

**Town Farm Dairy July 2008 Milk Borne Illness Investigation
Incident 2008-11
Final Report 09 Oct 2008**

On July 16th, 2008 the Connecticut Department of Public Health (DPH) notified the Connecticut Department of Agriculture (DAG) of a possible link between several reported illnesses and the consumption of Retail Raw Milk (unpasteurized milk). Epidemiological evidence in this illness outbreak implicated Town Farm Dairy, Simsbury CT. Town Farm Dairy sold both Raw and Pasteurized milk and is comprised of a milk production unit (farm) with a milk storage room attached to the milking barn and a milk processing plant located in a separate building. The facility had twenty eight (28) milking aged Jersey dairy cattle, at the time of this investigation they were milking twenty two (22). The facility produced approximately eight hundred (800) pounds (93 gallons) of milk a day. The on site investigation reviewed the milking procedures, milk handling equipment cleaning, construction and repair of milk handling equipment, milk handling procedures, refrigeration and, processing and packaging both Retail Raw Milk and pasteurized milk.

Town Farm Dairies' own test results (utilizing a private laboratory in NY) revealed elevated levels of Coliform bacteria and they had voluntarily stopped the sale of Retail Raw Milk the week before DAG was notified by DPH epidemiologists of this illness outbreak. DAG regulatory standards for Retail Raw Milk are: Standard Plate Count not to exceed thirty thousand per milliliter (30,000/ml), Direct Microscopic Cell Count not to exceed seven hundred-fifty thousand per milliliter (750,000/ml cattle, 1,000,00/ml goats) and Coliform bacteria are not to exceed fifty per milliliter (50/ml). Official regulatory samples collected prior to this incident did not exceed regulatory standards. The dairy in this investigation was fully cooperative throughout the investigation and agreed to stop the sale of Retail Raw and pasteurized milk while the investigation was being conducted. The dairy was allowed to and did start shipping bulk milk to a pasteurization plant.

In addition to on farm sales, Retail Raw Milk from this dairy was sold at several retail outlets including a national natural foods chain. DAG staff obtained a retail customer and wholesale distribution list. DAG staff surveyed the retail outlets who carried Retail Raw Milk produced by the dairy to determine if any Retail Raw Milk from this producer was being sold or was in inventory. None was found and the withdrawal of the product in question from the marketplace was determined to have been effective. DAG forwarded the customer list to DPH epidemiological staff.

It must be noted that at no time was pasteurized milk a concern, as pasteurization destroys vegetative pathogens. The investigation did include a thorough review of the sanitation and management practices to ensure the proper controls were in place to prevent cross contamination of pasteurized milk.

Milking Procedures

Employees wore nitrile gloves during milking. Teats were prepared for milking by dipping with a one percent (1%) titratable iodine solution, the solution was left on for forty five (45) seconds. Teats were then stripped to determine the presence of abnormal milk. After stripping the teats were dried using individual cloth towels. Teats were dipped after milk out with a one percent (1%) titratable iodine solution. The cloth towels were washed and then dried in a conventional electric heated air dryer between milkings. The milking procedures were found to be acceptable and were consistent with industry practice.

Milk Handling, Storage and Processing

All milk contact equipment was washed after each use using commercially available cleaners designed for dairy soils. Milk contact surfaces on the farm and milk processing plant equipment was sanitized prior to use using a commercially available sodium hypochlorite solution. The sanitizing solution was mixed per the manufacturer's directions and chlorine test strips were observed in the facility. After milking, the milk was cooled to approximately thirty eight degrees Fahrenheit (38°F) in a bulk milk tank located in the milk room attached to the milking barn and stored there until it was moved to the processing plant. Milk was pumped through sanitary hose from the farm bulk milk tank into a portable insulated tank which was used to move the milk approximately 150 feet to the processing plant. The portable tank was equipped with a working refrigeration unit. From the portable tank, milk was pumped through sanitary hose into the processing area,

where approximately one half (1/2) of the total volume of milk produced was pasteurized and packaged in returnable glass bottles. The other one half (1/2) of the volume of milk produced remained in the portable tank until it was packaged into returnable glass bottles. Retail Raw Milk was processed after pasteurized milk, processing and bottling was finished. A review of previous inspections of this facility did not reveal any significant violations of DAG regulations regarding the sanitary production, handling and bottling of either pasteurized or Retail Raw Milk.

Pasteurized milk was processed in either of two vat style pasteurizers equipped with the proper temperature monitoring and recording devices. The just pasteurized, hot milk was cooled by chilled water by passing the milk through a stainless steel plate heat exchanger. The cooled pasteurized milk was then stored for a short period of time in a tank located just prior to the filling machine. Pasteurized milk was then bottled in returnable glass containers using an industry standard filling and capping machine.

Returnable glass bottles were washed and disinfected just prior to filling, utilizing a bottle washer commonly used in the industry. The wash/disinfection was accomplished by maintaining a combination of sodium hydroxide concentration (NaOH) and temperature in the bottle washer soak tank which was bactericidal. A NaOH concentration test kit was available and the operator reported that he did check the NaOH concentration and wash temperature before washing returned bottles.

Retail Raw Milk was packaged utilizing the same holding tank and filler used for pasteurized milk, after the pasteurized milk run was completed and the equipment was washed and sanitized. The Retail Raw Milk was pumped from the transport tank located outside of the processing room into a holding tank, then packaged in returnable glass containers and capped. These described procedures and controls were deemed sufficient to prevent contamination of the pasteurized milk products.

Some containers of Retail Raw Milk were filled as needed when they ran out of previously filled bottles. This was done by filling containers using a "gooseneck" shaped piece of stainless steel tubing attached to the outlet of the bulk milk tank located in the milk room attached to the milking barn, after filling each bottle was hand capped. This is a common practice that is allowed by regulation for smaller volume Retail Raw Milk producers however this facility did not meet this small volume criteria. Items noted during previous inspections and during this investigation included failure to cap valves, an improper seal around an agitator shaft of the transport tank and a bio-film of protein residue was observed on the stainless steel milk contact surfaces of the milk transport tank.

Environmental and Milk Sampling

After review of the scientific literature and consultation with experts at Cornell University, the department determined the most like cause of contamination of the retail Raw Milk with E. Coli O157 would be from fecal contamination of the milk. DAG conducted extensive testing of environmental, milk and fecal samples in an attempt to isolate E. coli O157 so that DPH could attempt to genetically link the any E. coli O157 isolated from the farm with E. coli O157 isolated from sickened individuals using Pulsed Field Gel Electrophoresis (PGFE) technology.

DAG collected one hundred and seventy samples (170) of various kinds during the four (4) week investigation. Initially DAG attempted to obtain milk samples representing as many different days production as possible. DAG submitted all samples obtained during this investigation to DPH for analysis. Six (6) samples of pasteurized milk and eight (8) samples of Retail Raw Milk were tested by DPH. Coincidentally in same week DAG was notified of the illness outbreak, DAG staff had sampled each milking animal in an attempt to isolate the cause of high Coliform bacteria counts this dairy had been experiencing. Samples of each cow's milk was analyzed at the University of Connecticut Veterinary Diagnostic Laboratory (CVMDL) for the presence of Coliform mastitis causing bacteria such as Klebsiella spp. Fifty four (54) culture plates representing all milking animals were recovered from CVMDL and tested at DPH. Thirty nine (39) samples representing milk contact surfaces, surfaces of feeding areas, drinking water tubs, mud and cattle milking platforms were tested. Twenty eight (28) individual milk samples from each milking aged animal were obtained and tested by DPH. Thirty four (34) fecal samples representing all animals on the farm were obtained and tested by DPH.

Sample Analysis/Results

After extensive testing of milk, milk contact surfaces, water sources, the environment in and around the farm and processing plant and; analysis of feces from each milking aged animal, DPH obtained a PGFE match between *E. coli* O157:NM recovered from the feces of one (1) cow and *E. coli* O157:NM isolated from several sick individuals. DAG determined that the suspect animal was in the milking string at the time the individuals who became sick had purchased Retail Raw Milk produced by this dairy. Subsequent testing of the suspect animal two weeks later showed that the animal was no longer shedding *E. coli* O157 in her feces.

Conclusions

The number of reported cases of illness and the distribution of the onset of symptoms over several weeks suggests that on a random basis Retail Raw Milk became contaminated with sufficient numbers of *E. coli* O157:NM to cause the illnesses. Based on the fact that *E. coli* O157:NM was recovered from one (1) milking animal, dairy cattle are a reservoir for *E. coli* O157¹ and *E. coli* O157 does persist in a farm environment², the department has concluded that the most likely cause of this milk borne illness outbreak was the consumption of Retail Raw Milk contaminated with fecal matter containing *E. coli* O157:NM.

The violations of regulations observed during this investigation were not considered significant except for the bio-film observed in the interior of the milk transport tank. The bio-film in the transport tank could have contributed to the high Coliform bacteria counts of the Retail Raw Milk and possibly *E. coli* O157 contamination if present. A review of the available scientific literature reveals that *E. coli* O157 may survive washing and sanitizing if enmeshed in a bio-film³ but to be present in the bio-film the bacteria would have most likely have come from milk contaminated by fecal matter.

It is impossible with any degree of confidence to determine exactly how, where and when the Retail Raw Milk became contaminated. The nature of a farm environment make it an ideal location for *E. coli* O157 to live and survive.

The investigation is closed with this final report dated 09 Oct 2008.



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2 Margaret A. Davis, Karen A. Cloud-Hansen, John Carpenter and Carolyn J. Hovde. 2005. *Escherichia coli* O157:H7 in Environments of Culture-Positive Cattle. *Appl. And Environ. Microbiol.* 71:6818-6822

3 M. Sharma, J.-H. Ryu and L.R. Beuchat. 2005. Inactivation of *Escherichia coli* O157:H7 in biofilm on stainless steel by treatment with an alkaline cleaner and a bacteriophage. *J. Appl. Microbiol.* 99:449-459