

Development of non-invasive behavioral phenotypes that characterize dairy cow thermotolerance



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We can only manage what we measure...

THE HEAT STRESS RESPONSE IS HIGHLY VARIABLE

- Physiological response
- Behavioral coping strategy
- Severity of impact
- Thresholds of discomfort

OBJECTIVE 1: CHARACTERIZE REGIONAL VARIABILITY IN THE HEAT STRESS RESPONSE

- Top 10 dairy producing counties in the top 10 dairy producing states (Figure 1)
- Variability in productivity (daily milk yield) in response to weather (THI)

STATUS: Data sets have been acquired and are being cleaned for analysis

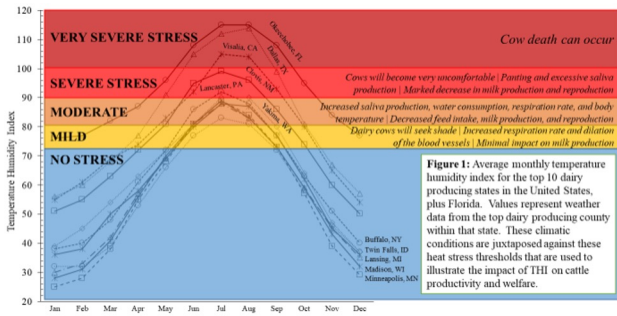


Figure 1: Average monthly temperature humidity index for the top 10 dairy producing states in the United States, plus Florida. Values represent weather data from the top dairy producing county within that state. These climatic conditions are juxtaposed against these heat stress thresholds that are used to illustrate the impact of THI on cattle productivity and welfare.

Collecting disparate data types

Data was collected from dairy cows that were 45-90 DIM at a commercial dairy during Summer 2022 and were milked with a Lely Automatic Milking System

THE OBJECTIVE OF THESE DATA COLLECTION EFFORTS WERE TWOFOLD:

- 1) To evaluate the impact of a fogging system designed for cow cooling on the comfort behavior of dairy cows in a tunnel ventilated barn
- 1) Collect disparate data types from dairy cows in an automatic milking system that can be used to identify and characterize a thermotolerance phenotype

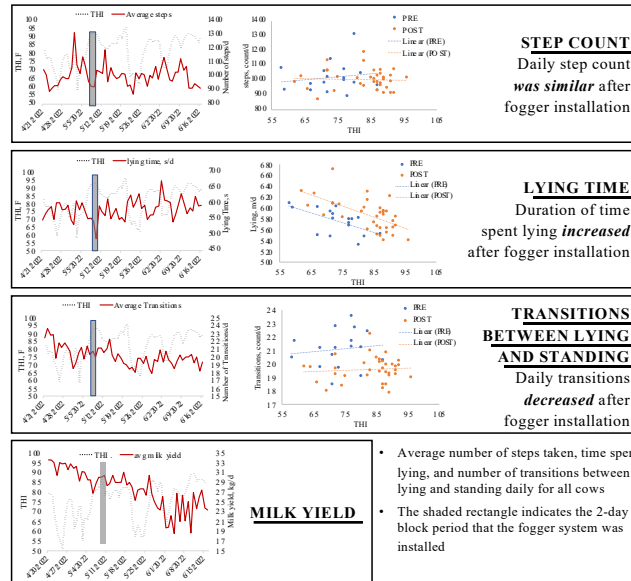
Animals and Housing

- Holstein and Holstein-Jersey cross dairy cows (n = 360) were milked using a Lely Automatic Milking System (n = 18 robots; 3 robots/pen @ 6 pens)

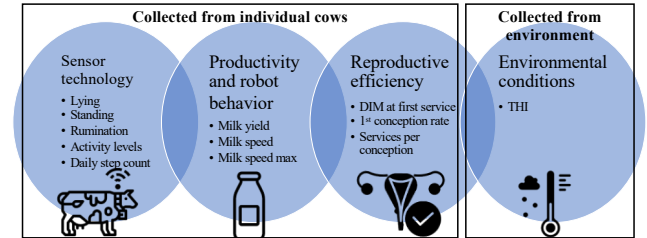


- Sixty focal dairy cows (n = 10 cows/pen @ 6 pens) at 45-90 DIM
 - Pedometer (IceQube, IceRobotics Inc.) attached to the rear left leg
 - daily rumination and activity levels were monitored with SCR collars
 - Productivity (milk yield) measured by the Lely Robotic Milking system

How does a fogging system impact cow comfort?

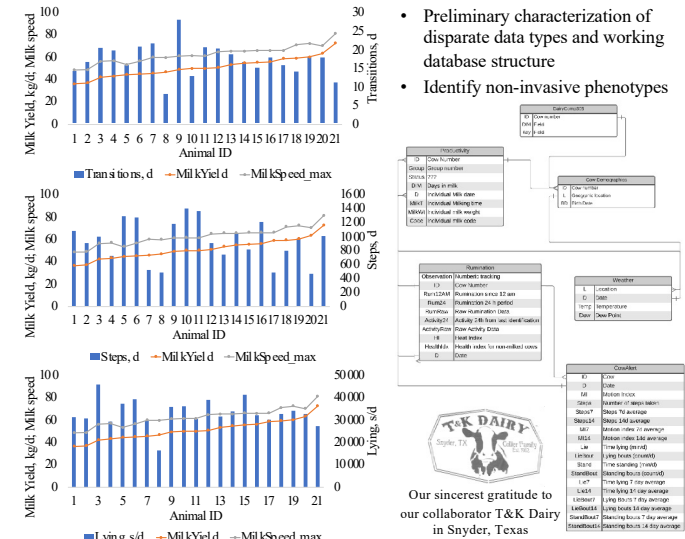


Characterizing thermotolerance



STATUS: Body mounted sensor output and robotic milking information has been collected and being prepared for combination with reproductive efficiency and environmental conditions to develop a strategy for effectively evaluating these disparate data types.

Assessing variation and identifying relationships



- Preliminary characterization of disparate data types and working database structure
- Identify non-invasive phenotypes



Our sincerest gratitude to our collaborator T&K Dairy in Snyder, Texas