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DAIRY RESEARCH SUMMARY

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High percentage of Alberta and Saskatchewan dairy farms are infected with *Mycobacterium avium* subsp. *paratuberculosis*, the cause of Johne's disease

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Why is this important?

Mycobacterium avium subsp*. paratuberculosis (*MAP) causes Johne's disease (JD) in cattle. Infected animals have lower milk production and an increased risk of being culled. In earlier studies, between 26 and 58% of Alberta, and approximately 25% of Saskatchewan dairy farms were estimated to be infected with MAP. However, these studies used a blood test for individual animal antibodies, a test that only detects a low percentage of MAP-infected cows, and only a subset of animals were tested on each farm; therefore probably not detecting many herds with a low number of infected cows. It is therefore likely that the true percentage of MAP-infected herds is much higher.

What did we do?

Collection of environmental samples is a fairly new method for detection of MAP on dairy farms and is based on collection of manure samples from different areas on a farm and subsequent testing of those for the presence of MAP bacteria. The most commonly used sampling protocol collects 6 samples from 3 different areas: manure concentration areas such as alleyways and gutters, cow concentration areas such as calving and sick cow pens and manure storage areas such as piles and pits. Environmental sampling has several advantages compared to individual testing:

1) it does not involve any collection of samples from individual animals which makes sample collection faster and less expensive,
2) MAP-infected animals do not constantly shed MAP bacteria and do not constantly produce antibodies, which makes individual testing inaccurate, and
3) environmental samples are very accurate since high shedders contaminate their surrounding very effectively and MAP bacteria survive for a long time in the environment.

This method was used to estimate the true herd prevalence of MAP infection in Alberta and Saskatchewan.

Dr. Robert Wolf collecting an environmental sample on a dairy farm

What did we find?

Environmental samples were collected on 360 Alberta (61% of the registered producers) and 166 (99%) Saskatchewan dairy farms. 47% of the Alberta and 53% of the Saskatchewan dairy farms had at least one MAP culture-positive sample (Table 1). Like the antibody tests, environmental samples do not detect all infected farms with a single test. Suggesting there may be a higher number of farms infected with MAP than first thought.

Therefore, the 82 farms enrolled in the Alberta Johne's Disease Initiative (AJDI) were tested more frequently e.g. once a year for 3 years. From these test results it was found that 68% of Alberta and 76% of Saskatchewan dairy farms are infected with MAP. Furthermore, herds with greater than 200 cows had a 3.5 times higher risk for MAP infection than herds smaller than 50 cows.

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Table 1. Associations between herd characteristics and the most recent environmental sample results estimated on 360 Alberta and 166 Saskatchewan dairy farms.

	Alberta				Saskatchewan			
	0 pos.[1] n (%)[2]	1-3 pos.[1] n (%)[2]	4-6 pos.[1] n (%)[2]	Total n	0 pos.[1] n (%)[2]	1-3 pos.[1] n (%)[2]	4-6 pos.[1] n (%)[2]	Total n
Total	191 (53)	92 (26)	77 (21)	360	78 (47)	50 (30)	38 (23)	166
Number of cows								
<50	6 (67)	1 (11)	2 (22)	9	9 (50)	7 (39)	2 (11)	18
50-99	69 (66)	24 (23)	12 (11)	105	34 (57)	14 (23)	12 (20)	60
100-149	73 (53)	39 (28)	26 (18)	138	21 (57)	10 (27)	6 (16)	37
150-200	25 (49)	11 (22)	15 (29)	51	10 (40)	10 (40)	5 (20)	25
>200	18 (32)	17 (30)	22 (39)	57	4 (15)	9 (35)	13 (50)	26
Lactating cow housing								
Free-stall/Loose housing	175 (52)	88 (26)	76 (22)	339	63 (44)	44 (31)	35 (25)	142
Tie-stall	16 (76)	4 (19)	1 (5)	21	15 (63)	6 (25)	3 (13)	24

[1]Number of positive environmental samples during last testing event
[2]Percentages represent row percentages

What does this mean?

Most farms in Western Canada are infected with MAP. This should be considered before animals are purchased. To reduce the risk of introducing infected animals into the herd, the Alberta Johne's disease herd status program offers a list of farms with a low risk of MAP infection proven through repeated testing. The JD herd status program is still accepting new participants who want to prove that their farm is at a low risk of MAP infection. A one-time negative environmental sample result (like with any other MAP test) does not mean that a herd is uninfected. Only 68% of the infected farms are detected when tested for the first time, therefore the AJDI includes annual collection of environmental samples. This allows repeatedly negative farms an increased confidence that their herd actually is uninfected.

The reason why larger herds are more likely to test positive than smaller herds is unknown. One likely explanation is that larger herds may have more than one cow in a calving pen at a time and often pool colostrum. This emphasizes that especially on large herds the implementation of best hygiene management practices which aim to reduce the transmission of the pathogen pays off by decreasing the MAP burden. However, more research on risk factors for MAP is needed to identify which management practices are most effective in controlling the pathogen.

Summary Points

- The majority of Alberta and Saskatchewan dairy farms are infected with MAP, the cause of Johne's disease.
- Previous studies have underestimated the prevalence of MAP infection in Alberta and Saskatchewan.
- The percentage of MAP-infected herds increases with increasing herd size, likely due to differences in management and more frequent animal introductions.
- Environmental sampling works well for large herd-level studies to determine the prevalence of MAP infection.

Want to know more?

For more information on Johne's disease and its control please visit our website:
http://albertajohnes.ca/

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