CSI: CowSide Investigation

Influencing factors of new mastitis infection rate

By Dr David A. Reid,
Director of Milk Harvest,
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Have you ever heard a veterinarian state that it must be the milking equipment, or some other factor such as the teat dip or the liner choice affecting a certain herd's level of new mastitis infections? Veterinarians will form this opinion because they are looking at how the cows respond to their treatment regimens for clinical mastitis. They use the same or very similar protocols for two or more herds that have very similar milking procedures and cow handling, but one of the herds does not respond to the therapy very well compared to the other herds on similar protocols and management levels. They conclude that it must be something unique to the equipment or some of the products such as teat dips or liners being used on the farms.

These veterinarians are violating one of the major rules of veterinary practice. They are 'making a diagnosis without completing the physical examination of the dairy. One of the most common sources of low response to treatment is sub clinical acidosis. Cows that have repeated bouts of rumen acid increases will have impaired immune systems and therefore they will not respond to treatment in a predictable fashion. Many very well managed herds have sub clinical rumen acidosis in a surprising number of cows all during the calendar year. Some common causes are lack of adequate fibre in the ration, feeding to eliminate weigh backs so cows are out of feed for longer than 1.5 hours per day, lack of consistent feed push up or excessive sorting of the ration in the feed bunk. If cows, especially high producing groups or individual cows, have not had access to a Total Mixed Ration for more than three hours they will slug feed on the TMR and they can and do develop subclinical acidosis on a regular basis.

Production can still be very good in these cows but they will typically show reduced milk fat levels and sometimes even reversed milk fat to milk protein ratios. In herds with meters, these cows often show more than a 4-5lb milk production swing from milking to milking or maybe even more for 24 hour milk production. Herds with a high level of subclinical rumen acidosis will also show longer toes and toes that begin to cross and touch on many cows.

The pictures below show these typical changes. If most or many of the cows in the herd exhibit these changes then 'the abnormal becomes normal' syndrome sets in and people do not make the association between the hoof lesions and the basic cause.

During July through mid September is the time that many herds have a higher incidence of sub clinical rumen acidosis due to the additive affects of heat stress. Cows can easily increase their core body temperature if the holding pen/parlour does not have adequate fans and sprinkler systems. Herds milked under these conditions will see a very pronounced spike in claw lesions such as sub solar abscesses and white line disease in cows around this time of year as reported by their hoof trimmer. These occur between 6-8 weeks after the first exposure to repeated bouts of holding pen heat stress.

The secondary effect of ration fibre issues, slug feeding, sorting, or heat stress are increased levels of clinical mastitis. Mastitis is directly related to the number of bacteria on teats when units are attached but the new infection rate is also related to the overall immune response of the individual cow. Data from many parts of the US shows an increase in the overall SCC level in shipped milk in the period between July and October. This increase is related to these two factors; the number of bacteria on teats when units are attached and the overall immune response of the cow.

If herds have some of these hoof lesions along with increased mastitis levels, these are not caused by the milking equipment, but the equipment, liners or teat dip often get the blame. If you are dealing with problem herds look at these issues to determine if they may be impacting the new infection rate for the herd. Remember to always 'complete the physical examination before making a diagnosis!' Be sure to look at all issues when investigating problem farms. ■

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Milk quality monitoring

By Dr David A. Reid,
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Methods for routine bulk tank culture analysis have been presented by Guterbock and Blackmer, 1984.

These tests and interpretation methods provide an indication of whether high bacterial counts are due to mastitis, pre-milking hygiene, equipment cleaning and sanitation or incubation of bacteria in the milk handling system during milking.

The recommended tests for bulk tank milk include the following:

- The Standard Plate Count (SPC) which is the number of bacteria in one milliliter of milk when incubated for 48 hours at 32°C or 90°F. SPC counts should be less than 5,000 if cow and equipment sanitation is good and cooling is adequate.

An SPC of less than 1,000 indicates excellence in all of these areas.

- The Laboratory Pasteurised Count (LPC) is the number of bacteria per milliliter of milk which survive laboratory pasteurisation at 62.8°C or 143°F for 30 minutes. Immediately after the milk has been heated in a water bath for 30 minutes, the sample should be cooled quickly and then a standard plate count is run.

This procedure kills the usual mastitis causing bacteria leaving only those types of organisms which grow and multiply in the milk handling equipment if cleaning and sanitation procedures are inadequate. The LPC should be below 100 if equipment cleaning and sanitation are adequate. An LPC below 10 indicates excellent equipment hygiene.

- The Modified Coliform Count will give the number of coliform bacteria present in bulk tank milk. A sample of 0.01ml is plated on a McConkey agar plate. The plate is incubated at 37°C and read after 18 hours. The major source of coliform (coli) bacteria in bulk tank milk is transportation on the udders of cows from the environment. The coli count thus provides an indication of both the effectiveness of cow preparation procedures during milking and cleanliness of the cow environment. Coliform counts between 100 and 1,000 are generally an indication of poor milking hygiene. Coliforms will also incubate in residual milk films left on milk contact services.

Coliform counts in excess of 1,000 suggest incubation in milk handling equipment. A coliform count of less than 100 per milliliter of milk is considered acceptable for raw milk pasteurisation. Coliform counts less than 10 indicate excellence in both pre milking hygiene and equipment sanitation.

It is important to exercise care in the collection and storage of samples for bulk tank tests. The bulk tank or silo should be agitated for at least five minutes before sampling.

Agitation of large tanks will require significantly more time before sampling. Samples should be taken so they are not contaminated and stored below 4.4°C or 40°F. One of the main causes of sporadic high counts is improper cooling of samples after they are taken and during the transfer to a laboratory. It is not advisable to make a diagnosis based on a single set of bulk tank tests.

A series of at least three tests should be performed.

Interpretation of the various tests and combination of tests is important. When equipment cleaning and sanitation problems exist the LPC count will be elevated as well as the SPC count. Incubation in the milk contact system components will cause a high coliform count and a high LPC count.

Inadequate pre milking hygiene results in elevated coli counts as well as a possible high standard plate count (SPC).

If both the somatic cell count (SCC) and the standard plate count (SPC) are high, mastitis organisms may be the cause of the high bacteria counts.

Remember, milk quality will never be improved after the milk leaves the farm!

Attention to properly milking cows and removing all abnormal milk are very important to the industry. ■

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What do cows experience in the parlour?

By Dr David A. Reid, Director of Milk Harvest, Science and Technology

When I walk through a dairy one of the areas I examine closely is the cow entrance to the parlour. I look for pipes, gates or other metal parts that may hurt cows as they enter.

It is very important to remember that machine milking requires the willing cooperation of the cow to be performed successfully! If a cow has an adrenal release by either being hurt or hit by equipment or people then she cannot let her milk down normally within the next 30 minutes.

The failure of full milk let down will occur even with excellent well timed udder preparation. High producing herds bring calm cows to the parlour at most milkings and they are rewarded with more consistent cow entry, less manure in the parlour and, most importantly, more milk production per cow.

The rear gate of an older double six parlour. Note how all of the upright pipes have been rubbed by the hip bones of cows entering the parlour.

The best installed and maintained equipment cannot make up for poor cow handling.

The goal is for the cows to see, hear and experience the same conditions at every milking. Cows are very sensitive to high pitched sounds such as metal gates banging or milkers whistling to move cows.

Some work in Canada from several years ago showed that cows have almost the same cortical steroid release from being subjected to an electric stock prod or just being yelled at in controlled situations.

The best way to move cows is to talk to them in conversational tones and to apply a hand to the flank or rear leg of the cow with an open palm rather than to poke a cow with the fingers.

Some herds bring springing cows and heifers to the parlour at least once a day for several days before they calf. This gets the animals acclimatised to the parlour and allows an examination of the udder and teat dip to be applied.

The best way to bring heifers that have never been to the parlour is to have at least several dry cows with them at the first exposure. Leave the front gates or any rapid exit gates fully open, move the heifers and a few older cows to the holding pen and then let them enter the parlour on their own and move to the exit alleys.

The second time they are brought to the parlour place the gates in the closed position and then calmly move cows into the stalls. Exposure to the parlour prior to milking will remove most of the negatives that contribute to poor milk let down and milk outs in fresh heifers. Many common features of the holding pen such as fans, gates and differences in light intensity will not be major factors if heifers have experienced them.

Cow entry is improved when panels are installed to block the vision of cows. The goal is for cows to see the back end of a herd mate moving into the parlour.

Normal cow behaviour is to follow other cows. By installing shielding the cows are focused on cow movement in front of them and parlour entry is improved.

All devices used to 'encourage' or hit cows to drive them into the parlour should be removed. Proper cow handling will improve parlour performance and maximise milk production. ■

An example of shielding to improve cow entry.

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Parlour performance I

By Dr David A. Reid, Director of Milk Harvest, Science and Technology

What is the definition of parlour performance?

Quite simply it means cows are being milked gently, completely and quickly at every milking.

The entire milking process as well as how cows are handled as they move from the housing pens to the parlour and how they return to these pens must be optimised to achieve the desired level of parlour performance.

The best monitor of parlour performance is milk per stall per hour.

The goal for 2x herds should be more than 59 litres per stall per hour and for 3x herds more than 45 litres per stall hour.

More importantly, what is the milk per stall per hour on your dairy and how can this be improved?

You can easily calculate the milk per stall per hour, if your system does not have meters that report this number at the end of milking, by recording the total milking time, dividing the total milk by the amount of time required for the milking in hours and then dividing this number by the number of stalls in the parlour.

Why should the average dairy be concerned about parlour performance?

By improving cow moving protocols and parlour performance, the time cows spend moving to and from the parlour, waiting to be milked, and actually being milked can be reduced which means they have more time to eat, drink and lie down.

The overall hoof health will be better due to less standing time on concrete and less time in the holding pen means less time for the heat stress to impact cows in the holding pen.

Expanding herds will milk more cows per hour and herds with constant numbers will milk in less total time, freeing labor for other tasks on the dairy.

Bringing clean calm cows to the parlour at every milking should be primary goals on every dairy.

Clean cows make milkers' jobs easier and result in less total bacteria on teats when units are attached. The lower the bacterial numbers on teats at attachment the lower the new mastitis infection rate for the dairy.

The photograph below illustrates clean cows in the parlour. Note how little manure splash is present on the back sides of the front legs.

When cows move slowly they will pick up their feet better which results in less manure splash but more importantly moving cows slowly results in less stress and better overall milk let down in the parlour.

It is very important to remember that machine milking requires the willing cooperation of the cow to be successfully completed!

If a cow experiences an adrenal release within 30 minutes of milking, she cannot milk out properly even with consistent timely udder preparation due to the interaction of the adrenal with the letdown hormone oxytocin.

The single best method to improve milk per stall per hour is to begin to prep the first cow as soon as she is in a position at the front of the parlour.

The goal is always to have consistent procedures that result in at least 10-12 seconds of teat contact time.

Teat contact time can be defined as the time when teats are either being stripped, rubbed while cleaning or drying with a towel.

Units should be attached approximately 90 seconds after the teats are first touched during the preparation process.

The ultimate goal is to attach units to clean dry stimulated teats at every milking. The process should be the same from milker to milker and milking to milking! ■

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Parlour performance II

By Dr David A. Reid, Director of Milk Harvest, Science and Technology

Adjusting the milking equipment can improve parlour performance.

However, consistent udder preparation is necessary before most equipment settings can be adjusted.

Timely, consistent udder preparation results in minimal dry milking at the front end of the milking process.

This means there are very few cows that have a period of no milk flow shortly after the units are attached to the cows. The end of milk point settings on many farms are far too dry.

By adjusting the take off point to a less aggressive setting (coming off the cow sooner), milking durations can be reduced on individual cows without reducing the milk yield.

Using a measuring cup will allow a quick easy method to evaluate the settings. A cow is considered milked out if there is less than 450ml of milk from all four teats as soon as the unit is removed.

Many herds have less than 25ml from all four teats on most cows. When performing stripping milk testing, evaluate the amount of milk and the degree of resistance to the stripping.

Cows that are over milked will be stepping and kicking as the teats are stripped immediately after milking.

If there are units still milking on one side of the parlour when the milker or milkers finish prepping and attaching units on the opposite side of the parlour, then changing the settings will result in improved parlour performance.

Monitor the milk production and total milking time as changes are made to the detacher settings to prove that milk production is not reduced by the changes. Many herds experience an increase in milk per cow because cow behaviour improves due to a reduction in the low flow periods that can be very irritating to cows.

Improved behaviour can be monitored by counting the number of steps (lifting feet during milking), kicks at the unit, kicking just as the units come off (cow assisted take-offs) and unit fall offs during milking.

Producers report less manure deposited in the parlour, better cow entry and less resistance to stripping and touching teats during the udder preparation process when irritation to teats by dry milking is reduced by improving udder preparation and making equipment adjustments.

Spend some time in your parlour or barn to observe cow entry, cow behaviour during the preparation steps and during the unit attached time.

Making some small changes to cow handling, udder preparation and equipment settings can yield significant improvements to the overall parlour performance and cow behaviour in the parlour or barn. ■