

Project number: 6877
Funding source: Department of Agriculture,
Food and The Marine (FIRM)

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Research supporting the unpasteurised milk and associated cheesemaking industry from a food safety perspective.



Key external stakeholders:

SME raw milk cheese producers; FSAI; DAFM; **safe**food; research community

Practical implications for stakeholders:

With regard to pathogens and drug residues, the quality of milk used for raw milk cheese is good and vigilance is required to maintain this.

Main results:

- There were no *Listeria monocytogenes* or *Salmonella* spp. detected in any of the raw milk, milk filters or raw milk cheese tested.
- Other permitted bacteria, such as *E. coli*, *S. aureus* and *B. cereus*, were within specifications
- There were no drug residues detected in any of the raw milk, milk filters or raw milk cheese samples tested.
- There were no *L. monocytogenes* detected in any of the raw milk cheese processing environments tested
- The numbers of *E. coli* did not decrease below 1 log cfu/g of cheese after about 60 days of ripening in cheese made in the laboratory or in commercially-made cheese, regardless of the initial numbers present.
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Opportunity / Benefit:

Awareness of the issues relating to *L. monocytogenes* in food and food processing facilities was created.

Collaborating Institutions:

Teagasc, Ashtown

Teagasc project team: Dr. Kieran Jordan (PI), Dr. Martin Danaher, Dr. Antonio Lourenco

1. Project background:

The rationale for the project is that the quality and safety of unpasteurised milk for the production of unpasteurised milk cheese is essential as this type of cheese is produced from smaller, if not single, herd sizes. Therefore the risk of potential contaminants in their products is higher than if milk from a larger number of herds is pooled. FIRM aims to develop advanced quantitative analytical methodologies and apply risk tools to manage existing and emerging national and global risks through exportation. Identifying microbiological, toxicological, contaminant and residue issues in the Irish unpasteurised milk cheesemaking industry will address these aims. The production of cheese using unpasteurised milk needs to be examined closely in order to minimise the risk to the consumer. An EFSA publication (EFSA scientific opinion on raw milk, 2015) recently identified several microbiological hazards transmissible through unpasteurised milk. However, the risks associated with unpasteurised milk cheese were not studied. Also highlighted was the need for improved risk communication to consumers, particularly susceptible/high risk populations, regarding the hazards and control methods associated with the consumption of raw milk? The presence of residues and contaminants from raw milk also needs to be assessed so that confidence in the end product can be assured in all aspects.

The toxin, contaminant and residue risks posed by unpasteurised milk cheese are unknown. There is a potential that toxins, contaminants and residues may be concentrated from the milk during the cheesemaking process. This was seen with residues in milk that remained in dairy products and in some cases increased (Iezzi et al., 2014).

Current regulations vary worldwide with respect to unpasteurised milk cheese. EU regulations require food producers to produce safe food, to identify food safety hazards in the food they produce, to identify measures to control these hazards and to verify that these controls are working. Member states are also required to periodically monitor for pathogens that could be passed from animals to humans through foods of animal origin by sampling animals and foods as appropriate. Other regulatory bodies worldwide vary in their compliance with regards to unpasteurised milk and cheese. Due to the changing export market, Irish cheesemakers will need to adhere to more than Irish and E.U. systems. Therefore, support from the scientific community is needed in order to ensure food producers use the most appropriate methods to produce safe foods. The application of analytical tools to analyse and assess unpasteurised milk cheeses is needed.

2. Questions addressed by the project:

- What the rate of occurrence of *L. monocytogenes* and *Salmonella* spp. in milk filters and raw milk used for raw milk cheesemaking.
- Is the occurrence of other bacteria in raw milk used for raw milk cheesemaking within specification
- What level of drug residues are in and raw milk used for raw milk cheesemaking.
- What is the occurrence of *L. monocytogenes* in the processing environments of raw milk cheesemaking facilities
- Are *E. coli* inactivated during cheese ripening

3. The experimental studies:

Raw milk intended for raw milk cheese production, milk filters, raw milk curd and raw milk cheese were obtained from nine raw milk artisan cheese producers in the south of Ireland, seven using cow's milk and 2 using goat's milk. Using the relevant standard methods, the samples were analysed for *L. monocytogenes*, *Salmonella* spp. *E. coli*, *S. aureus* and *B. cereus*. The samples were also measured for drug residues.

From 6 of the 9 processing facilities 40 swab samples of different food contact and non-food contact surfaces were collected on at least two occasions and analysed for *L. monocytogenes* by the ISO 11290-1 standard method.

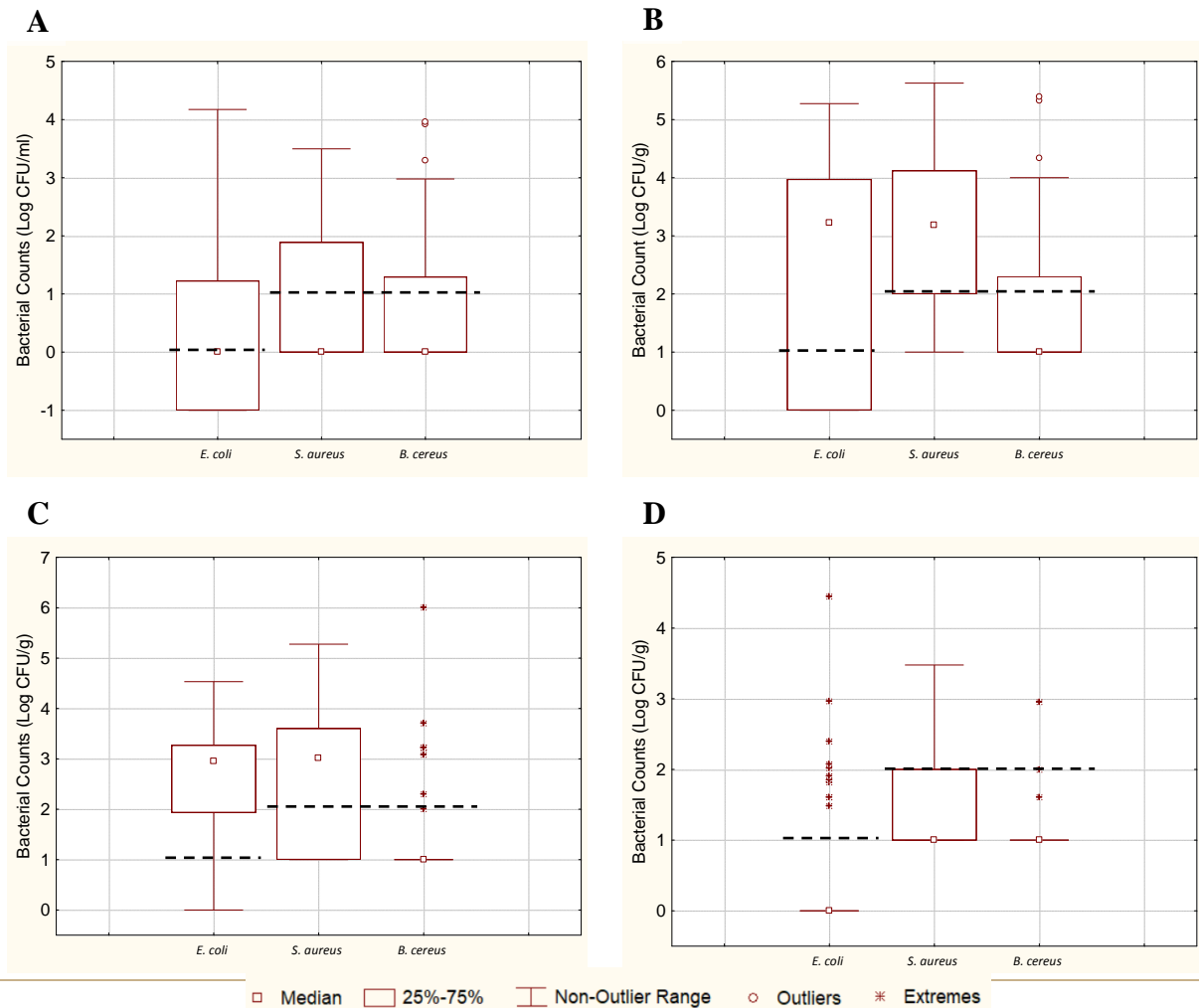
A generic laboratory-scale cheese was made with *E. coli* added at two different levels of inoculation. Cell numbers of *E. coli* were determined at various stages of cheese manufacture and ripening up to about 60 days. In parallel, *E. coli* numbers were measured during ripening of a batch of industrially-made cheese that was ripened for about 60 days.

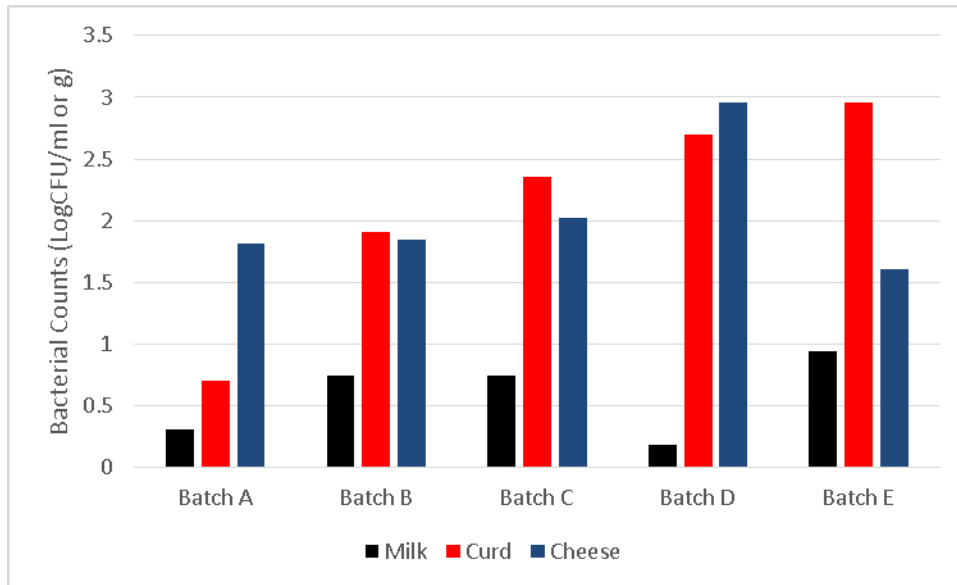
4. Main results:

- Table 1 shows the number of samples analysed during the project.
- No *L. monocytogenes*, *Salmonella* spp. or drug residues were detected.
- Figure 1 show other bacteria – explain box-plot
- No *L. monocytogenes* in processing environments tested
- *E. coli* survived in laborator-made and commercially-made cheese
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Table 1 – Number of samples tested for each type of sample in each microbiological analysis according to its origin

Sample	Total samples	Origin	<i>S. aureus</i>	<i>E. coli</i>	<i>B. cereus</i>	<i>L. monocytogenes</i>	<i>S. enterica</i>
Milk	68	cow	38	54	53	57	57
		goat	9	11	11	11	11
Milk Filter	58	cow	36	45	43	47	47
		goat	9	11	11	11	11
Curd	47	cow	28	42	40	45	45
		goat	1	4	4	2	2
Cheese	61	cow	47	47	48	50	47
		goat	5	9	9	11	9





5. Opportunity/Benefit:

The project results demonstrated that *Listeria monocytogenes*, *Salmonella* spp. and drug residues were absent in all the raw milk cheese-associated samples tested, while the other bacteria tested were within the specifications.

○ **Dissemination:**

Main publications:

- Antonio Lourenco, Mary Moloney, Martin Danaher, Kieran Jordan. 2019. The quality of raw milk, and cheese manufactured from it, in Ireland. One health EJP, Dublin, May 2019.
- Antonio Lourenco, Mary Moloney, Martin Danaher, Kieran Jordan. The Quality of Raw Milk, and Cheese Manufactured from it, in Ireland. Submitted to Food Control.
- Kieran Jordan and Antonio Lourenco. 2018. The quality of raw milk, and cheese manufactured from it, in Ireland. International Association for Food Protection European Symposium, Sweden, April 2018.

Popular publications:

- Two workshops were held for SMEs in order to transfer the knowledge to the relevant stakeholders.

6. Compiled by: Dr. Kieran Jordan