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Results of Statewide Surveillance for Mycoplasma Mastitis in Utah – Herd Level Prevalence and Characteristics of Infected Dairy Herds

The analyses are completed from our statewide Utah surveillance for mycoplasmal mastitis in 2007-2008. The results reported here are a summary of a new paper we have coming out soon in the Journal of the AVMA, written with Dr's. Greg Goodell, Anne Justice-Allen, and Scott Smith. References will be included in that publication, and are available upon request.

The study farms and bulk tank milk testing methods

277 of the 285 dairy farms in Utah (97%) were contacted, and 222 (78%) participated, giving written permission to test their bulk tank milk. Milk haulers or dairy producers collected 5 milk samples from all bulk tanks at 3-4 day intervals (this repeated sampling results in 97% sensitivity and 100% specificity). Milk was frozen at -20^{0}C and shipped frozen overnight to The Dairy Authority Laboratory in Greeley, CO for culture for *Mycoplasma* spp. Mycoplasma was cultured on modified Hayflick medium incubated at 37^{0}C in a 10% CO^2 incubator.

Mycoplasma-positive dairy herds in Utah

Bulk tank milk samples were collected from all 292 bulk tanks (n = 5 samples per tank; 1460 samples) on the 222 participating dairy farms at 3-4 day intervals. *Mycoplasma* spp was detected in milk from 16/222 dairy farms in Utah (7%). That is the second highest regional prevalence of mycoplasmal mastitis ever reported in the US. Percentage of all bulk milk samples tested positive per positive herd ranged from 5% to 100% (2 farms had 100% of samples positive), with median and mode 40% (4 farms had 40% of samples positive). Four of the 16 farms (all had more than one bulk tank – all bulk tanks were sampled 5 times) had the lowest percentages of their bulk milk samples test mycoplasma-positive: 15%, 10%, 8%, and 5%. This shows the importance of the repeat sampling to detect *Mycoplasma* spp in milk, because they are shed only intermittently by infected cows.

Positive farms were contacted through the milk buyer field personnel and offered follow up visits. A farm survey questionnaire was employed at the farm visits to describe the dairy herds and their management practices. All 16 positive herds' owners were contacted, 14 provided some information, and 12 agreed to a farm visit.

Lactating cow numbers in mycoplasma-positive herds

From Table 1, note that 13/14 positive herds (93%) milked > 100 cows, 8 (57%) milked > 750 cows and 4 (29%) milked > 2000 cows.

Table 1 – Mycoplasma-positive dairy herd sizes in Utah (number of lactating cows).

Number of lactating cows (range)	Number of herds (n = 14)
< 100 cows	1
101-400 cows	3
401-749 cows	2
750-1100 cows	3
1500-2000 cows	1
>2000 cows	4

SCC in bulk tank milk from mycoplasmal herds

From Table 2, note that bulk tank SCC (mean of most recent month) for 9 (82%) of the herds was between 140,000 and 240,000/ml; the highest herd SCC averaged 350,000/ml.

Table 2 – Mycoplasma-positive dairy herds' mean bulk tank SCC (mean of current month when farm visited).

SCC/ml (range)	Number of herds (n = 11)
140 – 175,000	3
176 – 200,000	2
201 – 240,000	4
270,000	1
350,000	1

Milk production in mycoplasma-positive herds

From Table 3, we can see that all mycoplasmal herds' actual milk production averaged at least 17,000 lb, and 7 herds (64%) averaged between 21,000 – 25,600 lb per 305 d.

Table 3 – Mycoplasma-positive dairy herds' actual milk production (current month when farm visited).

Actual milk/305 d in kg (lb) (range)	Number of herds (n = 11)
7718 – 9080 (17,000 – 20,000)	2
9081 – 9534 (20,001 – 21,000)	2
9535 – 10,442 (21,001 – 23,000)	4
10,443 – 11,123 (23,001 – 24,500)	2
11,622 (25,600)	1

Positive herd owners' previous familiarity with mycoplasma

All 12 interviewed owners of infected herds had already become informed of mycoplasma mastitis. Their sources of information were: veterinarian 5 (42%); articles (type of publication not specified) 5 (42%); other producers 3 (25%); internet 2 (17%); other sources 3 (25%). Mycoplasma mastitis had previously been diagnosed in 6 herds (50%), had not been diagnosed in 5 herds (42%) and one producer was not sure.

Mycoplasma and adult dairy cows

The following clinical signs were reported in mycoplasma-positive herds (the percentage is of the 12 farms):

Clinical mastitis (CM) that could not be clinically cured - 11 farms (**92%**)

CM in 2 or more quarters of the same cow simultaneously - 11 farms (**92%**) (same farms as above)

CM moving from one quarter to another - 9 farms (**75%**)

Adult cows with droopy ears - 8 farms (**67%**)

Adult cows with head tilt - 7 farms (**58%**)

Adult cows with *either* head tilt or droopy ears - 11 farms (**92%**)

When asked whether there were any other signs the producers had associated with mycoplasmal infections in the past, 5 answered: milk with little bubbles in it; milk with gray little grit in it; tan milk with sandy specks in it; mastitis very non-responsive to treatment; if cows have mycoplasma-positive pneumonia, they cough (that producer had had cows with positive ante mortem diagnostic test results for mycoplasma in the respiratory tract).

Mycoplasma and dairy calves (birth through weaning age)

The following clinical signs were reported in mycoplasma-positive herds:

Calf respiratory disease nonresponsive to treatment - 11 farms (**92%**)

Calves with droopy ears - 9 farms (**75%**)

Calves with head tilt - 7 farms (**58%**)

Calves with *either* head tilt or droopy ears - 11 farms (**92%**) (same farms that observed in adult cows above)

Milking practices

Predip was used on 11 farms (92%): spray - 6 farms (50%), foam - 3 farms (25%), and cup - 2 farms (17%). One farm (8%) used a water hose udder wash before milking. The composition of the predips is shown in Table 4. Most farms (75%) used either an iodine teat dip or a foam teat dip; one used an iodine foam.

Table 4 – Predip compound use on Mycoplasma-positive dairy farms (one additional farm used a water hose to wash teats).

Predip	**Number of herds (n = 11) £**
.5% iodine*	3
1% iodine	2
Iodine – unknown concentration	1
.5% iodine foam	1
2% lactic acid foam	1
Foam – unknown compound	1
Unknown compound (no label)	1
5% sodium hypochlorite (5 parts bleach:1 part water)	1

£ 12 farms had complete teat disinfection data, but the 12th farm was the one that used a water hose to wash teats

*Iodine concentrations refer to titratable iodine concentration

All farms dried teats before milking; common (used on more than one cow) cloth towels were used on 6 farms (50%), common paper towel drying on one farm (8%), and individual cow cloth towel drying on 5 farms (42%). All 12 farms postdipped teats after milking; 10 (83%) cup dipped and 2 (17%) spray dipped. The composition of the postdips is shown in Table 5. All but one farm (92%) used an iodine postdip, with 1% iodine used in 7 (58%) of the herds.

Table 5 – Postdip compound use on Mycoplasma-positive dairy farms.

Postdip	Number of herds (n = 12)
1% iodine*	7
.5% iodine	2
Iodine – unknown concentration	2
Unknown compound (no label)	1

*Iodine concentrations refer to titratable iodine concentration

Clinical mastitis and treatment practices

Percentage of the herd contracting CM per month was recorded for 8 herds; 1-2% CM/mo in 3 herds and 3-4% CM/mo in 5 herds. All detected cases were treated in 7 of the herds (88%), and the remaining herd treated half of the cases (2% of herd treated/mo of 4% CM/mo). The CM treatments most commonly used on the mycoplasma-positive farms are shown in Table 6.

Table 6 – Clinical mastitis treatments most commonly used on Mycoplasma-positive dairy farms.

Mastitis treatment	Number of herds (n = 12)*
Ceftiofur	8
Cephapirin	6
Pirlimycin	5
Flunixin meglumine	4
Amoxicillin	2
Oxytetracycline	2

* More than one treatment used per farm
In addition, the following treatments were each used on single farms: aspirin, isofluprednone, dexamethasone, oxytocin, penicillin, ampicillin, and “organic” (specific compound not identified by label).

Handling of known mycoplasma-positive cows

Six (50%) of the farms had had a diagnosis of mycoplasma mastitis before the project. By the time of the first follow up visit, 2 more had cultured milk of all individual cows and found some mycoplasma-positive cows. None of these 8 producers treated known *Mycoplasma* spp-positive cows if they contracted CM. However, 3/8 (37%) had tried treatment of *Mycoplasma* spp-positive CM cases in the past. Their descriptions of attempted treatment were: at a previous farm, didn't work; used to but response was poor; some cure. All known mycoplasma-positive cows were culled on 6/8 (75%) of the farms with individual cow diagnostic results.

Herd additions and biosecurity practices

Of the 12 positive herds, 2 (17%) had been closed to outside replacements for at least one year, and 2 other herds (17%) purchased only breeding bulls. Animals introduced to the herds were: heifers before first calving 6 (50% of total herds), bulls 5 (42%), cows 4 (33%), and calves 1 (8%). There was no fenceline contact with any other animals on 8 (67%) of the farms, including one closed herd and one herd that bought bulls only.

Of the 10 farms that purchased animals, biosecurity measures used included:

Vaccination **90%** (diseases not specified; usually included respiratory pathogens)

Segregation **50%** (details including length of time not specified)

Individual cow milk culture **30%**

Blood test for disease **10%** (owner not sure what disease(s))

Trichomoniasis test **10%**

None **10%**

Conclusions

Mycoplasmal mastitis infected a relatively high percentage of herds in Utah, 7%, in contrast to other regions of the U.S. with 2% to 6% of herds infected. This is in agreement with an earlier study that found mycoplasmal mastitis higher in the western US than other regions, but that study did not include Utah. The repeated sampling methods used were important to minimize categorizing mycoplasma-positive dairy herds as false negative herds.

All producers with infected herds had previously heard of mycoplasma, including the half who had not had a diagnosis in their herd previously. Their top two equally ranked sources of information were their veterinarian(s) and articles they had read. Increased education in the dairy industry regarding mycoplasma mastitis has been successful compared with past surveys. The veterinarian has been previously reported as dairy producers' most common source of disease and management information.

Classical mycoplasmal signs include nonresponsive respiratory disease of calves, head tilt or drooping of one or both ears in calves, and poorly responsive CM in multiple or shifting quarters of lactating cows; these signs were observed in nearly all infected herds in Utah. However, all but one of the mycoplasmal farms had also observed head tilt and/or droopy ears in adult cows, which has not been reported previously.

Herds detected with mycoplasma were large - most milked between 750 and 4800 cows – and had relatively high milk production – most averaged between 21,000 – 25,600 lb per lactation. SCC in bulk tank milk was relatively low, with most herds between 140,000 and 240,000/ml. The greatest financial loss from mycoplasma usually results from culling or death of affected cows. Although herd milk production may decrease and bulk milk SCC may increase during outbreaks of disease attributable to *Mycoplasma* spp, they are often not remarkable, just as they were not in this study, thus these parameters are generally not suitable for monitoring for *Mycoplasma* spp in dairy herds. The most effective surveillance for *Mycoplasma* spp utilizes testing of bulk tank milk or milk samples from cows in early lactation or with CM.

Over half of the mycoplasmal herds were milked with common use towels, used on more than one cow at milking time. This practice is associated with more spread of contagious mastitis than using a separate towel for each cow; use of a common towel on multiple cows at milking may be a contributing factor to the continued presence of mycoplasmal mastitis after it is introduced into a dairy herd.

In the experience of the authors, herds found infected with mycoplasma mastitis in the northeast and upper Midwest usually have a history of animals purchased 3 to 6 months preceding the discovery of the disease. In contrast, there were more closed and/or isolated herds with mycoplasma in Utah, suggesting that the source may be something other than purchased livestock. This raises the question as to whether wild ruminant species might harbor *Mycoplasma* spp. White-tailed deer fawns have been reported infected with *M. bovis*. However, Utah has mule deer, elk, pronghorn antelope, bighorn sheep and moose but no white-tailed deer; there are no reports of testing the aforementioned species for infection with mycoplasmas. Wild ruminant species found in the intermountain west should be further investigated as possible carriers of mycoplasmal infections. We are beginning to investigate this at Utah State University.

Progress has been made in educating dairy producers about mycoplasmal mastitis. In addition to classic clinical signs and history when dairy herds may have cows infected with *Mycoplasma* spp, head tilt or droopy ears in adult cows and use of common towels on more than one cow at milking time were found associated with the disease in this study.

In the future we will report on the second round of follow up. This examines what measures were taken by the management of the mycoplasmal dairy herds in Utah, and progress that was made.

As always, I like to hear from our readers, including suggestions for future topics. I can be reached at (435) 797-1899 M-W, (435) 797-7120 Th-F or David.Wilson@usu.edu.

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