

# Technical Summary: Investigating the Association Between Herd-level Lameness Scores and Reproductive Outcomes on a Single Dairy Farm: Case Series Farm 1

28 November 2024

## Project Overview

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In a case study of one calving and mating season on a large, well-managed, South Island dairy farm, EpiVets examined how higher Herd-i lameness scores affected 6-week in-calf rate and final pregnancy rate. In addition, the financial loss resulting from reproductive failure associated with lameness was reported. The study also looked at whether there were differences between lameness detected by the Herd-i system and lameness cases treated by farm staff.

The study analysed data from 549 cattle collected between June 2023 and February 2024. This included 125,304 Herd-i lameness scores and MINDA records detailing treatments for lameness, calving dates, and pregnancy test results.

## Methods

### *Categorising lame cows*

Cows were grouped into one of three Herd-i lameness categories based on their highest Herd-i lameness trend score during the study period: less than 1.25, 1.25–1.5, or greater than 1.5. For example, a cow with a maximum score of 2.0 was placed in the "greater than 1.5" category. Additionally, cows identified as lame by farm staff were categorised as such if they had a lameness treatment recorded in MINDA.

### *Comparing reproductive performance*

To investigate how higher Herd-i lameness scores affected reproductive performance on the case study farm, the percentage of cows that conceived on each day after the start of mating was calculated for each lameness category. These percentages were used to create graphs for comparison between the categories. The analysis specifically looked at the proportion of the herd that had conceived by six weeks after mating began (6-week in-calf rate) and by the end of the 12-week mating period (final pregnancy rate).

### *Estimating financial losses*

The calculations used DairyNZ assumptions for the costs associated with reduced 6-week in-calf and final pregnancy rates. Differences in these rates between Herd-i lameness categories were analysed to estimate per-cow financial loss, and the total financial loss for the study herd based on cow numbers in the season analysed.

### *Comparing Herd-i and farm lameness treatment*

To compare Herd-i lameness identifications with cases recorded as treated by farm staff, a cow was considered "Herd-i positive" if her maximum trend score was 1.25 or higher. A cow was considered "treated by farm staff" if she had a lameness treatment record in MINDA. Four categories were created: Herd-i positive and treated, Herd-i positive and not treated, Herd-i negative and treated, and Herd-i negative and not treated. The reproductive outcomes of these four categories were then compared.

## Key Findings

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Although limited to a single farm, the analysis in this case study demonstrates elevated Herd-i lameness scores reduce reproductive performance, leading to losses substantial enough to be of interest to farmers.

- Lameness was uncommon in the study herd. Of the 549 cows in the study, only 42 were treated for lameness during the study period, 54 had a maximum Herd-i lameness score over 1.5, and 95 had a score between 1.25 and 1.5.
- In this case study, 6-week in-calf rate was lower in cows with higher Herd-i lameness scores: 64% for non-lame cows, 56% for scores of 1.25 to 1.5, and 50% for scores of more than 1.5.
- Final pregnancy rates were also lower in cows with higher Herd-i lameness scores: 84% for non-lame cows, 76% for cows with scores of 1.25 to 1.5, and 69% for those with scores of more than 1.5.
- On this farm, 79% of farm-treated animals had a Herd-i score of greater than 1.25. Furthermore, 98% of animals with Herd-i scores of under 1.25 were not identified as lame cows needing treatment by farm staff.
- Across the study period, 22% of Herd-i lame cattle were treated for lameness by farm staff. While this means that 78% of Herd-i lame animals could potentially be considered 'false positives', the reproductive performance of these untreated Herd-i lame animals was worse compared to cows whose score never exceeded 1.25.
- Financial losses from poorer reproductive performance were estimated at \$108 per cow for lameness scores of 1.25 to 1.5 and \$204 per cow for scores greater than 1.5. Based on the number of animals in each lameness category, the total estimated loss due to lameness-related reproductive failure on the study farm was \$21,276.

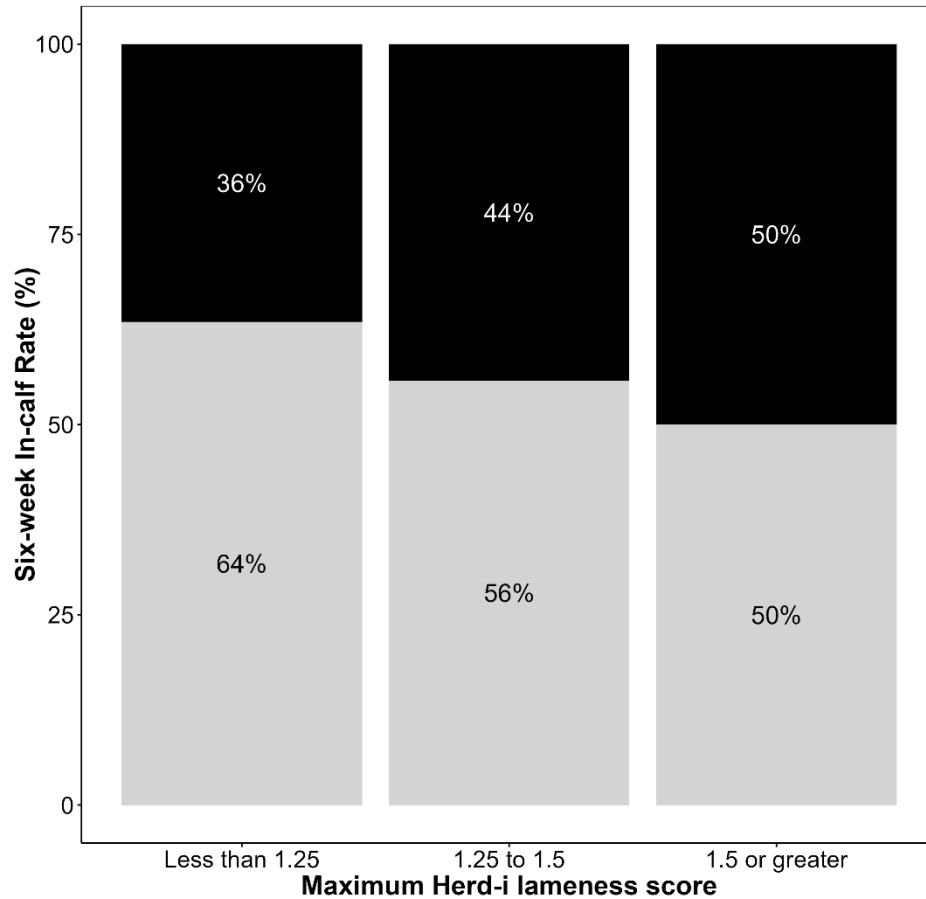
## Limitations

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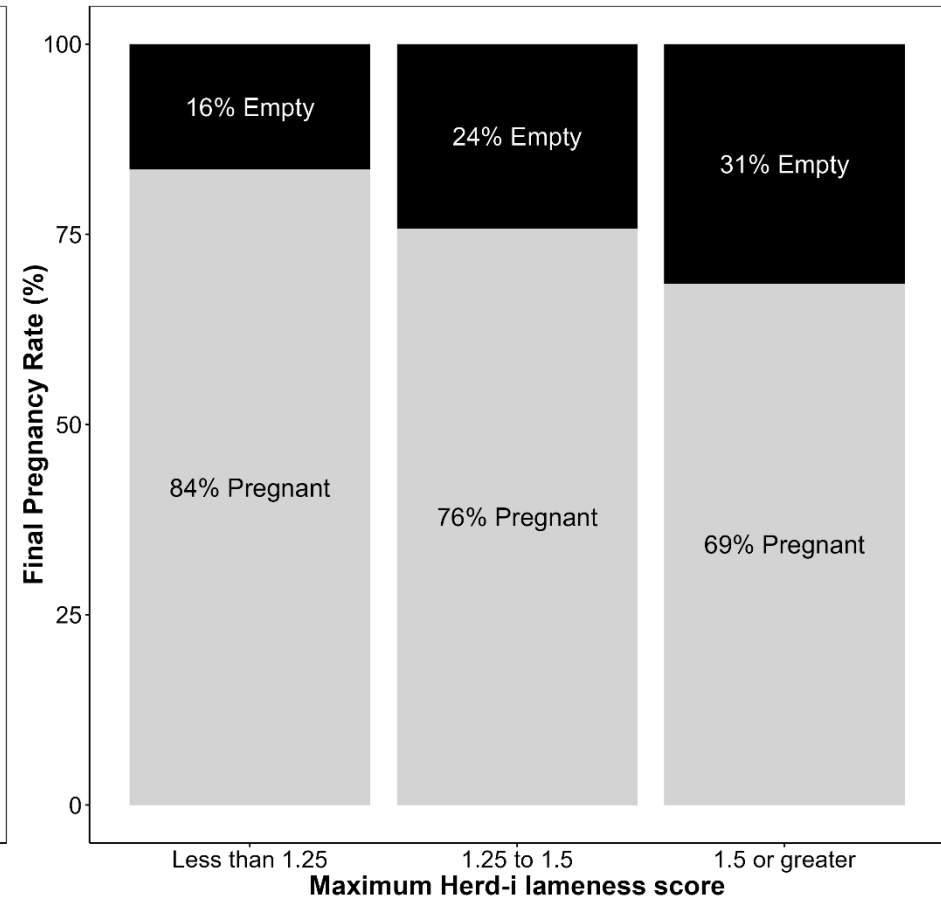
Limitations that should be considered for this study include that:

- This was a case study that only used data from a single herd. Reproductive performance, the frequency of lameness and cow management differ substantially between herds. This means that findings from this case study may not be applicable to other farms.
- Factors other than lameness like cow age and the interval between calving and mating also impact reproductive performance. There are plans to investigate how these affect estimates of reproductive losses associated with lameness using a larger study that involves more herds.

## 6-Week in-calf and final pregnancy rates were lower in Herd-i lame cows

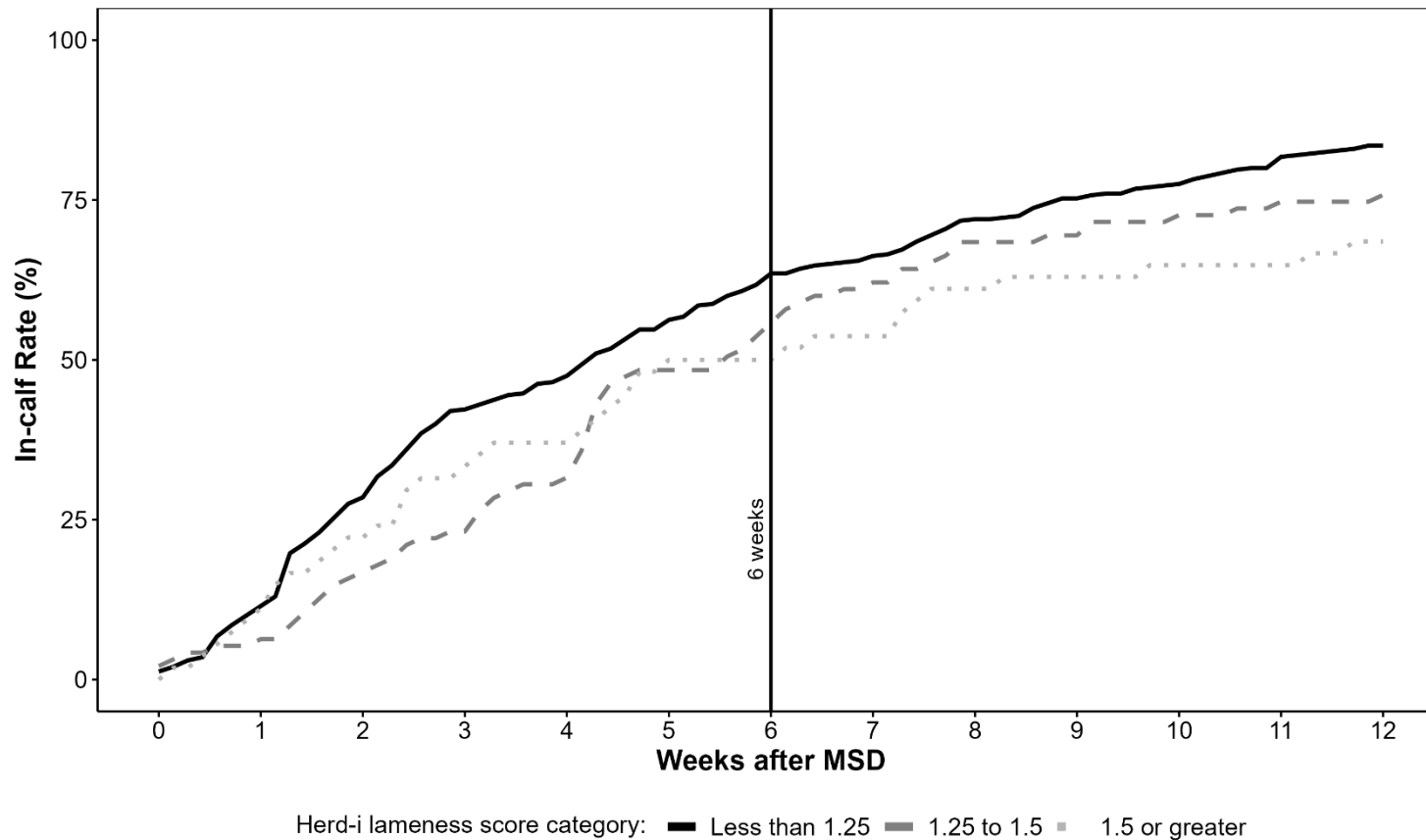


Pregnancy status:  Not pregnant at six weeks  Pregnant at six weeks



Pregnancy status:  Empty  Pregnant

## Cows with higher Herd-i lameness scores took longer to get in calf



## Financial losses associated with lameness

Financial losses used DairyNZ assumptions that each reduction in 6-week in-calf rate and final pregnancy rate decrease per-cow revenue. Differences in reproductive metrics between Herd-i lameness categories were used to estimate losses per cow and the resulting overall cost to the farm.

	Herd-i Lameness Category		
	Less than 1.25	1.25 to 1.5	1.5 or greater
<b>TOTAL IN CATEGORY</b>	<b>400</b>	<b>95</b>	<b>54</b>
<b>6-WEEK IN-CALF RATE (%)</b>	64	56	50
<b>6-WEEK IN-CALF RATE GAP (%)</b>	-	-8	-14
<b>6-WEEK IN-CALF RATE GAP COST</b>	-	-\$31	-\$54
<b>FINAL PREGNANCY RATE (%)</b>	84	76	69
<b>FINAL PREGNANCY RATE GAP (%)</b>	-	-8	-15
<b>FINAL PREGNANCY RATE GAP COST</b>	-	-\$77	-\$150
<b>COST PER LAME COW</b>	-	-\$108	-\$204
<b>COST TO THE FARM</b>		-\$10,260	-\$11,016
<b>REPRODUCTIVE COST OF LAMENESS SCORES <math>\geq</math> 1.25</b>			<b>-\$21,276</b>

## Comparing Herd-i and farm-recorded lameness

Most treatment-positive animals were also Herd-i positive (79%), and almost all animals with Herd-i scores under 1.25 were animals that farm staff did not think required treatment (98%). In comparison, over three quarters (78%) of Herd-i positive animals were not treated for lameness by farm staff.

Max Herd-i trend score	Treatment negative (% , Count/Total)	Treatment positive (% , Count/Total)
Herd-i negative	98% (391/400)	2% (9/400)
Herd-i positive	78% (116/149)	22% (33/149)

Despite the considerable number of cows identified by Herd-i that could be potentially considered as 'false positives', both 6-week in-calf rate and final pregnancy rate were lower in these cattle compared to cattle that were both Herd-i negative and treatment negative.

Herd-i and Treatment Status	Six-week ICR		Final Pregnancy Rate	
	Pregnant (%)	Pregnant (Count/Total)	Pregnant (%)	Pregnant (Count/Total)
Herd-i negative   Treatment negative	64	251/391	84	328/391
Herd-i negative   Treatment positive	33	3/9	67	6/9
Herd-i positive   Treatment negative	53	61/116	76	88/116
Herd-i positive   Treatment positive	58	19/33	64	21/33

