Farm management factors associated with the *Bacillus cereus* count in bulk tank milk

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Outline

- Introduction
- Study objective
- Sample and data collection
- Results
- Recommendations
- Future work

The infant milk formula market

“ When you’re in the infant milk formula market you cannot afford the first mistake”

Jim Woulfe, CEO, Dairygold,
National Dairy Conference, November, 2013

Bacillus cereus

Bacillus cereus is a Gram positive, rod shaped, motile, bacterium

- Ubiquitous in nature
- Ability to grow and multiply in biofilms on the milking machine
- Survives pasteurisation

(Andersson et al., 1995, Lewis, 2010)

Its presence in milk can limit the shelf life of dairy products and can cause **food poisoning** when present in large numbers

Prevalence of *Bacillus cereus* in infant milk formula

Reference	Sample source	Sample size	% positive
Becker *et al.*, 1994	Global infant milk formula	92	52%
Rowan *et al.*, 1997	UK	100	17%
Haughton *et al.*, 2010	Ireland	100	59%

Regulatory limits

- Dried infant formula – 5 samples
    - 4 must be <50cfu/g
    - Remaining can be between 50 and 500 cfu/g

- Raw milk promoted for infant milk formula manufacture has *B. cereus* count <60cfu/ml

Sources of *Bacillus cereus*

Contaminated teats

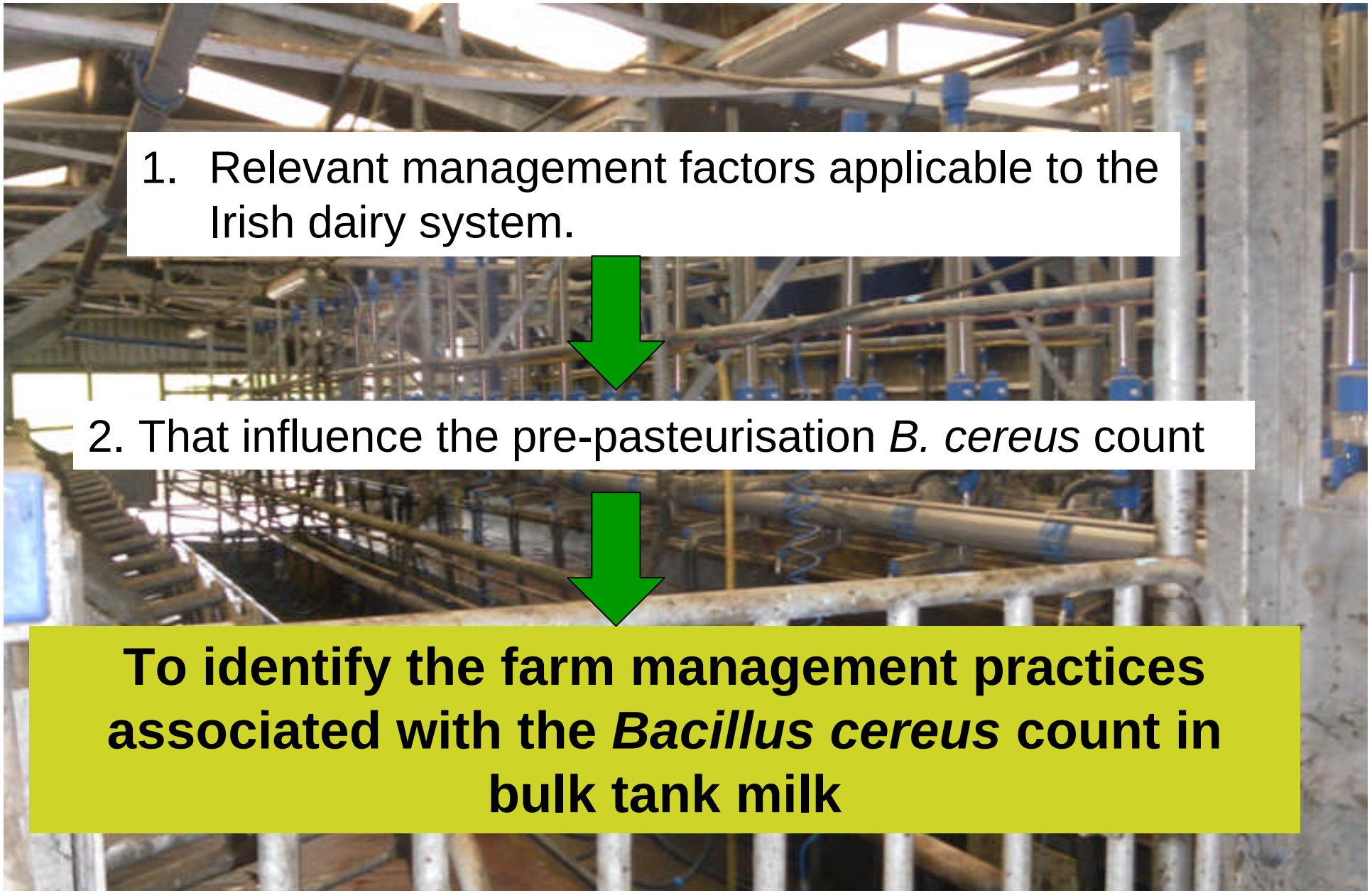
- Soil during the grazing period
- Bedding during the housing period
  - Bedding type and the frequency its changed
- Faeces via contaminated feed

(Christiansson *et al.* 1999, Magnusson *et al*. 2007, Vissers *et al*. 2007)

Degree of contamination on teats is influenced by the dry matter content of the soil and wet weather conditions

(Christiansson *et al.* 1999)

Objective



1. Relevant management factors applicable to the Irish dairy system.

2. That influence the pre-pasteurisation *B. cereus* count

To identify the farm management practices associated with the *Bacillus cereus* count in bulk tank milk

Identification of farms

- 63 farms - Dairygold suppliers
- Reqruited by milk quality advisor
- Between 4 and 8 samples BTM samples were collected from each farm two weeks prior to an on farm visit
- The last sample was collected within 24h of the on-farm visit
- Tested for *Bacillus cereus*
- Average of the four most recent results – *B.cereus* count on farm

Farm visits

- July – Aug 2012
- Milking time
- Unaware of the *B. cereus* count on the farm
- Farm visits were scheduled 12-48 hours prior to the visit via phone calls
- Pre-milking, milking, post-milking and grazing routines were observed during visits

Observations

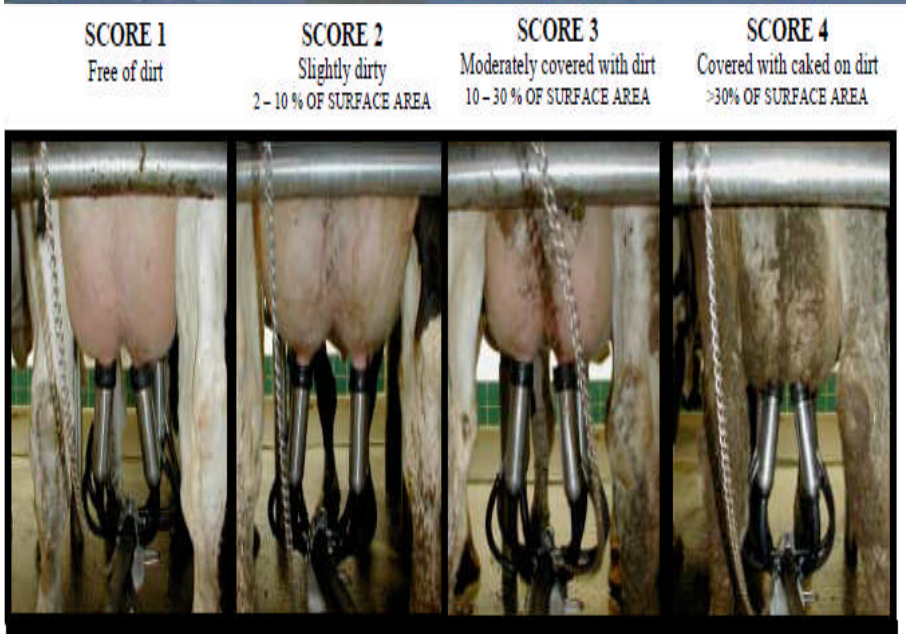
Questionnaire

- Capture what we couldn't observe at a milking
- Farm size – stocking density
- Mastitis management
- Milking machine service history
- Machine and bulk tank washes
- Water quality

Farms visited

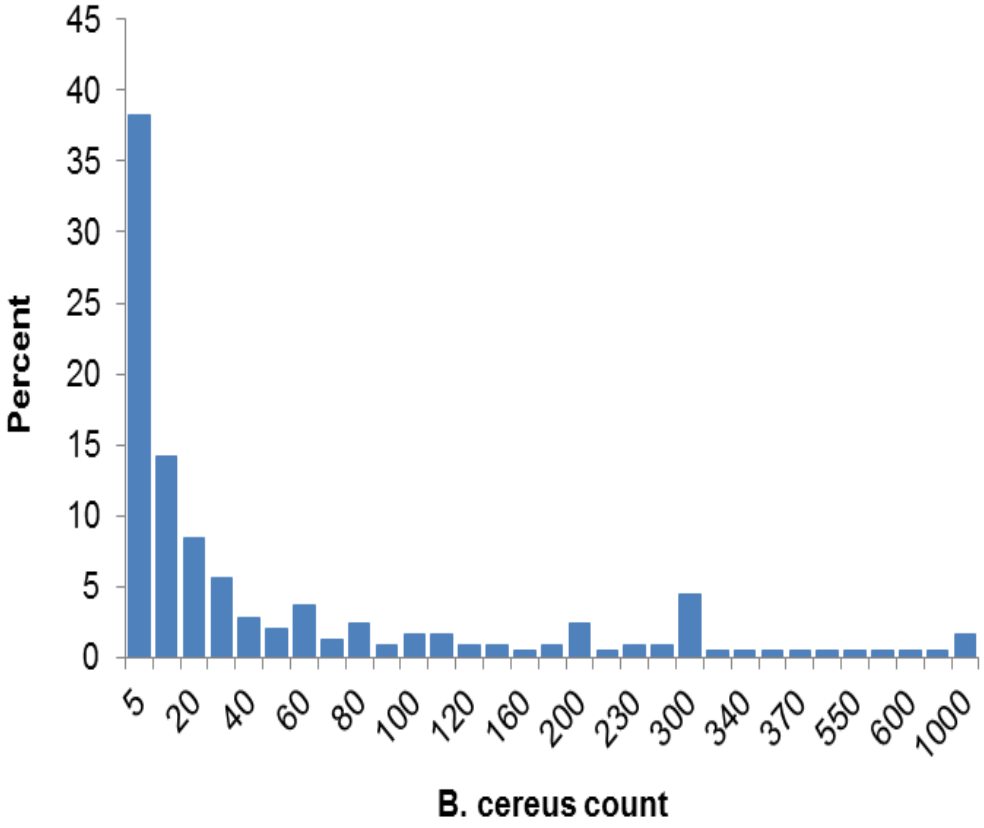
Farm characteristics

- 66 cows
- 10 units
- 67% milk recorded
- 40% fed silage
- 21% housed cows



	Hygiene Scores	
Hygiene Measure	<2	>2
Udder	27%	73%
Leg	6%	94%
Liner	29%	71%

Distribution of results



- *B. cereus* was not detected in 38% of all milk samples
- 71% of all milk samples had a count <60cfu/ml
- **56% of farms had a mean count <60cfu/ml**

Results

- **Reuse detergent more than once**
  - **53% farms had a deficit caustic working solution**
- **Detergent/steriliser wash start temperature**
- **Feeding silage**

Results

- Fresh grass allocation 24 hours or greater vs. 12 hours – more than doubled the *B. cereus* count
- Housing cows – four times greater *B. cereus* counts

Recommendations

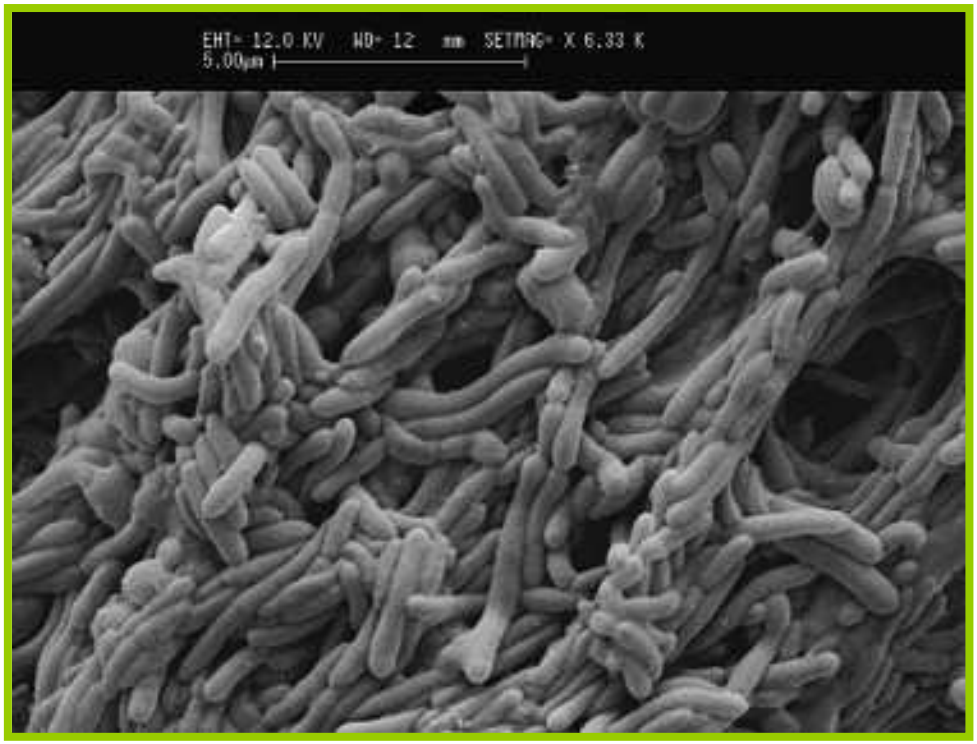
1. Present clean teats for milking

2. Minimise soil exposure

3. Clean milking and housing environment

75% clean or slightly dirty

4. Equipment sanitation



Simoes et al. 2010

Summary

- Equipment sanitation
    - High temperature washes
    - Appropriate caustic solution
    - Sterilizer
- Environmental conditions
    - Improved hygiene when indoors
    - Grazing management to limit soil exposure
- Adequate teat prep
    - Ensure teats are clean AND dry prior to unit application

Future work

- Identify *B. cereus* strains taken from various farm environments

Aim:

To identify a dominant strain and its route of transmission in BTM


Thank you for your time