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CANADIAN NETWORK FOR DAIRY EXCELLENCE

Genomic Evaluations for Calf Health in Canada

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Genetic Selection for Health Traits in Canadian Holsteins

Mastitis Resistance
Clinical Mastitis, SCS

2014

Metabolic Disease Resistance
Displaced abomasum, clinical & sub-clinical ketosis

2016

Digital Dermatitis Resistance

2017

Hoof Health Resistance
Index with the 8 most prevalent hoof lesions

2018

Fertility Disorders
Metritis, Retained Placenta, Cystic Ovaries

2020

August 2025 Calf Health

- In April 2025, the Health & Welfare Index was created and contributes 8% into the national selection index, LPI

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Calf Health

- Improved resistance to disease in early life is highly valuable
  - Economics
  - Loss of potential replacement
  - Lifetime performance
  - Animal welfare

- A **Calf Health index** combining two calf health traits will be published starting August 2025 for **Holstein**
  - Respiratory Problems (**RESP**): birth to 180d
  - Diarrhea (**DIAR**): birth to 60d

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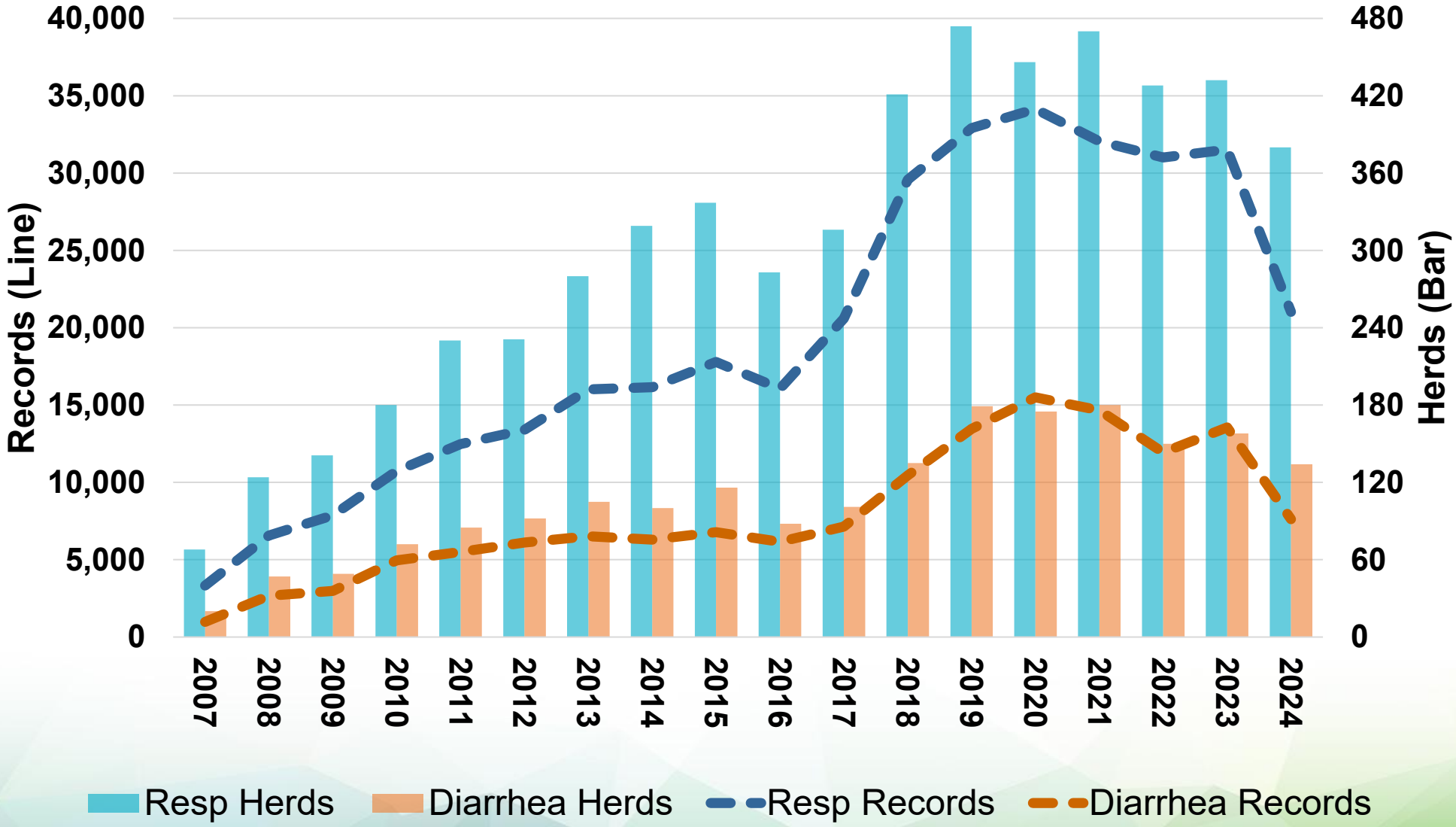
Calf Health Data

- Producer recorded health events for Holstein heifer calves
- Records since January 2007
  - Mostly coming from Ontario and the western provinces
- ‘Healthy’ contemporaries are identified using herd inventory data
- Binary traits (0 = no case, 1 = at least one case)

Data Recording Trends



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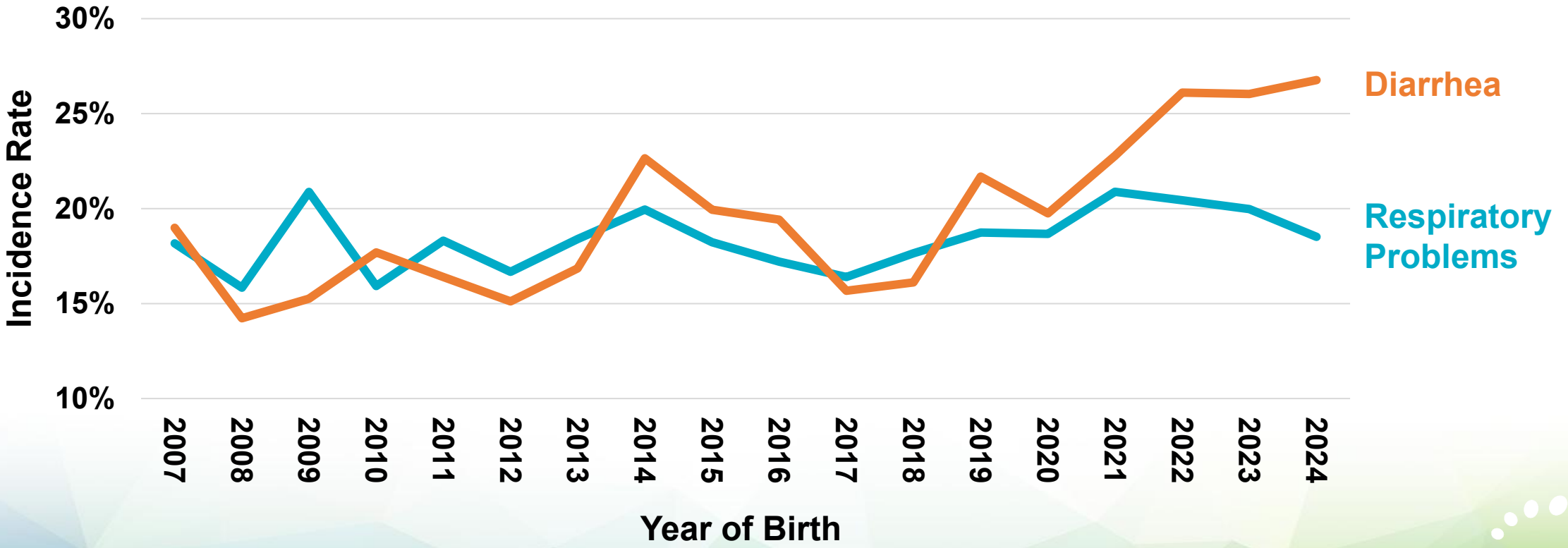
Incidence Rates

- Respiratory Problems: **18.7%**
- Diarrhea: **20.7%**



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Genomic Evaluation for Calf Health

Single-Step GTABLUP evaluation (using MiX99)

- Two-trait linear animal model for DIAR and RESP
  - Fixed: Year-Season
  - Random: Herd-Year-Season, Animal, Residual

Genetic Parameters

- Estimated from a 2024 data extract with 310,662 calf records from 1,179 herds
  - MC EM REML method with only pedigree-based relationships (A) in the genetic co-variance structure

	DIAR	RESP
DIAR	**0.044**	0.53
RESP	0.13	**0.054**

Heritability on diagonal, genetic correlation above diagonal, phenotypic correlation below

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Genomic Evaluation for Calf Health

May 2025 Genetic Evaluation

Total Records	**378,587**
Diarrhea	144,495
Respiratory	355,355
Both Traits	121,263

Total Genotypes	**119,715**
Genotyped with Record	74,013
Genotyped Sires	8,570

- Calf Health index weights:
  - Respiratory Problems 50%
  - Diarrhea 50%
- Expressed as Relative Breeding Values (RBV) (Mean 100, SD 5)
  - Higher RBV = Greater resistance to calf health diseases

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Calf Health Evaluations

- Bulls receive an official Calf Health evaluation when they are official for both Respiratory and Diarrhea
  - 20 daughters from 5 herds and minimum reliability of 70%
- Proof correlation between Respiratory and Diarrhea: 0.38

		Calf Health RBV			Reliability (%)		
	N	**Average**	Min	Max	**Average**	Min	Max
Calf Health official bulls	1,393	**100**	78	114	**87**	72	99
Young GPA bulls in AI	3,744	**100**	85	116	**70**	29	76

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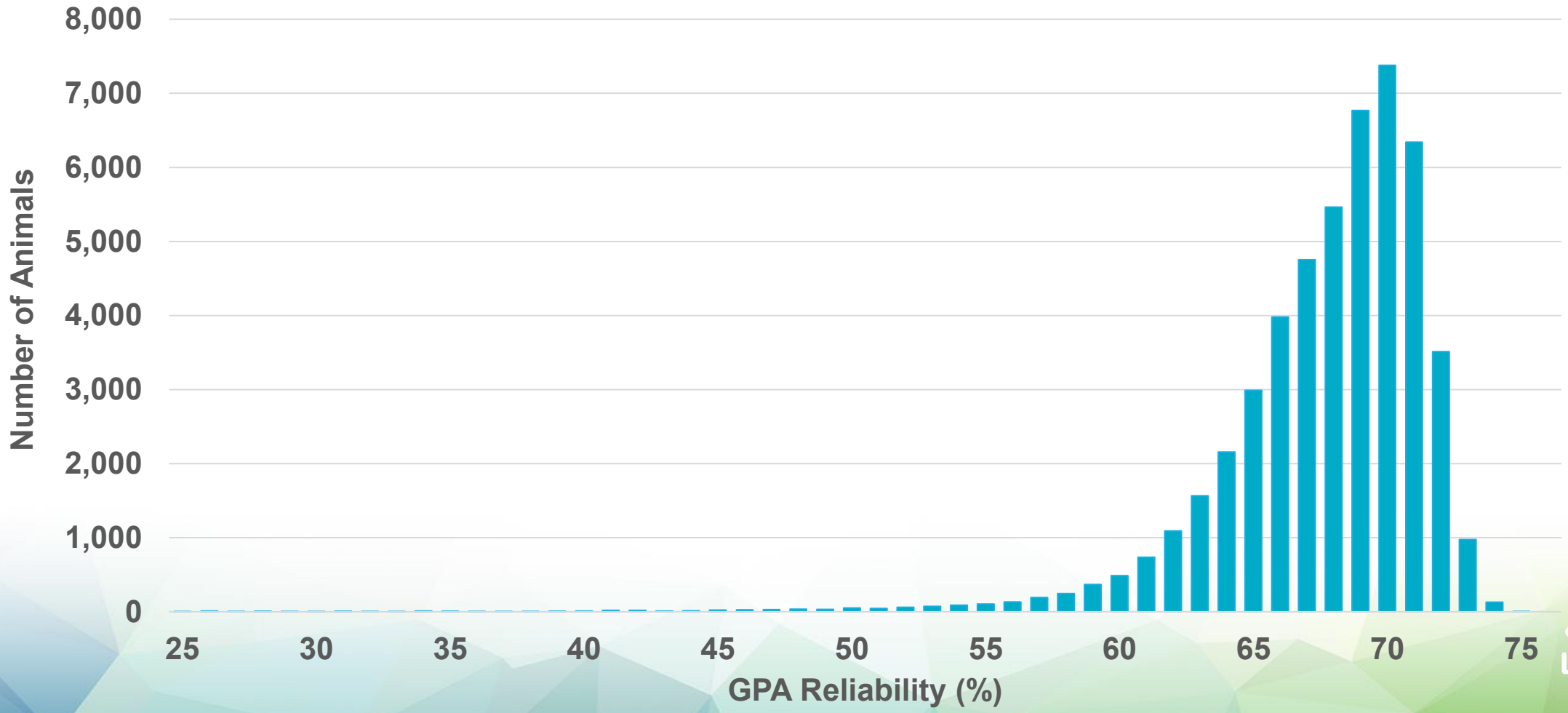
Distribution of Reliability for Respiratory Problems

- Sample of 50,000 young, genotyped animals without phenotypes



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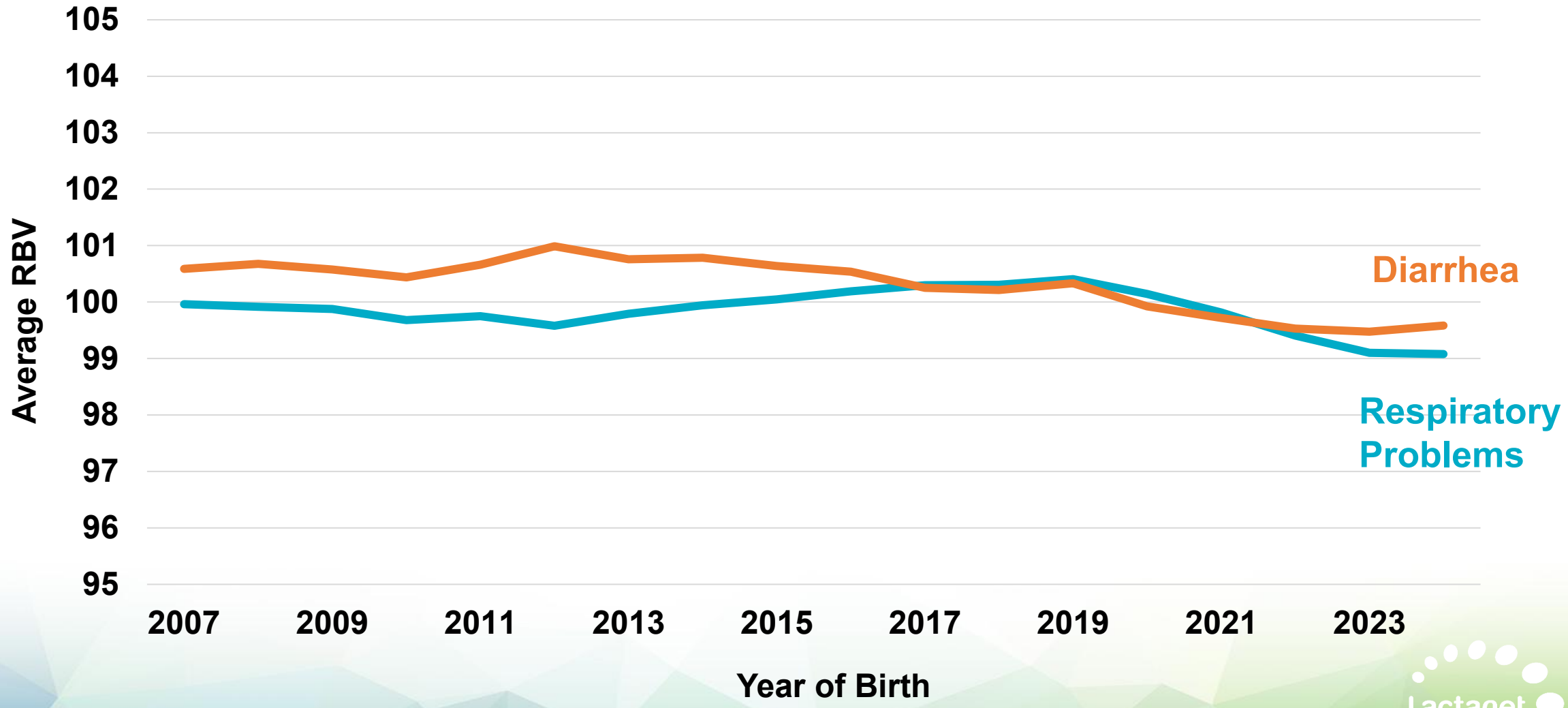
Genetic Trend – Females with Records



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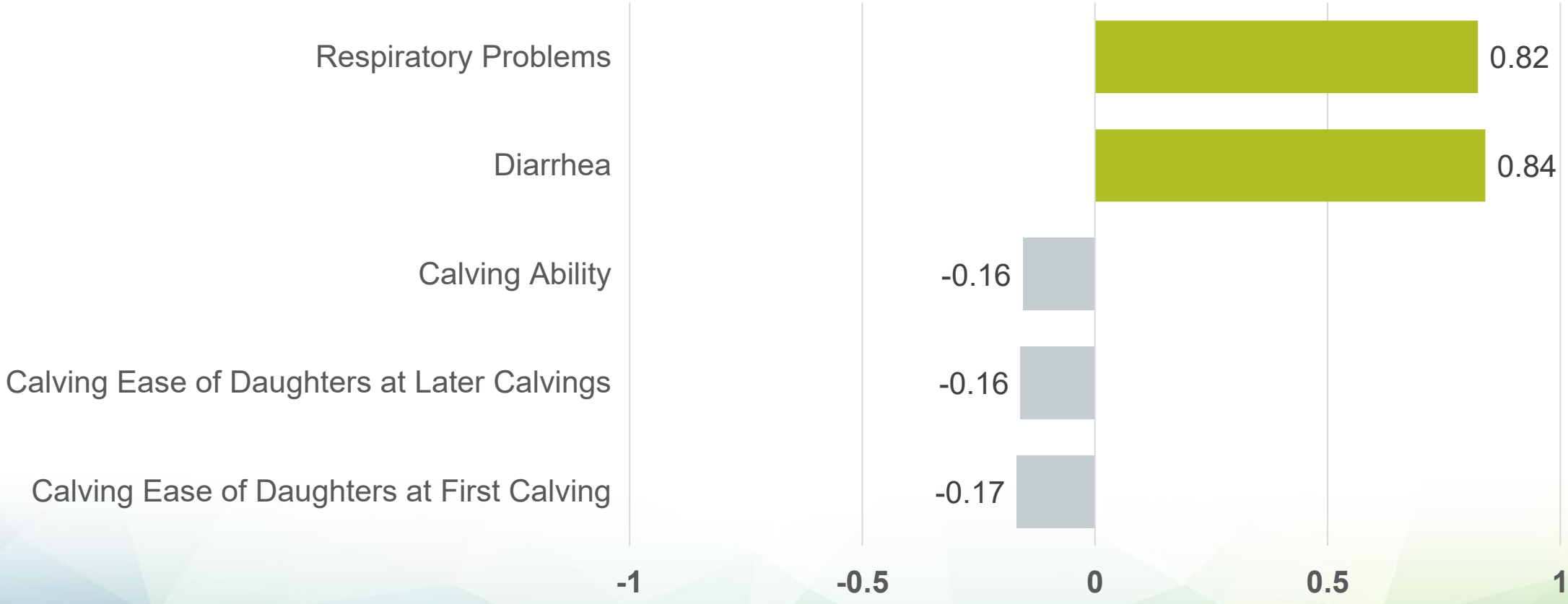
Proof Correlations
- Calf Health Index -



- 937 Holstein sires official for both Calf Health and LPI. Only |correlation| ≥ 0.15 displayed.

Top and Bottom 10 Official Sires

		RBV				% of Healthy Daughters			
		Average	SD	Min	Max	**Average**	SD	Min	Max
RESP	Top	**116**	1.9	114	119	**84**	8.3	63	92
	Bottom	**85**	1.3	82	86	**70**	6.8	58	80
DIAR	Top	**114**	0.6	113	115	**95**	5.9	86	100
	Bottom	**82**	2.1	78	84	**51**	13.6	33	68

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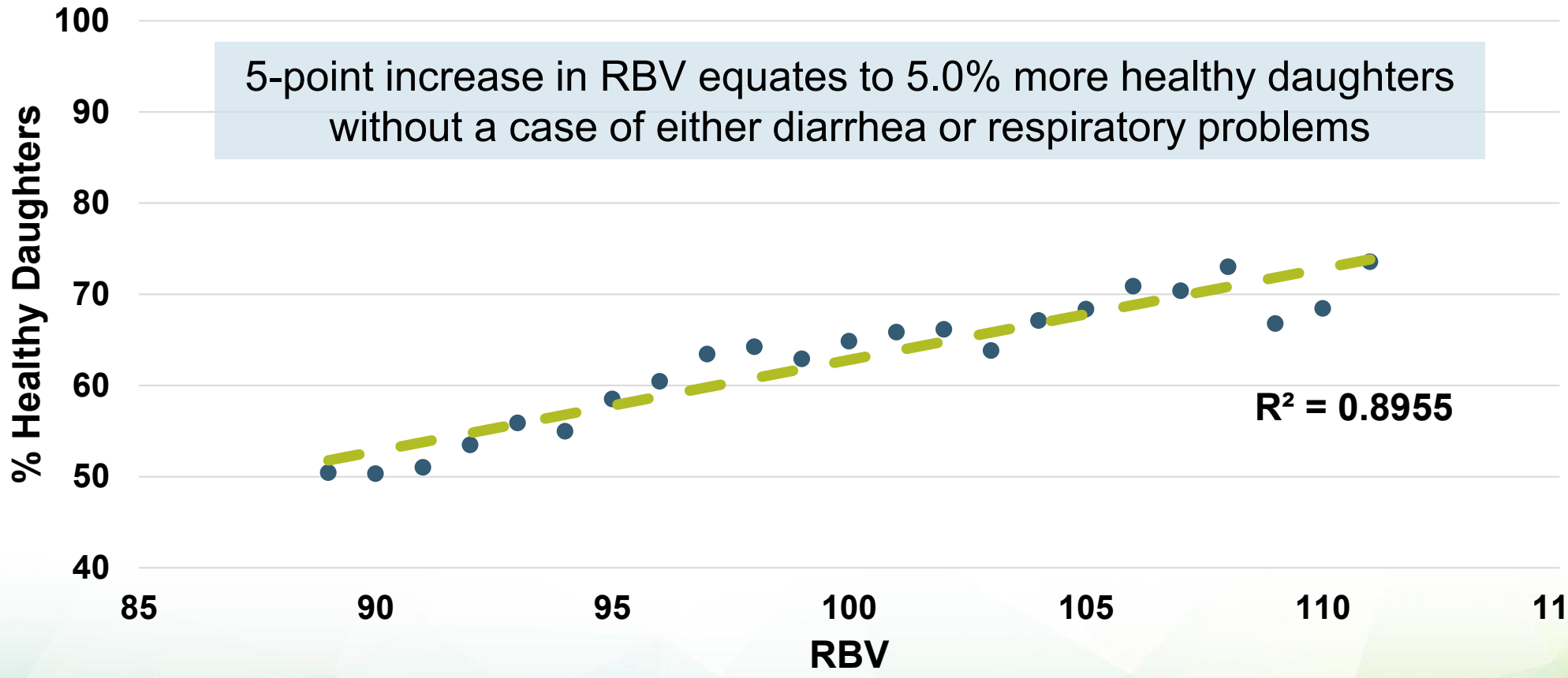
Average % Healthy Daughters - Calf Health Index -



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Summary

- Starting **August 2025,** Lactanet Canada will start officially publishing genomic evaluations for **Calf Health** for the Holstein breed
  - And the individual traits: Respiratory Problems and Diarrhea
- Clear differences have been found between sires for percent healthy daughters
- Objective to incorporate Calf Health index into the Health & Welfare subindex of **LPI in April 2026**

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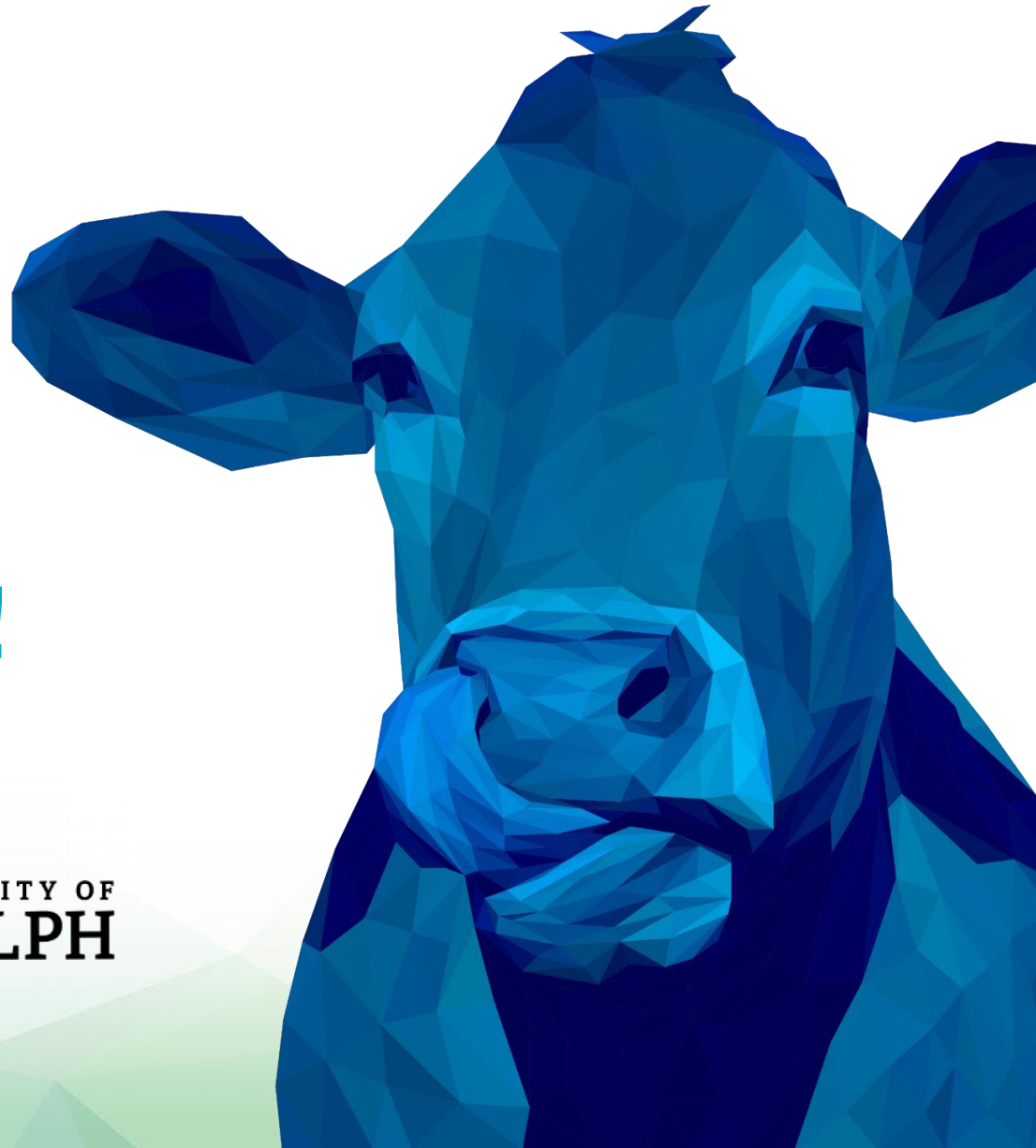

Thank you to all dairy producers collecting data!

THE Resilient Dairy GENOME PROJECT

Background research performed as part of the RDGP project

UNIVERSITY OF GUELPH