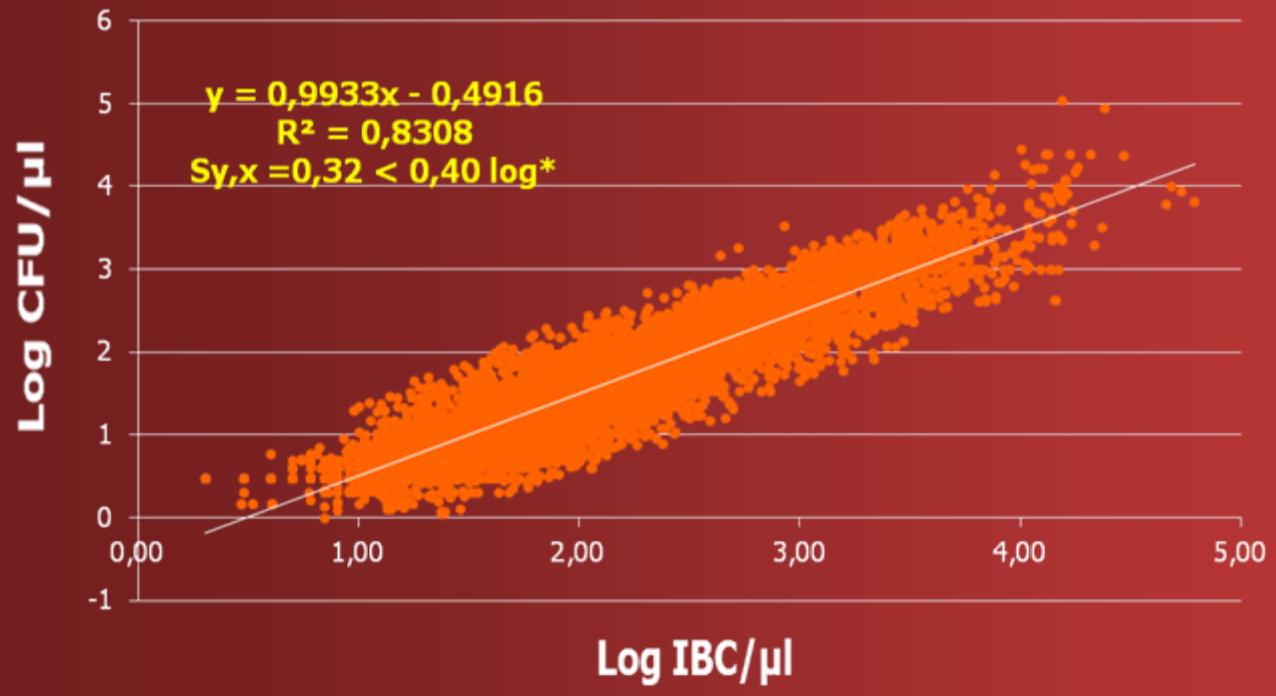
BactoCount 2012 “Universal” Conversion Equation Milk Total Flora

13 Countries, 21 BactoCount, 7802 samples, 10 years period
BactoCount vs. ISO 4833



1. Brazil
2. Czech Republic
3. Estonia
4. France
5. Germany
6. Ireland
7. Italy
8. Japan
9. Lithuania
10. Poland
11. Switzerland
12. Turkey
13. USA

**ISO 16140* specifications*

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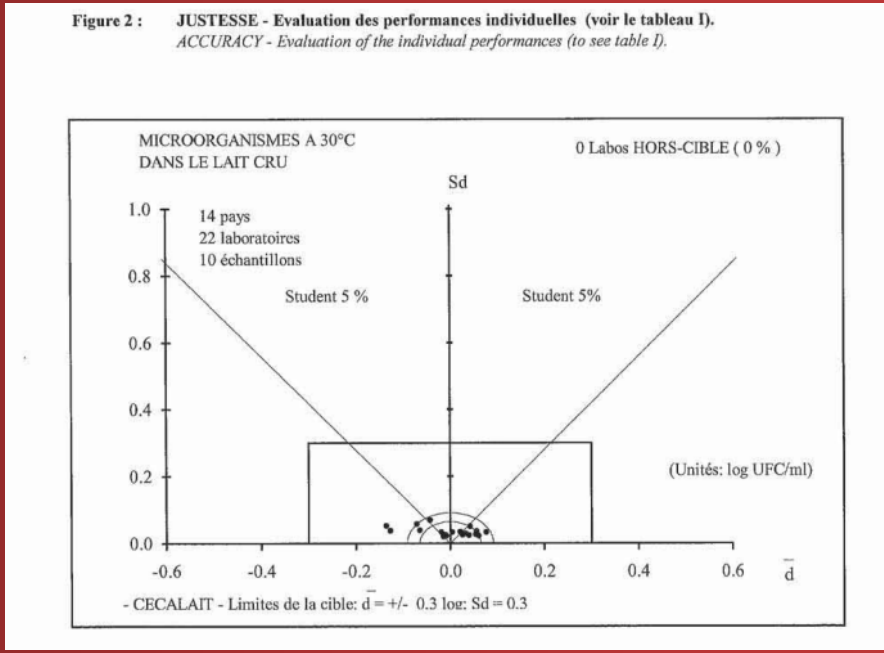
BactoCount IBC/IBCM

Bentley International Accredited Proficiency Test (Total Flora)

- 22 BactoCount
- 14 countries
- 100% on target

- Sr = 0,028 << 0,09 log
- SR = 0,072 << 0,16 log
- Sy,x = 0,035 log << 0,40 log

100% compliant with ISO 16140 Standard



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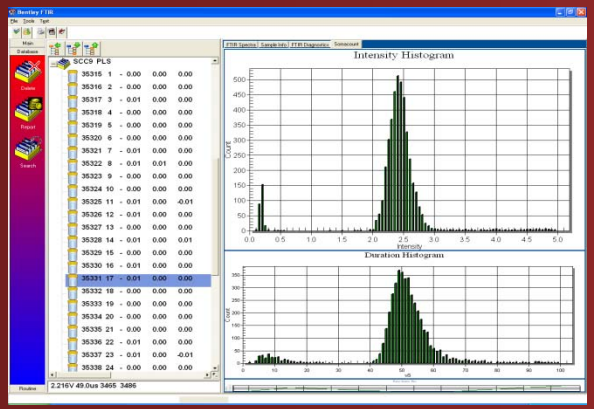
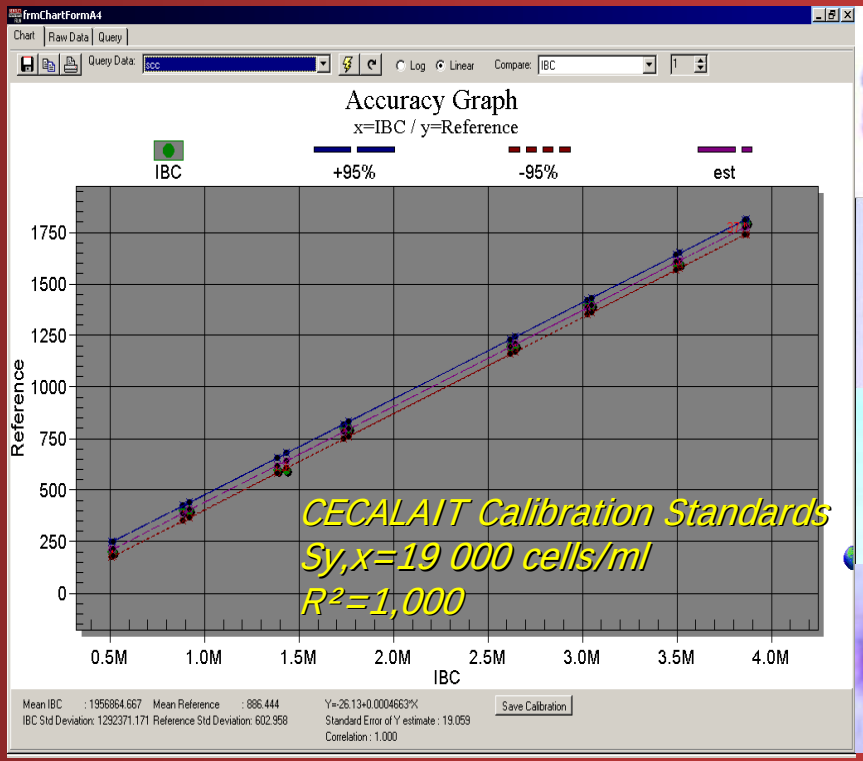
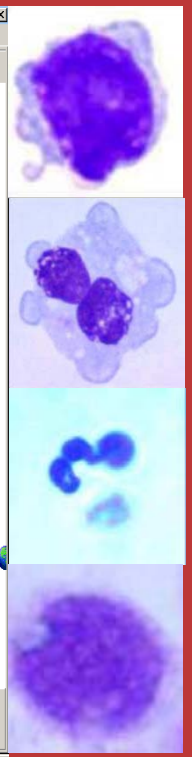
BactoCount Accuracy

BactoCount vs. ISO 13366-1/IDF 148-1 (*Somatic Cells*)

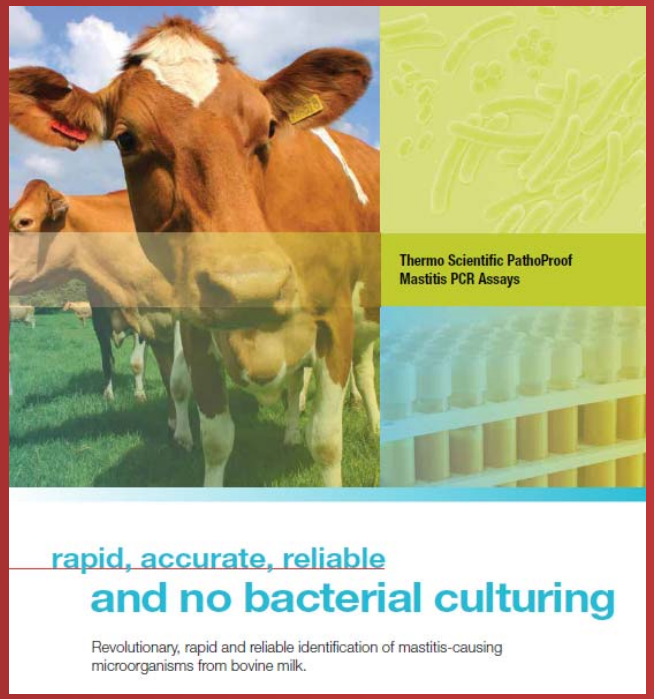






New Pathoproof PCR KingFisher Kits

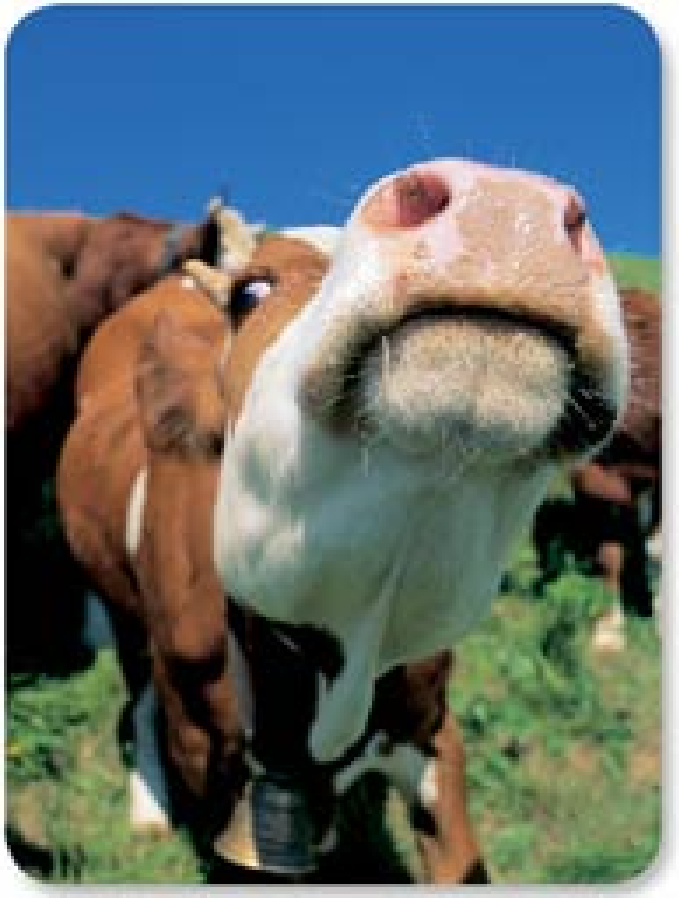
- Rapid, specific and simultaneous detection of up to >95 % of the bacteria responsible of all clinical and subclinical mastitis cases (individual cow and bulk tank)
- Powerfull tool to help reducing the incidence of mastitis in the herds and its negative impact on milk production, animal welfare and dairy products quality
- Potentially reduce the bacteria contamination in the bulk tank



PathoProof KingFisher Duo kits

Complete-16

- *Staphylococcus aureus*
- *Staphylococcus spp. (coagulase negative staphylococci)*
- *Streptococcus agalactiae*
- *Streptococcus dysgalactiae*
- *Streptococcus uberis*
- *Escherichia coli*
- *Enterococcus app. (including E.faecalis and* E.*faecium)*
- *Klebsiella spp. (including K.oxytoca and K.pneumoniae)*
- *Serratia marcescens*
- *Corynebacterium bovis*
- *Arcanobacterium pyogenes and Peptoniphilus (Peptostreptococcus) indolicus*
- Staphylococcal beta-lactamase gene (penicillin-resistance gene)
- *Mycoplasma bovis*
- *Mycoplasma* species
- Yeast
- *Prototheca* species



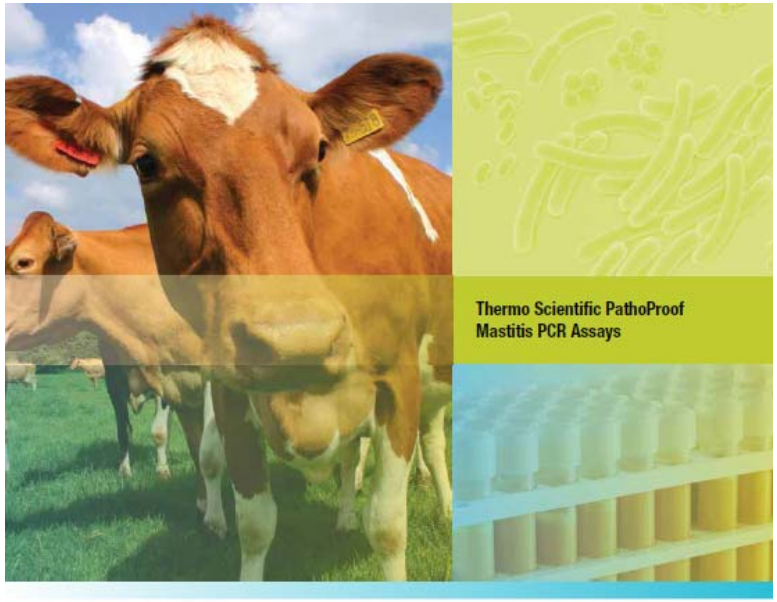
These bacteria are responsible for >95 % of all clinical and subclinical mastitis cases

PathoProof KingFisher Duo kits

- **Major-4.1**
- Mycoplasma bovis
- Staphylococcus aureus
- Streptococcus agalactiae
- Staphylococcal beta-lactamase gene

- **Major-4.2**
- Mycoplasma bovis
- Staphylococcus aureus
- Streptococcus agalactiae
- Streptococcus uberis

- **Major 3**
- Staphylococcus aureus
- Streptococcus agalactiae
- Mycoplasma bovis



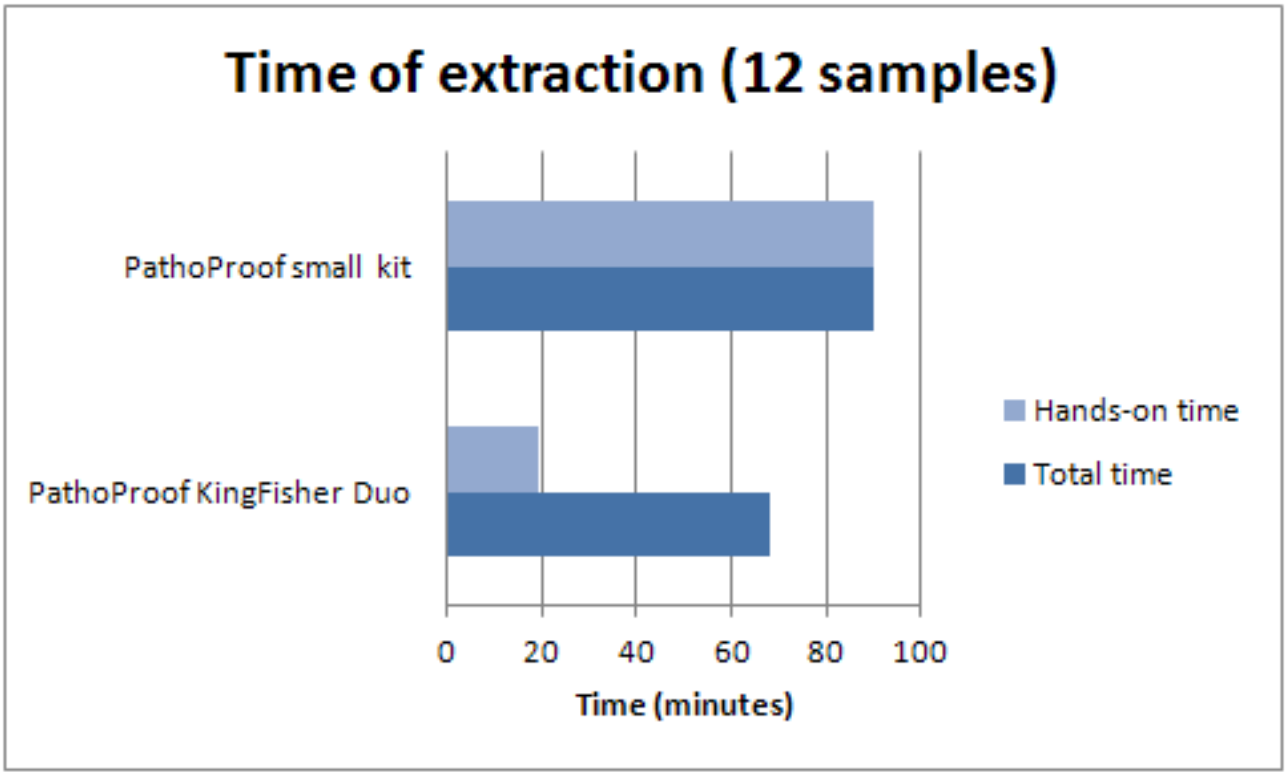
New DNA extraction solution for PathoProof

Full range of PathoProof kits combined to fast and efficient DNA extraction!

Perfect for small and medium troughput laboratories with restricted space

Minimal hands on time!

- KingFisher Duo DNA extraction
- Significant time saving!



- Detailed comparison in the application note

BENTLEY INSTRUMENTS

New Oculer Thermoduric bacteria test

The Technology:

As thermoduric bacteria grow, they consume dissolved oxygen.
The "Oculer reagent" phosphorescence signal increases.
The time taken to reach threshold signal is used to calculate initial microbial load.

Features:

- *High throughput screening*
- *Integrated pasteurization step*
- *6-24hrs time to result (*BS 4285-3.2:1991)
- *Accuracy down to 10 cfu/ml.*
- *Ease of use*
- *Simple, robust assay procedure*

Priority	Typed strain
1	Enterococcus Durans
2	Enterococcus Faecalis
3	Bacillus licheniformis
4	Bacillus subtilis
5	Bacillus cereus
6	Bacillus cereus spores
7	Microbacterium spp. (CDC.A-5)
8	Micrococcus luteus
9	Enterococcus bovis
	Less frequently identified
10	Bacillus pumlius
11	Bacillus decisfrondis
12	Micrococcus lylae




Conclusions

- New rapid, highly standardized methods are available to monitor and improve milk quality and value at the farm and dairy plant
- The use of the Bentley FT/DairySpec FT provides the full potential of FTIR spectroscopy with the direct access to the infrared spectra and opens up a wide range of new applications, new indicators but brings also new QC tools applicable down to the cow level.
- The implementation of the BactoCount tests at the dairy plants allows the real time detection of potential contaminations, the optimum milk segregation, thus the overall improvement of the milk and end-products hygienic quality and safety. It can also prevents expensive products recalls.
- BactoCount, FTS and DairySpec are open platforms and further Developments are on the way…

Thank you for your attention!

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