

Klebsiella mastitis - beyond bedding

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QMPS re-search found teats contaminated with *Klebsiella* before milking in one-third to 100% of cows. Up to 75% of cows still had *Klebsiella* on their teat skin after pre-milking teat disinfection.

Judging by producer comments and culture results from Quality Milk Production Services (QMPS) laboratories, *Klebsiella* is an increasingly important cause of mastitis on Northeast dairies. Though not as common as *E. coli*, *Klebsiella's* economic impact may be more devastating. The response of *Klebsiella* mastitis to treatment is poor. Many cows die or end up being culled because of chronic high cell counts.

Sawdust and shavings were long thought to be the most important sources of *Klebsiella*. Green sawdust, in particular, can introduce the bacteria into stalls. Producers, veterinarians and consultants alike thought that using other bedding materials could solve the *Klebsiella* problem.

One popular alternative bedding material used in the Midwest is recycled manure. However, the Northeast climate isn't conducive to using recycled manure as bedding, and where dairies have used it, they've experienced bad *Klebsiella* outbreaks. Also, outbreaks can happen when pathogen-free composted manure is used. Sand bedding is much better at reducing the number of cases, but even on sand *Klebsiella* mastitis occurs.

Where do the bacteria come from if not from sawdust? From the cows themselves. Work by QMPS staff in collaboration with Northeast dairy farms showed that approximately 80% of healthy dairy cows shed *Klebsiella* in their feces. Add feces and urine to any bedding material, and the bacteria have all they need to grow: themselves, moisture, nutri-

ents and the cows' body heat.

Just about anything in a dairy environment can be contaminated with manure. So in 2007, QMPS set out to explore other sources of fecal contamination and *Klebsiella* on dairies. With funding from the Northern New York Agricultural Development Program, and cooperation from northern New York farms, QMPS's Canton laboratory and the Miner Institute in Chazy, we discovered some interesting things about *Klebsiella* and what we can do to prevent it.

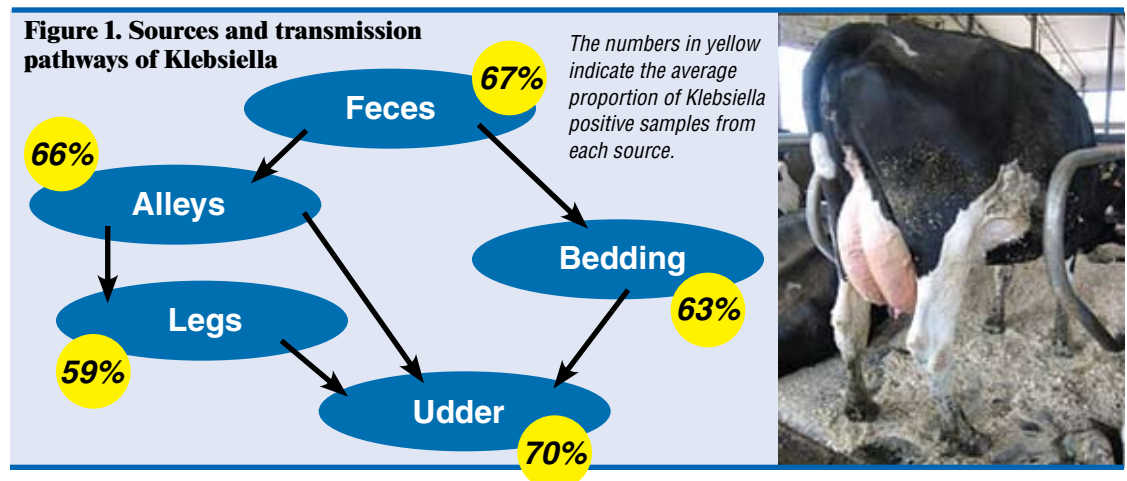
Alleys and legs

Where do we have manure scrapers? In alleyways. Why do we have them there? Because that is where manure accumulates. And what can we find in manure? *Klebsiella*.

Just about every barn has puddles of stagnant water, accumulation of manure in cross alleys that scrapers don't reach, or manure loads too great for scrapers to handle. Two-thirds of all manure and slush samples taken from alleyways on our cooperating dairies contained *Klebsiella*.

The cows walk through that *Klebsiella* slush to get to feed, water, the milking parlor and stalls. This results in the transfer of the bacteria to the cows' legs. On average, close to 60% of cows tested positive for *Klebsiella* on their legs when the QMPS *Klebsiella* research team swabbed the inside of both lower hind legs.

When a cow lies down, where do her teats rest? Against her feet and hind legs. So *Klebsiella* from



the manure makes its way from the alleyway to the legs and onto the teats, setting cows up for new cases of mastitis (Figure 1).

Not all legs are equal though: Dirty cows are more likely to have *Klebsiella* on their legs. And in dirty barns, cows are also more likely to have *Klebsiella*-invested manure on their legs. It isn't rocket science, but it is scientifically proven: If you improve your cows' hygiene score, the risk of exposure to *Klebsiella* goes down.

Teats and milking

In most milking parlors, cows are pre-dipped, and the disinfectant is allowed to work for 30 seconds before it's wiped off. Then units are attached to clean teats. Or so we hope.

In our research, we were shocked to find that teats were contaminated with *Klebsiella* before milking in one-third to 100% of cows. We were even more shocked to discover that up to 75% of cows still had *Klebsiella* on their teat skin after premilking teat disinfection.

A disinfectant is supposed to kill bacteria but in three of four cows, it failed to do so effectively. Disinfectants aren't to blame; we are. Just as it is for legs, hygiene is an indicator of the chance of finding *Klebsiella* on teats. What is more, hygiene is an indicator of how well pre-dip works. The more dirt on a cow's ud-

der, the more likely she is to have *Klebsiella* and the less likely the bacteria will be removed (Figure 2).

If we keep the beds, alleyways and holding pens clean, we can keep cows clean. If cows look clean, they have fewer mastitis-causing bacteria on their teats. And the bacteria that are present on clean-looking cows are easier to remove than those present on dirty teats.

When one herd in our study improved environmental hygiene, cow cleanliness and udder hygiene, it had as few as 3% of cows with *Klebsiella* on teat skin after pre-milking udder prep and disinfection. That is a goal for every dairy.

Managing *Klebsiella*

Though bedding has long been singled out as the main source of *Klebsiella*, it's time dairy producers woke up to the fact that alleyway hygiene is an important and neglected component of *Klebsiella* control.

Vaccines and treatments are not going to solve our *Klebsiella* problems any time soon. Predip can only do so much. It's the extra time and effort put into keeping alleys clean that will help maintain clean cows with clean legs and clean udders. So fix that broken scraper, hire that extra person, and go through cross-alleys, exit alleys and holding areas one more time. Your cows and your bottom line will thank you.

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QMPS is a program within the Animal Health Diagnostic Center, a partnership between the New York State Department of Agriculture and Markets and the College of Veterinary Medicine at Cornell.

The QMPS staff of veterinarians, technicians and researchers works with New York dairies to improve milk quality by addressing high somatic cell counts, milking equipment and procedures, and milker training in English and Spanish. QMPS also conducts research and teaching programs.

Reach the four regional QMPS laboratories at:

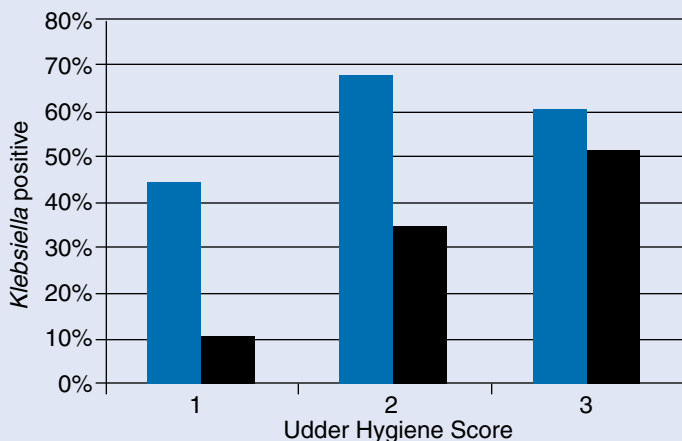
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Dairy One is an information technology cooperative, providing DHI records services and herd management software to dairies throughout the Northeast and Mid-Atlantic region. A comprehensive laboratory network provides milk quality testing as well as forage, soil, manure and water testing.

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Figure 2. *Klebsiella* on teats before (blue bars) and after (black bars) predipping



*Clean udders (score 1, photo at left) are less likely to have *Klebsiella* than dirty udders (score 3, photo at right). Pre-milking teat disinfection is much more effective (difference between blue and black bar) for clean udders than for dirty udders.*