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Calculating Milking Speed (MSPD) PTAs Using Sensor Data

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Milking speed – the most recently introduced trait in US national evaluations

A story of **collaboration** and **innovation**

- Required cooperation from multiple industry sectors
- Research agreement between USDA AGIL and DRMS
- Coordinating between AGIL and CDCB to produce evaluations

- Desired an alternative to subjective scoring
- First national genetic evaluation fueled by sensor data
- Creation of a new data format to transfer records

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What is milking speed?

Why select for it?

What is milking speed?

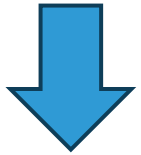
Measure of milk flow rate

Pounds of milk per minute (lb./min)

Averaged across a lactation
10-305 DIM
In a conventional parlor

Why select for milking speed?

Opportunity to optimize parlor efficiency



Reduce time and labor costs

Communication from both producers and industry to determine whether genetic selection for milking speed was feasible

Creation of the Milking Speed Task Force

- Formed in 2021 with representatives from many sectors of the industry

Asha Miles (chair) – USDA AGIL
Jeffrey Bewley – Holstein Association USA
João Dürr - CDCB
Sophie Eaglen – NAAB
Robert Fourdraine - DRMS
Kristen Gaddis - CDCB
Steven Sievert – NDHIA/QCS
Jay Weiker – NAAB

*AI-generated image

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Research behind the evaluations

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How do other countries currently evaluate milking speed?

What system effects influence milking speed?

How do we define the trait?

What biological factors influence milking speed?

What data do we need?
What data are available?

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CDCB Industry Meeting 2024

www.youtube.com/@CouncilonDairyCattleBreeding

https://www.youtube.com/live/FFJNSsVGDfk?si=wNNNwnezrqqwKawq

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How do other countries currently evaluate milking speed?

Most breeds and countries use a subjective score

What system effects influence milking speed?

Milking frequency
Milking session number
Equipment manufacturer

How do we define the trait?

Milking Speed (MSPD)
Pounds of milk per minute

What biological factors influence milking speed?

Parity
Breed

What data do we need? What data are available?

Milk yield
Milking duration

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Data

- Individual milking data provided by DRMS for AGIL research
  - Over **50 million** records from ~ **300** U.S. herds
  - Raw sensor data – substantial editing developed to ensure high-quality data available for genetic evaluations
- Data for August 2025 evaluations
  - **146,517** Holstein lactation records from **132k** cows in **215** herds using **10** different OEMs

Results

- **Heritability = 42%**
  - Milk yield $h^2 = 20\%$
  - Productive life $h^2 = 8\%$
  - Mastitis resistance $h^2 = 3\%$
- **Reliability estimates**
  - Proven bulls average 68%
  - Young bulls average 59%

On to operations...

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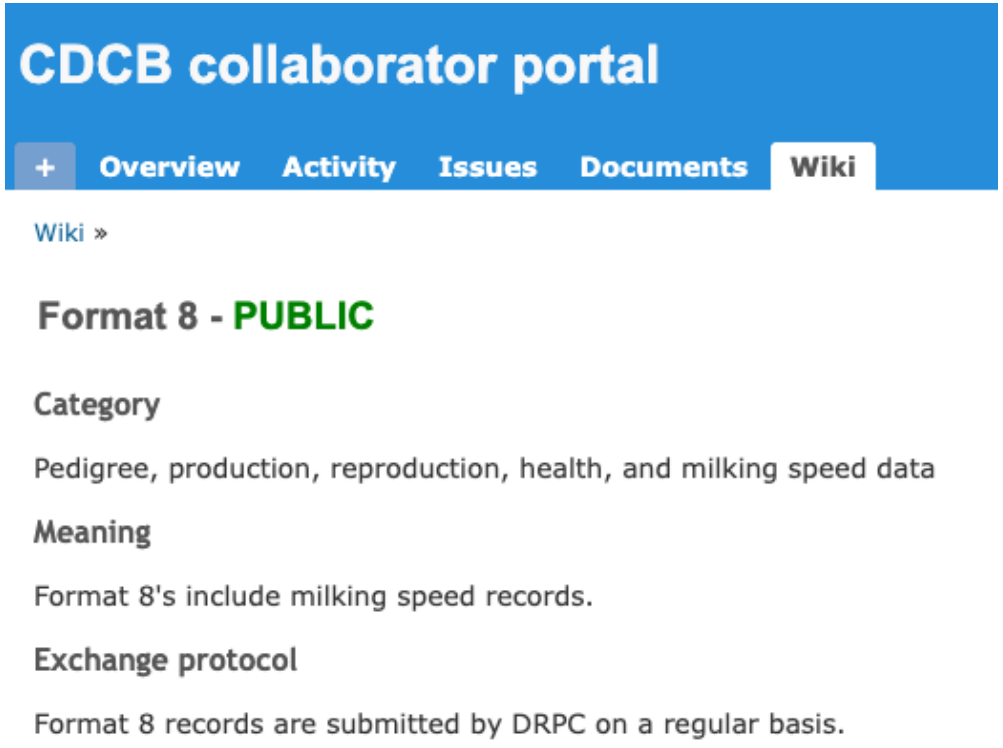
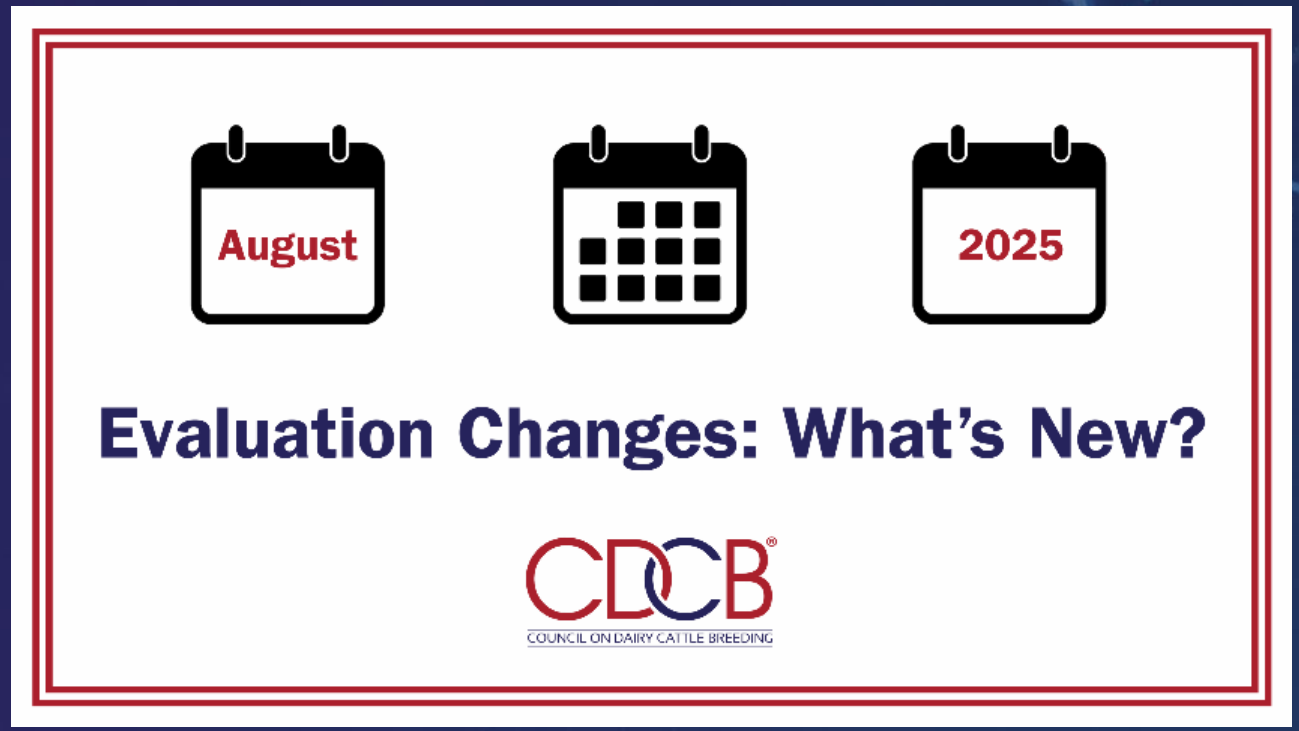
Testing, testing, testing

- First trait using sensor data → required new data format
- Data must be incorporated with existing data pipelines
- Approval from all levels after review of a complete test run with the new trait



Official MSPD evaluations released on August 12, 2025



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Official Results

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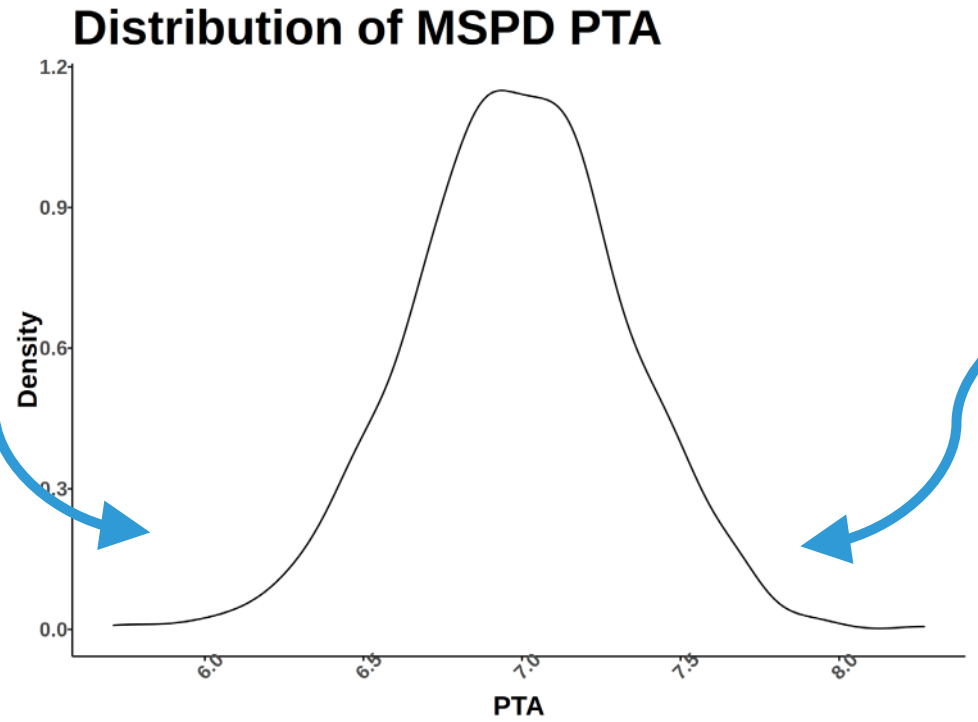
What does it mean?

- PTAs are based on a Holstein phenotypic average = 7 lb./min
- PTA correlation with milk yield, SCS and MAST; no other significant correlations

Slow milkers – LESS milk per minute

These are the animals we may want to avoid in the herd!



Fast milkers – MORE milk per minute

How do they compare?

- MSP from Brown Swiss and Milking Shorthorns use different data sources and will continue to be published

- Many other countries only use subjective scores

How does MSPD differ from other available milking speed selection tools?

	POWERED BY CDCB			Commercially available	Canadian	International
	Holstein	Brown Swiss	Milking Shorthorn	STgenetics Robot Cow Index	Lactanet (CDN)	14 Interbull countries
Trait code	MSPD	MSP	MSP	RCI	Milking Speed	Varies
Unit of measurement	Pounds per minute with an average of 7.1	Linear score from 1 (slow) to 8 (fast)	Linear score from 1 (slow) to 8 (fast)	Pounds per minute	Linear score from 1 (slow) to 8 (fast)	Most use a linear score
Heritability	42%	24%	10%	53%	14%	8.8% to 27.5%
Data source	In-unit sensors (non-robotic)	Type classification	Type classification	Robotic sensors	Producer-reported	Type classification
Records used	All parities, complete and partial lactations, numerous milking manufacturers	All parities	All parities		First-lactation cows	Primarily first-lactation cows, sometimes from a single classification
Additional notes	All records are standardized to 305 days. Partial records receive less weight than complete records.			This trait is 29% of the RCI formula.	Trait is expressed as the percentage of first-lactation daughters evaluated as "average" or "fast."	Germany uses objective scoring along with subjective scores.

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More questions?

- Individual traits – MSPD (https://uscdcb.com/milking-speed)
- Frequently Asked Questions (FAQs) (https://uscdcb.com/milking-speed-faq) – including differences in milking speed tools

What now?

Using MSPD PTAs

- U.S. dairy industry has a new tool to distinguish animals based on their genetic milking speed
- Identify the slow milkers
- No current plans to incorporate into Lifetime Merit Indexes

Future Work

- "**Easy**" - Incorporate additional breeds as more data are accumulated
- "**Challenge**" – Expand to use of AMS data
  - Many more factors to consider:
    - » Number of milkings can vary by cow and day
    - » Milking interval varies at a cow level
    - » Specificities based on OEM
  - Currently ~20k cow-lactations with data from AMS

Acknowledgements

- U.S. Dairy Producers
- Member sectors & collaborators
- USDA AGIL
- CDCB staff

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Resources

- Individual trait information: https://uscdcb.com/milking-speed
- MSPD FAQ: https://uscdcb.com/milking-speed-faq
- CDCB Industry meeting 2024: https://www.youtube.com/live/FFJNSsVGDfk?si=wNNNwnezrqqwKawq
- ICAR – Miles et al., 2024: https://www.icar.org/wp-content/uploads/documents/ICAR-Technical-Series-28-Bled-2024-Proceedings.pdf
- ICAR – Miles et al., 2023: https://www.icar.org/Documents/technical_series/ICAR-Technical-Series-no-27-Toledo/Miles.pdf
- Select Sires podcast: https://www.selectsires.com/article/ss-blog/2025/07/25/milking-speed-trait-coming-august-2025
- Hoards Dairyman – Miles, 2022: https://hoards.com/article-32922-is-there-a-genetic-piece-to-milking-speed.html
- Hoards Dairyman – Gaddis, 2025: https://hoards.com/article-36728-novel-milking-speed-trait-is-highly-heritable.html
- Dairy Herd Management: https://www.dairyherd.com/news/business/milking-speed-new-genetic-trait-debuts-august-proofs

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