

Raw Milk field lab: Trial details

Summary:

This trial will support farmers to effectively carry out regular (daily) on-farm testing of their raw milk, with the aim of:

- Improving the safety of the raw milk product for consumers,
- Identifying and promoting farm management practices which improve milk safety,
- Saving farmers huge stress and money from wasted time, expensive laboratory testing and lost milk if they fail statutory milk tests.

Background to the issue:

In England raw drinking milk is sampled and tested twice a year during inspections by dairy hygiene inspectors. The herd must be healthy and free from brucellosis and tuberculosis, for which they must also undergo regular testing. If testing detects the presence of harmful bacteria, high levels of indicator bacteria, or farms lose their TB-free or Brucella-free status, sales of raw drinking milk must cease immediately.

Raw milk producers are also required to undertake their own testing with a laboratory, with a minimum frequency of at least two tests a month for hygiene indicators (coliforms and total viable count). These tests are costly and time consuming to sample and deliver to laboratories. Results usually arrive around a week later, long after the milk is sold and consumed or processed, so they are aimed at validating the systems of production rather than ensuring safety of any particular batch of milk.

On-farm testing has the potential to give real-time information about the safety of the milk on a daily basis, thereby giving confidence in the safety of each batch of milk both for the farmer and the consumer.

If milk fails to pass the statutory tests or producers' own tests the cause of the problem must be identified and corrective action taken by the farmer. Sales can resume after at least two consecutive satisfactory tests from different batches of milk. This pause in sales costs the farm money and substantial time and expense to investigate and resolve the problem, as well as leading to wastage of all the milk produced during this time.

In addition, the cause of the problem is not easy to identify. The two consecutive tests may be satisfactory, but the farmer may not know what caused the initial failure, so cannot remedy the original problem. The real-time information farmers get from daily on-farm testing can highlight any adverse trends before they become an issue, and make it much easier to pinpoint the source of any increases in bacteria.

Why is the trial needed?

In this trial farmers will document farm management practices and any alterations in habits/conditions which may contribute to test failure, thereby spotting management patterns which may cause testing failure. This should prevent problems in the future and these experiences will be documented as part of the study to look for trends that may help better understand common causes of problems. Any learnings will be applicable not just to producers of raw drinking milk, but to the entire dairy industry.

The FSA stated in 2018 (their most recent review of raw milk) that: “improvements are required to ensure better controls and accountability” and to better explain the risk to consumers”. The fact that over twenty raw milk producers were interested in taking part in the trial, shows that farmers have taken this on board and are keen to work proactively on this issue. The FSA has approved this trial.

Although there are some farmers in the US doing on-farm testing, and a pilot project was recently run in Sweden, we are only aware of two dairy farms in the UK trialling this method, one raw milk producer and one cheesemaker. These have given very positive feedback on their experience as it has enabled them to feel more confident in the safety of the raw milk they are selling and processing, and enabled Fen Farm Dairy to implement a test and hold system and extend the use-by date of their milk.

If on-farm testing is shown to be practicable, accurate and reliable it could be a gamechanger for the dairy industry. It may enable farmers to reduce the frequency of expensive laboratory testing at the same time as increasing monitoring for any trends in the microbiology. The ability to see results in 24 hours (usually a week for samples sent to a lab), enables a rapid response to any adverse trends and will help with identifying the cause of any issues.

Despite many years of substantial effort from both the dairy industry and the Food Standards Agency, there has been no significant improvement in the microbiological test results of raw drinking milk (McLauchlin et al, 2020). However, changing practices and interventions following focused audits and advice can lead to an improvement in somatic cell counts and total viable counts (Mihajlović et al, 2022). The issue is that often it is unclear what can be done to improve test results, and the literature is sparse and ambiguous on how the many management practices involved in dairy farming and milking processes influence test results, and the results of farmer-led investigations and corrective actions are often undocumented.

Some research has found high hygiene indicator counts to be associated with summer, udder soiling, not drying teats during teat preparation, less frequent acid washes, not clipping udder hair and manual bulk tank cleaning (Elmoslemany et al, 2010), although these associations are not consistent in the literature (e.g. Gibson 2008). Management practices in the UK also vary from those in other countries where their effect on test results has been studied.

Petrifilm tests have been shown to have good correlation with traditional testing methods in raw milk (Freitas & Carvalho, 2009; Souza et al, 2015) and coliform petrifilms can detect post-pasteurisation contamination of milk (Rojas et al, 2020).

Aims of the trial

The aim is to trial on-farm testing for hygiene indicators on dairy farms and to gather information relating to the following research questions:

1. Are on-farm TVC and coliform test results accurate when compared to laboratory-tested results?
2. What factors and practices affect TVC and coliform test results?
3. Is on-farm testing a practicable solution for different farms of different types and scales?
4. Does on-farm testing support dairy farms in achieving their target microbiological results?

Due to the small scale of the trial we do not anticipate answering these questions decisively, but we expect it will provide further understanding of the potential of on-farm testing and to highlight areas for further research.

It is difficult to estimate the economic impacts of a milk sample failing the official test, but it could be as high as £4,500 for a farm. This has been calculated using standard figures from the Raw Milk Producers' Association, and includes costs of additional inspections and samples, lab tests, farmer labour. The biggest impact is from loss of income from raw milk sales.

There could also be an increase in income from the testing, e.g. would farmers get more customers or be able to increase prices if they made their test results publicly available by increasing consumer confidence.

The group

The idea originated in the RMPA committee after Jonny spoke enthusiastically about his trials at Fen Farm Dairy, because it sounded like it could make a huge difference to the whole industry. In particular, Jonny had found the sources of microbiological issues he wouldn't have without the on-farm testing.

There was interest from 20 farmers wishing to take part in the trial. Those who are taking part are those that can commit to test every day or every other day and already submit frequent samples to a laboratory to enable collection of the maximum data over a 6-month period.

The coordinator of the trial is Tali Eichner from The Raw Milk Producers' Association. Our researcher is Katharina Watson at Royal Agricultural University. We have 6 participants who are all producers of raw drinking milk, some of whom also process their milk into other dairy products. Jonny Crickmore of Fen Farm Dairy is already doing this testing and will feed in his data for the trial. The other 5 participants are new to on-farm testing and are based in Suffolk, Wiltshire, Llandysul and Kent.

The group are also communicating with a group of raw milk cheesemakers who are starting to do the on-farm testing with the support of Specialist Cheesemakers Association. The two groups will aim to share their experiences to capture any qualitative findings.

Trialists are motivated by the potential benefits of on-farm testing and volunteered to participate in the trial, which will provide evidence for the use of the method.

Trial design

Participants will be supported to set up their own on-farm lab through sharing of equipment sources, written instructions and a demonstration workshop at Fen Farm Dairy.

TVC and coliforms will be tested on-farm by participants using 3M Petrifilms. The first test for the trial will include 3 replicates from the same sample. This will be repeated as needed, but once consistency is established, non-replicated tests will be carried out daily or on alternate days. Fen Farm Dairy and trialists on the pilot in Sweden say testing takes 5-10 minutes for each sampling, which participants have confirmed they can commit to.

Data will be collected via:

1. Pre-trial questionnaire: to provide information about ongoing farming and milking practices (e.g. teat preparation and cleaning methods, animal feed, housing, etc.)
2. Results submission form: to be submitted by participants for each sample tested, to include results and questions on variable factors that might influence results (e.g. milking and testing staff members, conditions, incidents, etc.)
3. Results of laboratory tests sent by email
4. Post-trial questionnaire: to collect feedback from participants on their experiences of on-farm testing
5. The co-ordinator and participants will maintain contact via a Whatsapp group and other mediums for peer support, experience sharing and to collect qualitative data on any investigations of microbiological issues and corrective actions taken

Test results will be analysed to look for any trends over the duration of the trial, accuracy in comparison with laboratory test results, and correlation with management practices. Observations and feedback will also be used to assess the utility of the method, any impacts of on-farm testing on participant farms, and any common factors influencing milk microbiology.