Johne's Disease Risk Factors

Takeaways

- Older cows and skinnier cows or cows from herd having cows with signs of Johne's disease, were more likely to test positive on an ELISA test.
- Herds having dairy cattle on-farm, or having cows showing signs of Johne's disease on-farm were more likely to have a positive pooled PCR.
- Herds with a history of cows on-farm with clinical signs of Johne's disease were more likely to test ELISA or PCR positive.
- These findings highlight the risks for producers in introducing animals from herds of unknown Johne's status.

Background

A recent Canadian study investigated the prevalence of *Mycobacterium avium paratuberculosis* (MAP) in beef herds, and risk factors for its detection.

Methods

159 participating herds were recruited from the Canadian Cow-Calf Surveillance Network (C3SN) sampling platform

BC: n = 8	ON = 23
AB = 48	QC = 22
SK = 33	Atlantic Provinces = 4
MB = 21	

Average herd size:

West = 230 (SD = 209)

East = 176 (SD = 168) females

- A baseline dataset of herd management procedures was captured in a pre-enrolment survey, with a subset of herds also providing data on additional potentially relevant management practises or disease events.
- Veterinarians collected blood and feces from 20 cows in each tested herd.
- Cow age and Body Condition Score (BCS) were also recorded.
- Blood was assayed via ELISA for MAP antibodies.
- Feces was assayed in pools of 5 individual cows' samples, with all samples in pool re-tested individually if a pool tested positive.

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Results

Risk Factors for Individual-cow ELISA Seropositivity for *Mycobacterium avium paratuberculosis* Across 3171 Study Cows for which Pre-Enrolment Survey Management Data was Available

Risk Factor	Category	Odds Ratio	95% Confidence Interval
Age	>3 years old vs 2–3 years old	2.6	(0.91, 7.6)
Body Condition Score at Pregnancy Testing	< 2.5 vs ≥ 2.5	2.3	(0.97, 5.3)

Risk Factors for Pooled PCR Detection of *Mycobacterium avium paratuberculosis* Across 3171 Study Cows for which Pre-Enrolment Survey Management Data was Available

Risk Factor	Category	Odds Ratio	Confidence Interval
Calving location	Confined vs Non-confined	3.4	(0.4 – 29)
Dairy cattle on-farm	Yes vs No	9.7	(1.4 – 68)

Risk Factors for ELISA Seropositivity for *Mycobacterium avium paratuberculosis* of 2150 Study Cows for which Additional Information on Herd Management Practises.

Risk Factor	Category	Odds Ratio	Confidence Interval
Cows on-farm showed signs of Johne's disease over the past 3 years	Yes vs No	5.1	(2.0 – 13)

Risk Factors for Pooled PCR Detection of *Mycobacterium avium paratuberculosis* across 2150 Study Cows for which Additional Information on Herd Management Practises was Available.

Risk Factor	Category	Odds Ratio	Confidence Interval
Cows on-farm showed signs of Johne's disease over the past 3 years	Yes	17	(2.0 – 14)

Risk Factors for Herd-level ELISA Seropositivity for *Mycobacterium avium paratuberculosis* of 108 Herds Providing Additional Information on Herd Management Practises.

Risk Factor	Category	Odds Ratio	Confidence Interval
	No		
Cows on-farm showed signs of Johne's disease over the past 3 years	Yes vs No	3.5	(1.1, 11)

Risk Factors for Pooled PCR Detection of Mycobacterium avium paratuberculosis Across 108 Herds Providing Additional Information on Herd Management Practises.

Risk Factor	Category	Odds Ratio	Confidence Interval
Cows on-farm showed signs of Johne's disease over the past 3 years	Yes vs No	17	(1.7, 158)

Diagnostic Test Performance

Individual animal PCR had the highest test sensitivity and specificity. The sensitivity of pooled fecal PCR was substantially lower than for individual testing – however, it was slightly higher than for the ELISA test. The specificity of the ELISA test was only slightly lower than for PCR.

References

Johnson P, McLeod L, Campbell J, Rousseau M, Larson K, Waldner C (2022). Estimating the sensitivity and specificity of serum ELISA and pooled and individual fecal PCR for detecting Mycobacterium avium subspecies paratuberculosis in Canadian cow-calf herds using Bayesian latent class models. Front. Vet. Sci. 9:937141. doi: 10.3389/fvets.2022.937141)

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