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THE DAIRY GOAT DIGEST

Dairy Food Safety Program, Food Inspection Branch
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CALIFORNIA MASTITIS TEST (CMT) IS A GOOD TOOL!

MIKE FORAN, RAW MILK SPECIALIST, DAIRY FOOD SAFETY PROGRAM

The CMT was developed in the late 1950's at the University of California when it was discovered that certain types of detergents, when added to milk, caused gelling that correlated with higher Somatic Cell Counts (SCCs).

How it works and what does it measure?

Mixed with milk, the CMT solution reacts with the DNA of somatic cells. Somatic cells are mostly made up of white blood cells, also known as leucocytes. The more white blood cells that are present, the more pronounced the gelling. If a goat has an udder infection, the body will send white blood cells to the udder in order to fight off the infection. The milk and CMT solution will gel in proportion to the number of white blood cells present, indicating the severity of the inflammation.

Figure 1: CMT kit

Can CMT help solve a Bactoscan problem?

The CMT is a good tool to monitor SCCs. However, many producers have noted that the CMT can be useful in troubleshooting Bactoscan problems as well. A goat with subclinical mastitis does not have the typical swollen, painful udder or abnormal milk and can therefore go undetected as a source of infection. Occasionally, such goats with subclinical mastitis can shed bacteria in huge numbers causing the bulk tank Bactoscan test to spike. In these cases the CMT can be used to help identify a goat shedding high numbers of somatic cells and also contributing to a high bulk tank Bactoscan test.

Using the CMT

Under normal circumstances, teats are stripped before using the foremilk to conduct the CMT. Each half of the udder, or a composite of the two, can be tested. To do so, a producer needs to put about 2 to 4 mL of milk into a well on the CMT paddle. He then tips the paddle almost vertically, allowing the excess milk to drain out, leaving about 2 mL of milk in each well. Using the squeeze bottle, the producer adds 2 mL of CMT reagent and swirls the paddle in a horizontal motion. There will be a reaction depending on the number of somatic cells present in the milk. The biggest error performed during this test is the addition of too much milk and reagent to the wells, skewing the results, and making the gelling difficult to observe.

Ministry of Agriculture and Food
Ministry of Rural Affairs
Ontario

CALIFORNIA MASTITIS TEST (CMT) IS A GOOD TOOL! (cont'd)

Interpretation of the CMT

CMT scoring is very subjective, in that each person performing the test may interpret the results differently. This is the biggest disadvantage of the CMT. Producers should begin by getting a clear understanding of what a negative and positive CMT result looks like (refer to table 1 below).

The CMT can be done on fresh goats; however, the milk of fresh goats may gel more even in the absence of significant subclinical mastitis. The milk of goats in very late lactation may react similarly. Therefore CMT results on fresh and late lactation goats are not always reliable.

Advantages and Disadvantages:

There are a number of advantages regarding the CMT. Namely, it is fairly accurate in measuring somatic cells in individual goats. The test is also relatively inexpensive, and it is simple and easy to use. Unfortunately, the scoring and interpretation of the results may vary between testers, and the exact somatic cell count number is not achieved. Keep in mind that the results from fresh and late lactation goats may be doubtful. ■

Rating	Reaction	Description of visible reaction	Interpretation (Cow SCC)
-	Negative	Mixture remains liquid and smooth. Perfectly clear reflection in fluid on bottom of paddle.	0-200,000 cells/ml.
T	Trace	A light slime forms and is seen most easily by tipping the paddle back and forth and observing the mixture as it flows over the bottom of the cup. There is a distorted reflection in the bottom of paddle. Trace reaction tends to disappear quickly with continued movement of the fluid.	150,000-500,000 cells/ml.
1	Weak	Numerous distinct clumps appear but with no tendency toward a single gel mass. With some milk, the reaction is reversible and may disappear with continued movement of the paddle.	400,000 – 1,500,000 cells/ml.
2	Distinct positive	The mixture thickens immediately with gel formation. As the mixture is swirled, it tends to move as a mass around the periphery of the cup forming a tail. When you tip the paddle, you can break the stream of liquid as it pours over the edge.	800,000-5,000,000 cells/ml.
3	Strong positive	A gel is formed which causes the surface of the mixture to become convex. An egg like appearance. This central peak may adhere to the bottom of the cup. When you tip the paddle, you cannot break the stream of liquid as it pours over the edge of the cup; it all comes out as one mass.	Cell number greatly over 5,000,000/ml.

Table 1: Interpretation of CMT visible reactions to estimate SCC

MILKING PROCEDURE TIPS—GOOD PRACTICES PRODUCE GOOD RESULTS

MIKE FORAN, RAW MILK SPECIALIST, DAIRY FOOD SAFETY PROGRAM

Figure 2: Goats being milked.

Milking procedures practiced by dairy goat producers are quite variable. During routine farm inspections we, as inspectors, try to specifically note what management practices producers with top notch milk quality carry out. Below is a summary of best practices for milking procedures based on recommendations by the National Mastitis Council. The National Mastitis Council is an international not-for-profit professional organization that promotes research and provides information to the dairy industry on udder health, milking management, milk quality, and milk safety. Some producers feel these recommendations are for cows and are not relevant to dairy goats. However our observations reveal that a good udder preparation and milking routine can improve milk quality (Bactoscan and Somatic Cell Count). How do your procedures compare?

Provide a clean, low stress environment for the goats.
The benefit of always providing adequate bedding for the goats should not be underestimated. Before milking, hands should be thoroughly washed with soap and water and then properly dried.

Clip udders for cleanliness.
Some goats tend to have a lot of hair on their teats. Although not a common practice, some producers clip the hair. Teats with long hair are difficult to clean and dry. Milking wet or dirty teats increases the risk of high bacteria counts in the milk and increases the rate of new cases of mastitis.

Check foremilk and udder for mastitis.
Mastitis can be detected by examining by hand the udder and using a strip cup to examine foremilk prior to each milking. Milk should never be stripped directly into the hand because this spreads organisms from teat to teat and goat to goat.

Wash teats with an udder wash solution, predip teats in an approved product, or use approved sanitizing dairy wipes.
Using an udder wash in a bucket and individual paper towels to prepare the teats for milking is acceptable. Individual towels are highly preferred because sponges and common cloths transfer mastitis-causing organisms to uninfected teats and goats.

Predipping is also an acceptable practice. Predipping works best when teats are clean. The entire length of the teat should be immersed. Predip should remain in contact with the teat for 30 seconds and then be thoroughly wiped off prior to attaching the milking unit. Sanitizing dairy wipes are also an option. A teat drying step is not required with the sanitizing wipes.

Dry teats completely with an individual towel.
If using an udder wash or predip, producers must dry the teats. Dry teats with individual paper towels or use separate cloth towels. Cloth towels can be laundered and dried after each milking. Milking wet teats increases the likelihood of mastitis and decreases milk quality.

Attach milking unit within 90 seconds after the start of stimulation.
The milking machine should be attached as soon as possible after milk letdown occurs. Attachment should be done carefully to prevent excessive air from entering the milking system potentially injuring teat ends.

Adjust units as necessary for proper alignment.
Observe units while they are attached to the udder to be sure they are adjusted correctly to help prevent liner slips. The greatest concern is slipping or squawking teat cups. The majority of new udder infections caused by liner slips occur near the end of milking when a teat cup liner slips and the liner opens, propelling small droplets of milk back against the end of the teat. These droplets may contain mastitis-causing organisms. Since milk flow near the end of milking is minimal, there is less flushing of the teat end and therefore increased risk of the organism remaining in the teat canal and causing infection if liner slips occur.

Shut off vacuum before removing unit.
The unit should be removed as soon as the last half of the udder is milked out. In parlours equipped with automatic detachers, care should be taken to ensure they are properly adjusted. Vacuum should always be shut off before teat cups are removed. The practice of pulling the unit off under vacuum needs to be avoided because it may result in liner slips and new udder infections.

Dip teats with an effective product immediately after unit removal.
Dip at least the lower one third of each teat. A good teat dip destroys organisms on teats, prevents them from colonizing in the teat canal, and may eliminate organisms already living inside teat ends. Research with dairy cows indicates teat dips reduce new infections by 50 percent.

Teat disinfection does not affect existing mammary gland infections but may reduce new infections of coagulase negative staphylococci (CNS). This is an important factor with dairy goats as CNS has been associated with high bactoscan results and is frequently cultured in high numbers (see article **Troubleshooting Milk Quality Problems** on page 10).

Maintain teat dip cups in a clean and sanitary manner.
Teat spraying is an alternative to teat dipping and may be acceptable if done correctly with a device that provides good coverage.

Other management factors can help. If possible, milk first lactation goats first and problem goats (goats with clinical mastitis or high SCC) last to avoid transferring infections to new milking animals. ■

BIOFILMS

BRUCE KEOWN, DAIRY FOOD SCIENTIST, FOOD SAFETY SCIENCE UNIT

Producers are often faced with sporadic spikes in their monthly Bactoscan counts. A high Bactoscan count one month and low count the next may indicate the presence of biofilms in the milking system.

So what are biofilms? Basically, they are layers of bacteria that are attached to milk contact surfaces and to one another with the help of slime (polysaccharides) that some bacteria produce. This slime traps other bacteria, debris and nutrients allowing the bacteria to reproduce protected from the effects of the wash cycle. Studies have shown that bacteria in the milk can attach themselves to a surface within 30 minutes, and within eight hours, a stable film develops. As the biofilms get thicker and thicker, they get harder and harder to remove. Gross biofilms may be visible as white-to-grey or cream-coloured deposits on milk contact surfaces or as a dullness to the sheen normally seen on stainless steel surfaces. However, biofilms can exist and cause problems even when not visible.

Biofilms are similar to the plaque that develops on our teeth or the slime on the rocks on the bottom of a stream. Once they are established in the milking system, pieces of the biofilms may break off during milking, resulting in sporadic high bulk tank Bactoscan counts. Any milk contact surface can harbour biofilms. They have been found on stainless steel, aluminum, glass, nylon materials, rubber parts, and Teflon seals. Improperly polished welds in pipelines, pinched gaskets and any milk contact surfaces that are scratched, cracked or pitted can foster the development of biofilms. Producers should assume that biofilms can form anywhere in the milking system.

Biofilm formation is not something that happens suddenly without warning. They most often develop when the cleaning and sanitizing program used in the milking system is not quite up to par. Producers should make sure that the water temperature used in the washing cycle meets the temperature suggested by the chemical supplier, that cleaner/sanitizer concentrations are correct and that the slugging action during the wash provides enough volume and force to clean the system adequately.

Thorough cleaning is the most important step in the prevention of biofilms. Cleaning prepares the milk contact surfaces for sanitizing. If the surface is not clean, it cannot be properly sanitized. Any remaining dirt or debris in the milking system can provide an excellent environment on which biofilms can easily develop. The application of sanitizers to dirty surfaces is both ineffective and a waste of money, as the ability of the sanitizer to destroy bacteria is drastically reduced. Once biofilms are established, they can be very difficult to eliminate. They act like insulators protecting the bacteria from contact with cleaners and sanitizers. They can actually shed water, and the bacteria in the biofilm can be much more resistant to sanitizers than bacterial cells floating around in the milk.

Since biofilms are very stable structures, the cleaning program has to be modified in order to remove them. Increasing the flow rate in the system, the chemical concentrations and the wash cycle times, (increases the contact time between the cleaners and the milk contact surfaces) may help to remove biofilms. Wash temperatures may be increased but raising them too high can cause proteins to “bake-on” making the biofilm problem even worse. The use of other cleaners that are better able to penetrate the biofilm protective barrier may have to be used as part of the milking system cleaning program.

Studies have shown that peroxyacetic acid-based compounds have the ability to penetrate and loosen the biofilm making it easier for the cleaners in the wash cycle to remove it. Use of a peroxyacetic acid cleaner/sanitizer in every wash cycle for two weeks will remove the biofilms. However, check with your chemical supplier before making any changes and always follow their advice. ■

The best defence against biofilms is making sure that the milking system is:

1. **Well-maintained**: gaskets and other plastic and rubber parts are replaced before they are etched or cracked. Spray balls are not plugged. Air injectors are working well.
2. **Well designed**: lines are self-draining and the welds are of sanitary quality. Also, the slugging action in the system provides sufficient fluid velocity for cleaning.
3. **Clean:** chemical supplier’s instructions must always be followed. Temperatures, chemical concentrations and contact times are all critical in ensuring a clean system. Remember that all cleaning and sanitizing chemicals including peroxyacetic acid are hazardous and that appropriate protective gear must be worn when handling them.

WHAT TO DO IF YOU SUSPECT INHIBITORS IN YOUR MILK—CASE STUDY

PHILLIP WILMAN, RAW MILK SPECIALIST, DAIRY FOOD SAFETY PROGRAM

Day 1:
Recently, a producer had his herd of milking goats break out of their pasture one evening and into the field where he keeps his veal calves. The goats consumed some of the veal calf feed, which had been top dressed with Aureo S-700 G Crumbles, a medicated feed containing the antibiotics chlortetracycline and sulfamethazine.

Day 2:
The escape was noted after milking in the morning. Nonetheless the goats were milked into the tank that evening. The producer did not notify the transporter of the milk, the purchaser of the milk or the Dairy Food Safety Program (DFSP) at the Ontario Ministry of Agriculture and Food and the Ministry of Rural Affairs (OMAF and MRA).

Day 3:
The milk from this producer was picked up early in the morning, along with the milk of three other dairy goat farms, and was delivered to the processing plant. The processing plant tested a milk sample from the truck using a beta-lactam rapid test kit. This test result was negative; that is it showed no presence of beta-lactam antibiotics (antibiotics are also referred to as 'inhibitors'). The beta-lactam class of inhibitors includes common antibiotics such as penicillin and its derivatives. However neither chlortetracycline nor sulfamethazine are in the beta-lactam class of inhibitors, which is why the test failed to produce a positive result. Based on the test result, the milk was accepted by the plant and made into cheese.

When the DFSP Raw Milk Specialist (RMS) went to this farm on day three on an unrelated matter, he discovered through conversation with the producer that a finished product (the cheese) destined for human consumption may have been made with milk contaminated with antibiotics. The RMS immediately notified the processing plant and the transporter of the milk, gathered details about the disposition of the milk and advised that further testing must be completed before any of the cheese could be marketed.

Day 4:
Inhibitor testing of the milk sample that was taken by the Bulk Tank Milk Grader was performed by the University of Guelph, Agriculture and Food Laboratory (AFL). The result of the test indicated the presence of sulfamethazine. The RMS immediately notified the processor and the transporter that the farm in question was under detention, and that no milk could be marketed from the farm until a negative inhibitor test result was obtained from the bulk tank. During this time period, the Canadian Food Inspection Agency (CFIA) was notified by the DFSP regarding the discovery of potential inhibitors in cheese. CFIA placed the cheese in question under federal detention and arranged to have samples sent to one of their laboratories for inhibitor testing.

Day 9:
On day nine, the RMS visited the farm and sampled that mornings milking. The sample was taken to the University of Guelph, Agriculture and Food Laboratory (AFL) and tested. This time the sample tested 'negative' for inhibitors and was therefore acceptable for marketing. At this point the farm detention was lifted.

Day 13 and 14:
Meanwhile the suspect cheese remained under detention while awaiting test results. The samples of cheese that were sent to the CFIA lab eventually tested positive for both chlortetracycline and sulfamethazine on day 13. The level of residue in these results was lower than the Maximum Residue Limit (MRL) as set by Health Canada, and as such, the cheese was deemed to be safe for human consumption. This resulted in the CFIA lifting their detention on the cheese on day 14. In the meantime the cheese manufacturer, at least for the short term, stopped purchasing milk from this producer.

Had this producer taken the time to call his transporter, his milk broker, his processor or an RMS, this milk would have been tested prior to being picked up, saving the transporter, processor and regulatory bodies much time and expense. ■

What to do
The first thing to do if you suspect that you might have inhibitors in your milk is to contact your RMS (refer to back page of digest). They will advise you on having the milk tested. There are three different classes of inhibitors commonly used on livestock for which rapid tests are available. Choosing the correct rapid test to use will depend on which type of inhibitor you suspect in your milk. If contaminated milk has already been shipped, CFIA will be notified. For further information on preventing inhibitor residues in your milk, please see the Milk Quality Infosheet Troubleshooting Antibiotic Residues in Goat Milk available on the OMAF and MRA website: www.omafra.gov.on.ca

ON-FARM DEADSTOCK DISPOSAL

BRIGITTE FALLOWS, SUMMER EXPERIENCE STUDENT, DAIRY FOOD SAFETY PROGRAM

The death of animals on any farm is a problematic, but inevitable occurrence. The deadstock must be properly dealt with in order to safeguard everyone's health and well being. Natural disposal of the deadstock (leaving the carcass to decompose in the environment) is illegal in Ontario, as it may attract scavengers, cause disease and odour issues, and also poses a biosecurity risk if surrounding water and soil are contaminated. Acceptable deadstock disposal methods include removal by a licensed deadstock collector, composting, incineration, burial, and use of disposal vessels (see figure 3).

Collector:
The carcass may be picked up by a licensed mortality collection services worker. The deadstock is collected on-farm or from communal collection containers and transported to either salvaging facilities, a renderer or composting facilities. Currently, over 80% of farms in Ontario have access to collection services.

Composting:
Composting is a procedure where environmental conditions are controlled to allow for the occurrence of aerobic decomposition and the natural breakdown of organic matter. The goal of this disposal method is to limit biosecurity risks by composting at temperatures above 55° C and maintaining high moisture (65%) environments, and a carbon to nitrogen ratio of approximately 30 to 1. This method is ideal because it is simple, inexpensive and biosecure.

Incineration:
Incineration is a fuel assisted cremation of the carcasses, which may reduce the carcass to inert ash. In order to be able to operate, incinerators must have a Verification Certificate issued by the Environmental Technology Verification Program of Environment Canada This verifies that the incinerator is able to reach the extremely high temperatures necessary for secondary combustion. Incineration destroys all pathogens (microorganisms that causes illness) and is therefore useful for preventing contamination in areas that have poor drainage, or are in close proximity to water sources.

Burial:
A carcass may be buried, by placing it in a large pit, and covering it with soil. This method promotes decomposition, while being simple, easy and biosecure. This simple method works best if the animal is buried in well-drained, warm soils.

Disposal vessels:
Disposal vessels are scavenger-proof and leak-proof containers that are above or under ground that promote deadstock decomposition. The vessels allow for year-round disposal and contribute limited air pollution. Disposal vessels are simple and relatively inexpensive to install and operate. ■

For more information on deadstock disposal methods including a list of all licensed livestock mortality collection services please refer to:
www.omafra.gov.on.ca/english/livestock/deadstock/

Figure 3: (from left to right) three-bin composting system; Incinerator with a secondary chamber; digging a burial pit using a backhoe

CONTROLLED REPRODUCTION FOR OFF SEASON MILK PRODUCTION

DR. CLINTON, VETENARIAN PRACTICING OUT OF KIRKTON, ONTARIO
PHILLIP WILMAN, RAW MILK SPECIALIST, DAIRY FOOD SAFETY PROGRAM

While there have been great improvements made in ensuring that the volume of milk production is consistent throughout the year, there are still periods in the spring and summer where milk production levels are too high. With most of the major brokers of goat milk having contracts stating that at least 50% of the milk must be produced in the "off season", it is more important than ever to have control of your breeding program.

Goats are seasonal breeders, thus their breeding cycle is heavily influenced by daylight intensity and length. That means that goats in Ontario will naturally start their estrus cycles as the day length diminishes in the fall. In order to get more does pregnant in the 'off' season, we need to influence the natural estrus cycle of the doe so that she can breed when we want her to.

A few options to bring does into heat in the off season include the use of hormones, light manipulation, introduction of a breeding buck and combinations thereof.

Introduction of a Breeding Buck:

One of the more common, albeit least successful methods, is to simply introduce a breeding buck to the does. Many producers report that a few, or some of the does, will conceive in the off season using this method, however it is rare to have a large number bred and pregnant using this method. In fact, it is quite common to have no results whatsoever.

Light Manipulation:

One option that is very inexpensive is to manipulate the length of time the goats are exposed to light so as to simulate the daylight lengths experienced in the fall period. This requires sufficient light for a minimum of 18 hours per day for a minimum of 45 days, and it is recommended that the light intensity be 12-15 foot candles (129-161 lumens) when measured at the eye level of the doe. This level of light can be achieved with 400 watts of incandescent light for an approximate pen area of 12 feet by 12 feet (13.5 m^2). The length of light period is then gradually and steadily decreased by 1-2 hours per week, until 8-10 hours of light per day is achieved. It is very important that the breeding bucks intended for use are exposed to the same light regime such that they are equally prepared for the upcoming breeding period. Approximately 6-8 weeks after the termination of the light treatment the breeding bucks should be introduced to the does, with fertile estrus occurring 10-20 days after the introduction of the buck.

Use of Hormones:

CIDRs

Another option involves using hormones to jump-start the estrus cycle. A Controlled Internal Drug Releasing Device (CIDR), which is a plastic intra-vaginal implant that contains progesterone, can be very effective when used in a program with additional hormone injections.

The protocol for the use of CIDRs is:
Day One-Implant CIDR.
Day 12-Inject prostaglandin.
Day 14-Remove CIDR and inject Pregnant Mare Serum Gonadotropin (PMSG).
Day 15-Expose doe to sight and smell of buck.
Day 16-Breed doe 43-48 hours after removal of CIDR.

Melangesterol Acetate

Feeding Melangesterol Acetate (MGA), which is a progesterone like compound, for a period of time mimics a similar effect that the CIDRs have and can be used to induce estrus. It is important to note that MGA cannot be used on lactating animals, and can only be used in non-lactating animals under a veterinarian's prescription to avoid drug residues in milk. Utilizing hormone injections in combination with MGA can increase the number of pregnancies; consult your veterinarian for a protocol.

Hormone Injections

Injections of Prostaglandins, such as Estrumate or Lutalyse, can also be used on their own; however these hormones will only work on active corpus luteum, and will have no effect if the ovary is not already active. Any of these hormone products must be used in conjunction with a veterinary consultation, as not all products are suitable for all animals. It is important to recognize that although these hormone preparations are safe they are considered 'off-label' and must be used with veterinary approval.

A combination of hormones, light manipulation, and introduction of a breeding buck may be the most effective means for maximizing pregnancies in the off-season and ensuring even milk production throughout the year. Many producers report having good success with inserting CIDRs into 20-25% of the does while at the same time using light manipulation to stimulate both the does and breeding bucks. No method will work perfectly, and what works at the neighbour's may not work at your farm. As with any aspect of your operation, record keeping and following protocols are the keys to success.

NATIONAL FARM-LEVEL BIOSECURITY STANDARD FOR THE DAIRY GOAT INDUSTRY

DEBORAH SONG, SUMMER EXPERIENCE STUDENT, DAIRY FOOD SAFETY PROGRAM

What is biosecurity?
Biosecurity is a set of practices that reduce the transmission of disease-causing organisms between animals. It is a proactive approach to protecting the health of your herd by focusing on routine, day-to-day farm activities.

Purpose of the biosecurity standard:
The standard provides guidance on 'best practices' to be used on goat farms to reduce disease and provides useful information to enhance producers' knowledge and understanding of biosecurity. The Guide takes into account the challenges faced in the goat industry and assists producers with preparing and implementing biosecurity plans that can be adapted to suit the needs of each farming operation. The Guide can also be used by producer organizations, veterinarians, service providers (such as milking equipment dealers, feed suppliers), and other stakeholders in the goat industry.

What does the standard cover?
The standard provides information on:

1) Sourcing and introducing animals
2) Animal health
3) Facility management and access controls
4) Movement of people, vehicles and equipment
5) Monitoring and record keeping
6) Communications and training

Who developed it and how?
The Canadian National Goat Federation (CGNF) and the Canadian Food Inspection Agency (CFIA), in collaboration with Agriculture and Agri-Food Canada (AAFC) developed the standard with the helpful guidance of representatives from goat industry organizations, colleges and universities, and government.

The process of developing the standard included researching existing biosecurity programs world wide and consulting with producers to identify best practices on goat farms in all production types (meat, milk and fiber).

Why is it important?

- Animal health management has undergone many changes in the past few years with new practices that producers should be aware of and adopt.
- There is new information about the risks of emerging pathogens and virus- related diseases due to commingling of animals and people.
- Globalization has led to increasing market opportunities and requires more attention to traceability in the goat industry.

As a result of these influences, implementing an approach focusing on disease prevention and on-farm biosecurity has become a main focus in the livestock industry.

The benefits to increasing on-farm biosecurity include:

- reduced disease transmission and mortality rate
- Improved herd health and welfare
- increased profits
- increased consumer confidence in the safety of Canadian goat products. ■

An electronic copy of the National Farm-Level Biosecurity Standard for the Goat Industry is available online at: www.inspection.gc.ca

IODINE TESTING

CHARLES FULTON, RAW MILK QUALITY PROGRAM COORDINATOR, DAIRY FOOD SAFETY PROGRAM

The Dairy Food Safety Program is expanding the regulatory testing program to include the testing of milk samples from the bulk tanks of goat milk producers in Ontario for the presence and concentration of iodine. Health Canada's maximum recommended threshold for iodine in milk, has been set at 500 micrograms (µg) per litre.

More information is available in a letter mailed out to all goat milk producers on July 9th, 2013. If you have any questions or concerns please contact your Raw Milk Specialist, or Charles Fulton, Raw Milk Quality Program Coordinator at (519) 826-5996. ■

REMINDERS TO PRODUCERS

BRENDA NORRIS, TECHNICAL REGULATORY ANALYST, DAIRY FOOD SAFETY PROGRAM

Bulk Tank Sampling

In cases where the milk cannot be reached for sampling with a pipette, Bulk Tank Milk Graders (BTMG) require a clean sanitized dipper to collect milk samples from the bulk tank. Note that the condition and quality of your dipper can have a direct impact on your Bactoscan test results. Producers are required to provide Bulk Tank Milk Graders with approved, clean, long-handled dippers and sanitizing solution. Ideally producers should leave the dipper in a small pail of sanitizing solution on pickup day. It is not advisable to leave the dipper in the sanitizer for extended periods, since sanitizers may loose their effectiveness over time and cause degradation of plastics and rusting of stainless steel. Always follow the manufacturer's instructions printed on the product label to make sure you are preparing the correct concentration of sanitizing solution.

Even when a long-handled dipper is available, some farm bulk tanks are still difficult to grade and sample. If the milk in the bulk tank can't be reached for grading and sampling, producers need to keep a clean step ladder or stool on hand to allow a BTMG or Raw Milk Specialist (RMS) to safely obtain samples.

Hose Maintenance

Producers are required to supply a hose with an attached nozzle in the milk house for use by the BTMG for rinsing the bulk tank after it is emptied. Immediate rinsing removes the majority of milk residue and prepares milk contact surfaces for cleaning. Please ensure your hose and nozzle are clean, readily available and working effectively.

Label Dispenser

Milk sample labels and label dispensers have been supplied to all milk producers. Please ensure your label dispenser is secured to a wall in an accessible and easy to find location. This helps your BTMG to find labels and properly identify milk samples.

Hose Port Maintenance

A milk truck transfer hose takes a lot of abuse from routine daily use and needs to be periodically replaced. Maintaining your milk house hoseport will help to extend the hose's life. Please ensure hoseports are repaired promptly, upgraded when necessary, and clean.

Loading Areas

In light of the very wet weather experienced in some parts of Ontario this summer, producers are reminded to ensure that their loading areas are well drained and kept free of refuse and animal and plant waste. A well maintained loading area helps to prevent milk contamination.

Keeping Livestock Securely Penned

It is critical that goats are securely penned to prevent them from accidentally getting into pesticides and chemicals that could compromise milk and meat safety or the health of animals. Pesticides and chemicals used on your dairy farm must also be properly stored to prevent animals from accessing them. Pesticides include chemicals used on crops or pastures, and in and around the milk house and barns.

Producers that feed medicated feed to any group of animals must also take extra precautions to ensure that milking animals do not have access. Keep goats securely penned. Ensure all medicated feed storage areas, feed bins and carts are clearly identified for those that deliver the feed and feed the animals. Consult with your veterinarian and follow recommended milk and meat withdrawal times for all feed medications to avoid penalties.

Planning to Build or Renovate?

This is a reminder to all goat milk producers to notify the Dairy Food Safety Program (DFSP) prior to building or renovating milk houses or milking areas. A RMS will visit the farm to review the construction plans and provide appropriate recommendations, ensuring that the regulatory requirements outlined in the *Milk Act* will be met. Pre-approval of construction plans prevents costly after-the-fact modifications and improper equipment installation which often leads to operation failures and cleaning problems.

Once the construction is complete, facilities must be inspected by the RMS before putting milk into the tank. Producers are encouraged to make a request for final inspection at least one week in advance to ensure a RMS is available when the new equipment is ready and the producer is ready to start milking.

Ceasing Operation?

Occasionally goat milk producers voluntarily cease milk shipments at some point in the year. Whether you stop permanently or temporarily, producers and brokers are asked to notify the DFSP. If you start you operations again please notify the DFSP. If you have ceased operations for more than 30 days your RMS must conduct an inspection prior to you shipping milk. ■

TROUBLESHOOTING MILK QUALITY PROBLEMS:

Why a Step by Step Approach is Important!

PHILLIP WILMAN, RAW MILK SPECIALIST, DAIRY FOOD SAFETY PROGRAM

It is no secret in the goat milk industry that poor milk quality has plagued many producers in the past, and in particular, the last 18 months. While the reasons for this are many and varied, this article will illustrate a few of the more common problems that we, as Raw Milk Specialists (inspectors), have found.

Poor milk quality can be separated into two major categories: equipment related and udder health related. While both causes have their own unique characteristics, the steps taken in determining the actual cause of the poor milk quality are the same. To help illustrate this, and the necessity of using a step-by-step approach, we will discuss three instances of poor milk quality and how they were solved. It is important to note that while these cases are factual, the names of those involved have been changed.

Case 1:

Joe called his inspector, and was concerned that the bacteria count in his milk was very high. Joe operates a dairy goat operation that milks 150 goats in a single 12 parlour. He always uses approved sanitizing teat wipes before milking and an approved iodine based post milking teat dip. His goats are well bedded in clean straw, so it came as a surprise to see that his Standard Plate Count (SPC) had gone from an average of 2500 colony forming units per milliliter (cfu/mL) to a 'too numerous to count' (TNTC) result in one week (TNTC is greater than 250,000 cfu/ml). The SPC is one way of enumerating bacteria in milk and a result of less than 50,000 cfu/mL is considered an acceptable level.

After an initial phone conversation where Joe explained how he had unsuccessfully attempted to find the source of the problem, a quality assistance inspection was arranged. The following detailed protocol was used by the inspector, as it has been proven time and again to save time and effort by methodically checking the critical control points. These critical control points include ensuring that the milk temperature is kept as close to 1˚C (34˚F) as possible, that the cooling unit chills the milk to this temperature within an hour after milking, that the water temperature at the start of the chlorinated alkali wash is at least 74 ˚C (165˚F) and that the temperature is at least 49 ˚C (120˚F) at the end of the hot wash cycle. Hot water is the most important cleaner on the farm, as even the most potent cleaners cannot keep goat milk fat in suspension unless it is first melted by hot water.

All of the milk contact surfaces were checked for cleanliness. It is important to check equipment after it has dried, as wet stainless steel can look clean and shiny even when it is dirty. For example deposits of mineral called 'milkstone' are only visible when equipment surfaces have dried. Since many systems are large and complex and may have areas that cannot be easily examined visually, it is important to have a method that ensures that these systems are also receiving adequate washings. In these cases, a "Wash System Analysis" is performed by the inspector, which includes checking water temperatures, chemical strengths, cycle times and the slugging action in the system.

In Joe's situation, even though the system appeared clean, a wash analysis was performed as a precaution. The analysis showed that the cleaning cycles were properly set up and functioning, the air injector settings were correct for the size of the pipeline and the air injector was functioning during all wash cycles. Note that even though the water temperature from the tap in the milk house may be quite high initially, it is imperative to check the water temperature as the sink fills. If the bottom element in the electric water heater fails, the top element will still function and will provide water of the correct temperature at the start of the sink fill; however the temperature will drop rapidly after a few minutes.

Since the equipment and cooling appeared to be functioning correctly, a bulk tank mastitis culture test was conducted. This test uses specific growth media plates and temperatures to allow the growth of the most common mastitis-causing organisms. A trained laboratory technician will then visually identify any organisms that do grow, and assign a number from 1+ (low) to 4+ (high) to indicate the number of organisms present on the plate. The direction of the troubleshooting will depend on which organisms grow and at what level. Organisms such as *Staphylococcus Aureus* and *Streptococcus Uberis* are highly indicative of udder health issues while high numbers of *pseudomonas* species and *bacillus* species are more indicative of an equipment cleaning issue that has resulted in a biofilm.

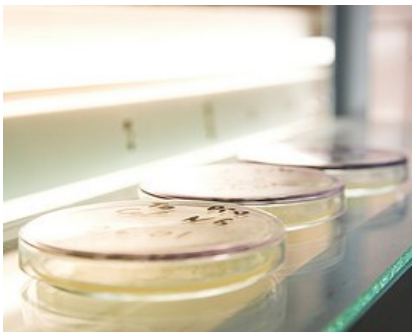


Figure 4: Bacterial cultures on Petrie dishes

Coagulase Negative Staphylococcus (CNS) is a common skin microbe that is often found at the 1+ level in cultures. At this level, CNS normally has little impact on overall milk quality. When CNS infiltrates the teat canal and the udder, it can cause mastitis and high bacterial counts in the milk of that doe, and subsequently, the bulk tank. This is what happened at Joe's, the culture came back with a 4+ rating for CNS. Upon receiving the test results, the inspector immediately suggested that Joe use the California Mastitis Test (CMT) to screen the goats for udder health issues (figure 4). (See page 5 for more information on the CMT).

Joe screened each goat at the next milking, and found one goat of the 150 milking animals which reacted strongly (gelled heavily) to the CMT yet showed no clinical signs of mastitis. Joe did not milk this animal in to the bulk tank and on the next milk pick-up his SPC dropped from TNTC to 2000 cfu/ml. (It just worked out that the day that Joe found the goat with mastitis was a milk pick-up day and the tank was empty, so the entire next weeks milk did not have the mastitic milk in it). A culture of the milk from that goat showed a 4+ CNS and a SPC of > 500,000 cfu/mL. Needless to say, Joe culled that goat and has had excellent milk quality for the last two plus years.

Case 2:

In a very similar situation, Jane called to consult on her milk quality problem. Jane runs a dairy goat operation with a history of good milk quality. Originally, the udder prep routine included a pre-milking dip, wiping the teats dry with a paper towel, milking the doe, then applying a post milking dip. Jane was becoming increasingly concerned, as she had been experiencing poor milk quality even though she had the equipment dealer out to check the system and was using the CMT to screen the goats. The dealer felt that the system was clean and operating correctly, and the CMT showed no goats that were reacting. A quality assistance inspection was arranged. The inspector agreed with the dealer that the equipment was clean and shiny, and that the system appeared to be washing correctly. Jane was using the CMT correctly, but was not finding any animals which reacted to the CMT.

It was arranged that the Bulk Tank Milk Grader would take two duplicate samples from the bulk tank on the next milk pick-up and that one sample would be sent for mastitis culturing. Such sampling arrangements are only conducted after the inspector has held a consultation with a producer or conducted an inspection at the farm. Similar to Joe's case, the result showed a high level of CNS, plus some other environmental mastitis organisms at low levels. Upon receiving these results, a telephone conversation with Jane to review milking practices revealed that she had stopped using post milking teat dip some months earlier, to reduce costs. The puzzling part was why none of the goats were reacting to the CMT.

An early morning drive by the inspector allowed him to obtain hand milked group samples and to observe milking practices and procedures. Testing of the group samples showed that one of the eight groups of milking animals had elevated bacteria levels. Another trip to the farm to individually sample each goat in the suspect group and return the samples to the lab proved beneficial, as two goats were identified with elevated bacterial counts. These goats were removed from the milking herd and the bacteria counts dropped to acceptable levels. Further investigation led to bacteria and culture testing of the milk from each of the suspect goats.

The results were confusing to the inspector, the producer and the veterinarian involved. The results showed that the goats had 4+ culture results for CNS and very high bacteria levels but a low Somatic Cell Count (SCC). It was thought up until this point that a CNS infection would always result in a high SCC. This experience, as well as others since, have shown that CNS may or may not be associated with a high SCC. This is problematic, in that the use of the CMT may or may not always catch the problem doe! In a tough case like this the use of a strip cup, covered with a fine meshed black nylon may reveal mastitic milk and therefore be a useful tool to compliment the CMT (see figure 5). A combination of CMT screening and group testing helped to narrow down the source of this milk quality issue.

Because the Bactoscan test has such a quick turnaround time for producing test results, milk quality issues can be resolved quickly. Group and individual goat milk samples can be collected and tested on the same day. Good record keeping is essential in order to quickly identify groups and individual goats that may be responsible for high counts. We have found that just one half of a doe's udder in a herd of over 400 milking does can cause the bulk tank test result to be over the allowable limit for bacteria.

Figure 5: Strip cup

TROUBLESHOOTING MILK QUALITY PROBLEMS (cont'd)

The group samples are tested using the Bactoscan while the individual goat samples are held in the laboratory refrigerator. Any group having a high bacteria level is indentified and the individual goat samples from that group are gathered for further testing. To avoid 'plugging up' the Bactoscan only individual goat samples with a SCC of less than four million are further tested on the Bactoscan. This requires that individual goat milk samples first be run through the Foss machine to test them for SCC.
Any sample with a SCC greater than 4 million will not be tested on the Bactoscan. Quite often (although not always), a doe with a SCC of greater than four million will also have an elevated bacteria count. Therefore for the purposes of resolving milk quality issues it is advisable to keep the milk from does with high SCCs out of the bulk tank.

Figure 6: Wash system analysis kit

Case 3:
In the third case, Sam's broker ordered a culture as part of their routine milk quality program. Sam called the inspector looking for assistance in interpreting the test results, as well as to request a quality assistance inspection. An inspection was arranged and the test results were discussed at the start of the inspection. As with most cultures performed before a quality assistance inspection, this culture showed very low levels of environmental pathogens and a 1+ level of CNS.

During the inspection the producer explained that a few weeks ago he noticed that his hot water heater had failed. The bottom element had burnt out, and he had no idea how long the element had not been functioning. He had repaired the hot water heater but his Bactoscan test results had not improved. A check of the hot water showed that the initial temperature from the tap was adequate at 82˚C (180 ˚F). A visual inspection of the milking equipment showed that a very heavy film had developed in the pipeline and the receiver jar. At this point it would have been logical to assume that the hot water heater malfunction was the cause of the problem. However, rather than break his own rule to always follow the step by step approach, the inspector decided to proceed with performing a wash system analysis (figure 6).

The results of the wash system analysis showed some interesting deficiencies that would not have been found otherwise. The wash start temperature was adequate (79˚ C (175 ˚F) at the end of filling the sink) and the manual addition of chemicals to the system made it unlikely that it was either of these two items that caused the film build-up, so an analysis of the air injector timing and subsequent slugging action was performed. The results were shocking.

The air injector settings, which should have been 3 seconds open and 15-20 seconds closed, were 18 seconds open and 12 seconds closed! Sam opened the control panel and adjusted the controls until the proper settings were obtained. **(Be VERY careful if doing this yourself as there are high voltage wires in the box!)** The other surprise finding was that the divert valve at the receiver group was left in the open position. Sam told the inspector that he had not been opening or closing this valve for milking and washing for over a year. He did not realise the importance of having the valve open during milking to allow proper milk and vacuum flow to both sides of the parlour, and the importance of diverting (by closing the valve) the slug of wash water around the entire pipeline. This, coupled with the improper air injector settings, had caused the heavy film build-up that was quite visible in the equipment.

It is important to note that a film does not appear overnight, nor does it disappear overnight. It often takes numerous days – sometimes up to two weeks - to fully remove a heavy film. Biofilms are even harder to remove. It is advisable to work closely with your inspector and equipment dealer if you suspect a biofilm (see page 4 for information on biofilms).

Sam's Bactoscan test results have improved since the quality assistance inspection, although there were a number of weeks in between where the counts bounced up and down, and actually went very high one week. We often see this as the extra-strength "power" wash loosens and removes the film. While no system works perfectly every time, following the protocol listed below works quickly and effectively almost all of the time. ■

TROUBLESHOOTING MILK QUALITY PROBLEMS (cont'd)

Step by Step Protocol

Steps to take when you encounter poor milk quality:

1. Check milk temperature.
2. Ensure that the cooling unit lowers milk to as close as possible to 1°C (34°F) within one hour after milking.
3. Check water temperature at the start (74 °C (165 °F) or higher) and end (49°C (120°F) or higher) of the chlorinated alkali wash cycle.
4. When dry, visually inspect the pipeline, milk hoses, inflations and any other milk contact surface for the presence of films.
5. Observe a complete wash cycle of the milking and the cooling equipment. You may find that a pump or valve is worn and not working properly, or that chemicals are not being dispensed as required.
6. Consult your equipment dealer and/or the inspector to discuss findings and arrange for a quality assistance inspection and/or a culture.
7. Utilize the CMT or a strip cup to screen for udder health issues.

Please see laminated insert for producers to post in their milk house.

SUMMARY OF RAW GOAT MILK TEST RESULTS

JEFF PERKINS, SCIENTIFIC SUPPORT ANALYST, FOOD SAFETY INFORMATION MANAGEMENT UNIT

Table 1 : Goat Milk—All Test Result Averages (medians)

Month	Bactoscan (median) (ibc/mL)	Fat Content (%)	Freezing Point (°C)	Protein Content (%)	Somatic Count (cells/mL)
Jul-12	93,000	3.31	-0.545	3.13	1,037,000
Aug-12	87,000	3.35	-0.545	3.16	1,046,000
Sep-12	81,000	3.5	-0.549	3.26	1,119,000
Oct-12	96,000	3.81	-0.549	3.5	1,359,500
Nov-12	104,500	4.01	-0.551	3.66	1,479,000
Dec-12	113,000	4.07	-0.552	3.66	1,513,000
Jan-13	105,000	4.09	-0.552	3.65	1,503,000
Feb-13	113,000	4.14	-0.552	3.61	1,421,000
Mar-13	102,000	4.1	-0.551	3.53	1,302,000
Apr-13	105,000	3.91	-0.55	3.41	1,185,000
May-13	81,000	3.69	-0.549	3.3	1,173,500
Jun-13	82,000	3.54	-0.547	3.21	1,074,000
Averages	**96,000**	**3.78%**	**-0.549**	**3.4%**	**1,254,000**

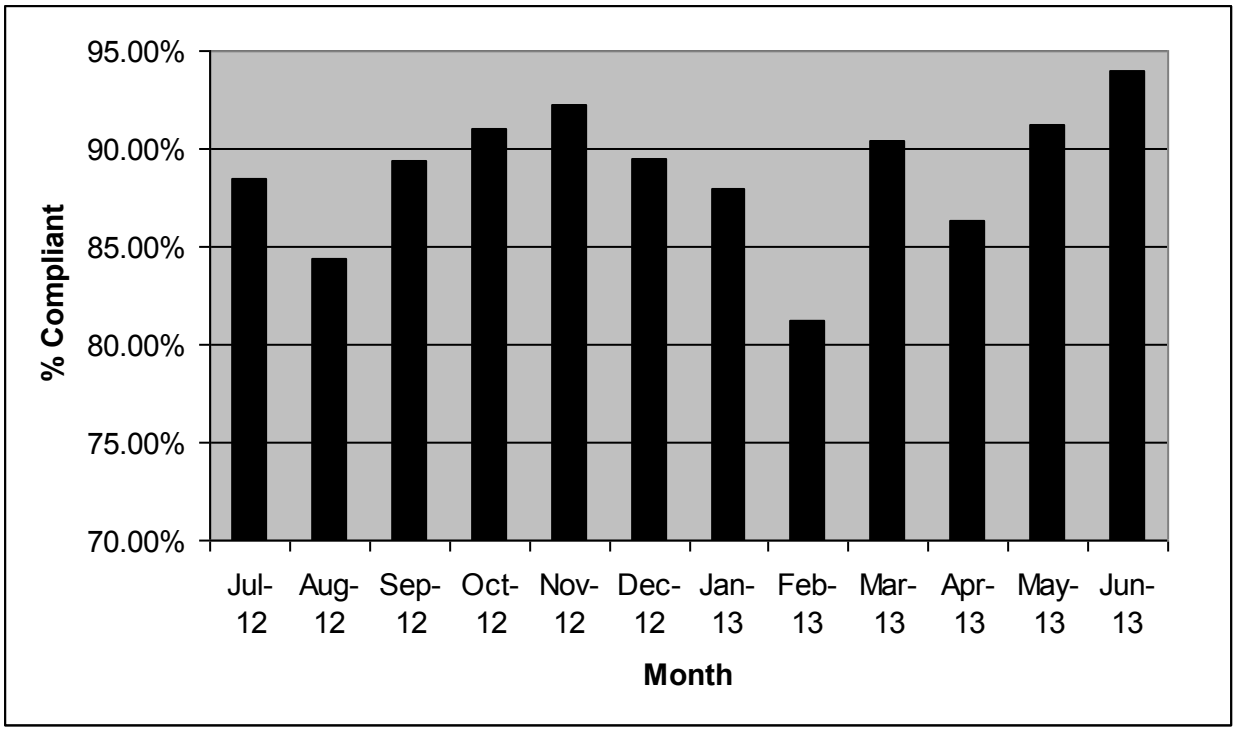
BACTOSCAN TEST RESULTS: 12 month averages

JEFF PERKINS, SCIENTIFIC SUPPORT ANALYST, FOOD SAFETY INFORMATION MANAGEMENT UNIT

Table 2: Distribution of goat milk Bactoscan results for the period of July 2012 to June 2013. The following table represents bacteria test results (using the Bactoscan) for regulatory goat milk samples (1 per month) collected from each dairy goat farm over the past 12 months. "Compliant" figures represent the percentage of samples that met the regulatory standard of less than 321,000 ibc/mL. The columns of less than or equal to 100 (<= 100) ibc/mL illustrate that the majority of goat milk producers are shipping milk with very low bacterial levels.

Month	# of Samples Tested	<=100 ibc/mL	101-320 ibc/mL	> 320 ibc/mL	% <= 100 ibc/mL	% Compliant
Jul-12	235	142	66	27	60.4%	88.50%
Aug-12	238	145	56	37	61.0%	84.40%
Sep-13	238	144	69	25	60.5%	89.40%
Oct-12	235	135	79	21	57.4%	91.00%
Nov-12	232	128	86	18	55.2%	92.20%
Dec-12	221	97	101	23	43.9%	89.50%
Jan-13	224	118	79	27	66.9%	88.00%
Feb-13	224	101	81	42	45.0%	81.20%
Mar-13	231	129	80	22	55.8%	90.40%
Apr-13	234	123	79	32	52.5%	86.30%
May-13	238	161	56	21	67.7%	91.20%
Jun-13	225	148	63	14	65.7%	94.00%
Average for 12 months	231	131	75	26	56.7%	89.10%

Table 3: Goat Milk Bactoscan Results - Percentage of Producers Compliant (<321,000ibc/mL)



NEW ANIMAL HEALTH ACT REGULATIONS

This article made its first appearance January 2013 in the Virtual Beef, Pork News and the Ontario Sheep Marketing Agency Sheep News newsletters.

Effective January 1, 2013, new reporting and compensation regulations under the Animal Health Act will help Ontario Ministry of Agriculture and Food and Ministry of Rural Affairs (OMAF and MRA) detect and respond to animal health events in a timely manner. The new reporting regulation requires that animal health laboratories and veterinarians report certain animal health hazards to the OMAF and MRA immediately and annually. These reports help to identify risks and assess the level of response required. They also help to identify new and emerging trends and assess the need for preventative programs. Veterinarians are required to report situations of very serious risk (as well as positive results of immediately notifiable hazards from samples that they sent to out-of-province laboratories).

The second regulation allows compensation to be paid to owners who have incurred costs or losses as a result of actions taken under the Act. For example, compensation could be paid to owners for the value of animals that are destroyed or injured as a result of actions taken under the Act. Compensation could also be paid for cleaning, disinfection, destruction or disposal costs. The compensation regulation clarifies details around eligibility for payment. It sets out limits for payment amounts as well as considerations that could result in reduction or refusal of a payment.

For example, compensation will not be paid by OMAF and MRA for costs or losses incurred as a result of actions taken under other legislation.

There are no provincial reporting requirements for animal owners. Animal owners should call their local private veterinarian when their animal is sick and the veterinarian and laboratory will determine if reporting is required.

For more information on the new reporting and compensation regulations please visit www.ontario.ca/animalhealth. ■

GROWING FORWARD II

Growing Forward 2 (GF2) is a five year federal-provincial-territorial initiative launched earlier this year and is designed to encourage innovation, competitiveness and market development in Canada's agri-food and agri-products sector.

GF2 offers workshops and funding assistance for producers, processors, organizations and collaborations under two main categories:

- **Capacity building activities** - includes skills development, training, audit, assessment and planning, and
- **Implementation-based projects** – requires strong rationale for projects and a well-developed plan.

A GF2 program guidebook and application form can be found at: ontario.ca/growingforward2 and is also available through delivery partners:

Producers may contact:
Ontario Soil and Crop Improvement Association
www.ontariosoilcrop.org
Tel: 1-800-265-9751

Processors may contact:
Ministry of Agriculture and Food
www.ontario.ca/growingforward2
Tel: 1-877-424-1300

Organizations & Collaborations may contact:
Agriculture Adaptation Council
www.adaptcouncil.org
Tel: 519-822-7554

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BROUGHT TO YOU BY THE FOLLOWING OMAF and MRA STAFF:

Dairy Food Safety Program

- Karen Atchison, Manager
  (519) 826-4378
- Mike Foran, Raw Milk Specialist
  (519) 826-4061
- Phillip Wilman, Raw Milk Specialist
  (519) 826-3746
- Charlie Fulton, Raw Milk Quality Program Coordinator
  (519) 826-5996
- Armaghan Dayyani, Program Coordinator
  (519) 826-3491
- Brenda Norris, Dairy Technical Regulatory Analyst
  (519) 826-4684
- Brigitte Fallows, Summer Experience Student
- Deborah Song, Summer Experience Student

Food Safety Science Unit

- Bruce Keown, Dairy Food Scientist
  (519) 826-3869

Information Management Unit

- Jeff Perkins, Scientific Support Analyst
  (519) 826-3531

Toll Free: 1-888-466-2372
Extension is last 5 digits of telephone number

Got Questions? Need Answers?

Visit the **NEW Dairy Food Safety website** page to get information on getting started milking goats, goat farm inspections, grading and transportation of goat milk and much more:
www.omafra.gov.on.ca/english/food/inspection/dairy/tableofcontents.htm

Info sheets on goat husbandry and milking procedures are also available at www.omafra.gov.on.ca/english/livestock/

The Agricultural Information Contact Centre (AICC) is a user-friendly means to make OMAFRA's information accessible to agri-business, rural business and producers in Ontario. Clients can contact AICC to receive targeted and relevant information and resources. The AICC's knowledgeable and dedicated staff are available to answer your questions weekdays between 8: a.m. and 5 p.m. Call toll free at 1-877-424-1300 or email to ag.info.omafra@ontario.ca.

Q Fever

***Coxiella burnetti* in goats and Q fever in humans**

Coxiella burnetti is a bacterium commonly found in domesticated animals throughout the world, including goats. Infected animals may not have any symptoms yet can pass the infection onto humans (a zoonotic disease) who experience flu-like symptoms and many require medical attention (Q Fever). Pasteurization destroys the *C. burnetti* bacterium in milk. To learn more see the enclosed Infosheet.

LEARN MORE!

Check out past issues of the Dairy Goat Digest at www.omafra.gov.on.ca/english/livestock/goat/news_dairygoat.html.

Également disponible en français

For more information :
Telephone : 1-877-424-1300

www.ontario.ca/omafra