

Drinking Behaviour Patterns in Dairy Cattle



Negar Sadrzadeh | negar.sadr@ubc.ca

Arash Kamyabi |
arash.kamyabi@ubc.alumni.ca

CPSC 547 Final Presentation - Fall 2021

Individual level cattle behaviour

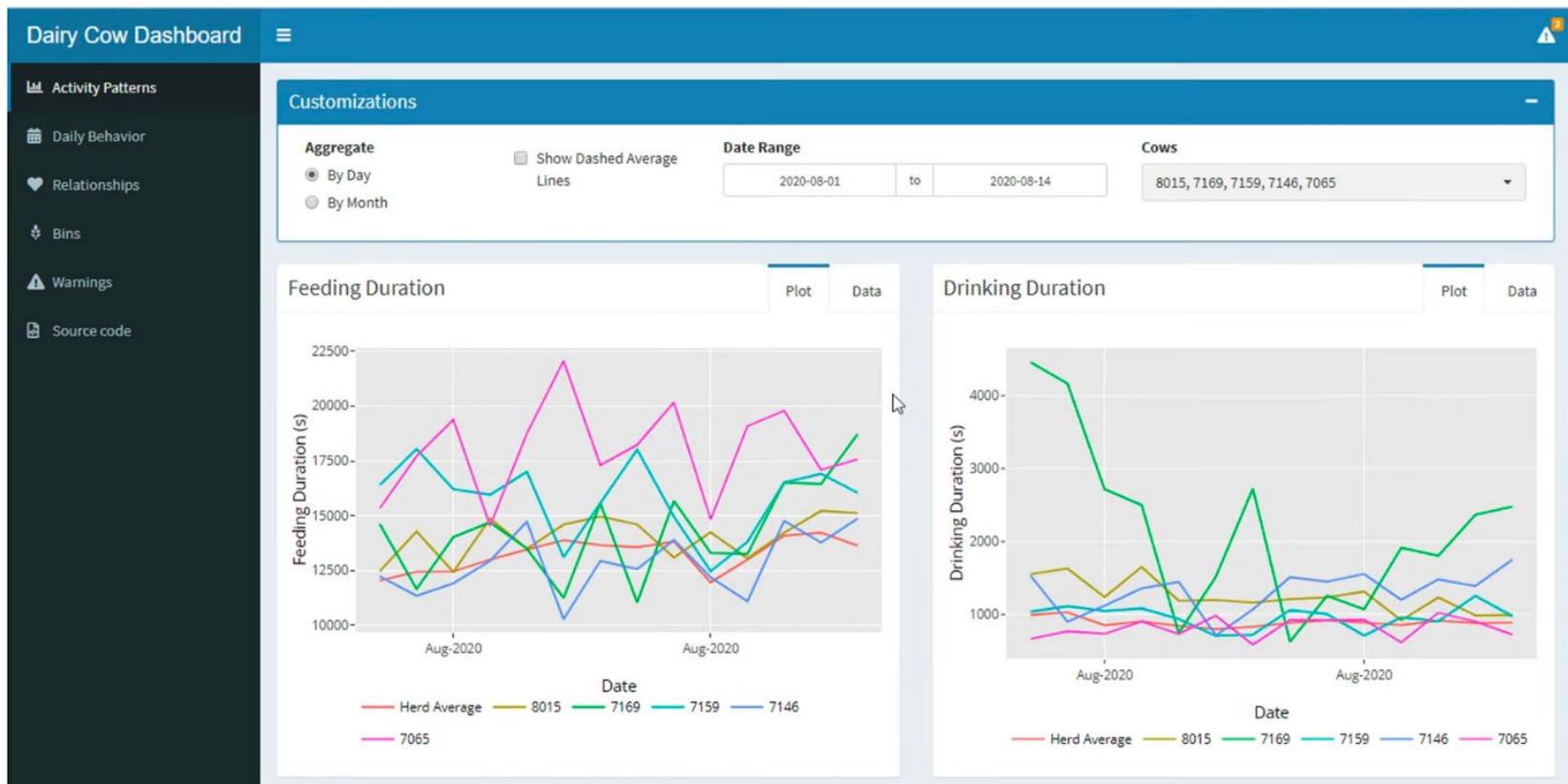
- Farms are incentivised to re-evaluate their best management practices
- Water deprivation can adversely affect their health, behavior, and performance
- Significant behavior differences amongst individual cows
- Critical in making optimal decisions for housing and water access



InsenTec System



Peek-a-Moo



What? → The Data (cont.)

Name	Type	Description	Scale	Range
Cow	Categorical	A unique 4 digit number assigned to each cow		n=53
Start	Ordinal	The date and time when the visit starts		Range = 15/7/2020 - 3/5/2021
Duration	Quantitative	The time spent in the water bin	seconds	0-250
Intake Amount	Quantitative	The amount of water consumed	Kg	0-30
Bin	Categorical	The number of water bin		101,102,103, 104,105



What? → The Data (cont.)

Derived:

Name	Type	Description	Scale
Daily Duration	Quantitative	Sum of all durations of visits during the day	seconds
Daily Intake	Quantitative	Sum of all water intake amount of visits during the day	Kg
Average Daily Duration	Quantitative	Average of daily water intake for all days	seconds
Average Daily Intake	Quantitative	Average of daily water intake for all days	Kg



Why? → Task Abstraction

- T1: Intake-Duration Correlation
 - Explore the correlation between the Daily Duration and Daily Intake
 - Discover the similarities and patterns in herd-level
 - Groups of cows that are similar
 - Pattern for each individual
 - Compare the behaviour of all cows



Why? → Task Abstraction

- T2: Seasonality
 - Explore the correlation between time and visits
 - Discover
 - Seasonality of the data
 - Distribution of visits in time
 - Similarities between herd and each individual
- T3: Individuals
 - Present the consistent drinking behaviours in individuals



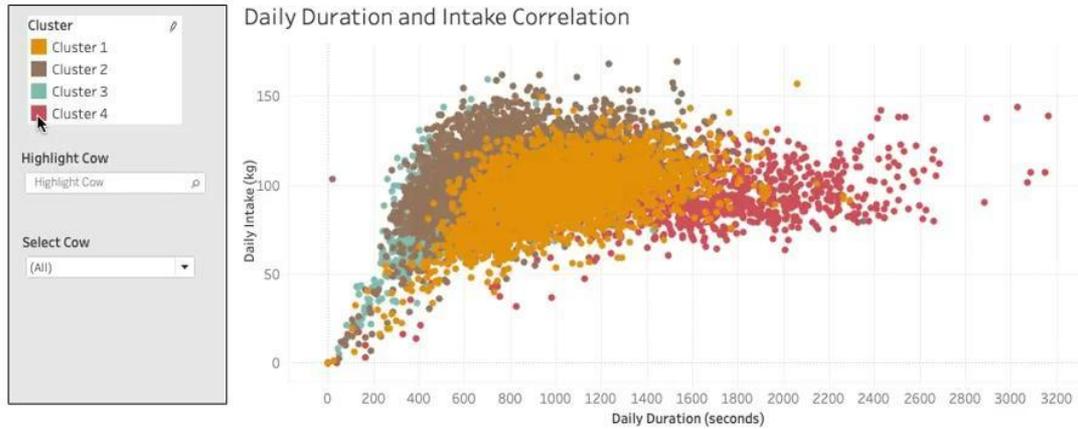
How?

The Solution

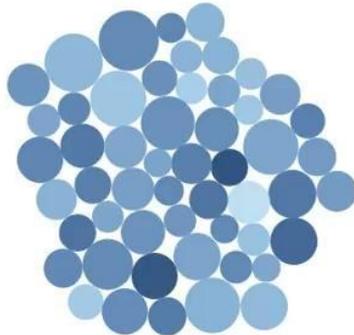


How? —→ The Solution (Intake Duration Correlation)

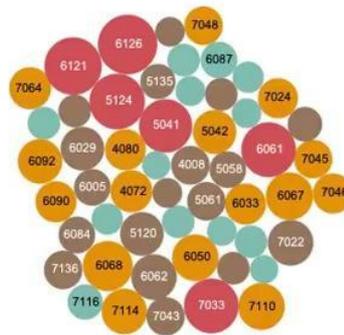
Intake Duration Correlation



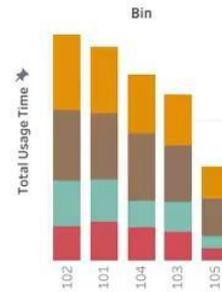
Herd Summary



Cow Clusters

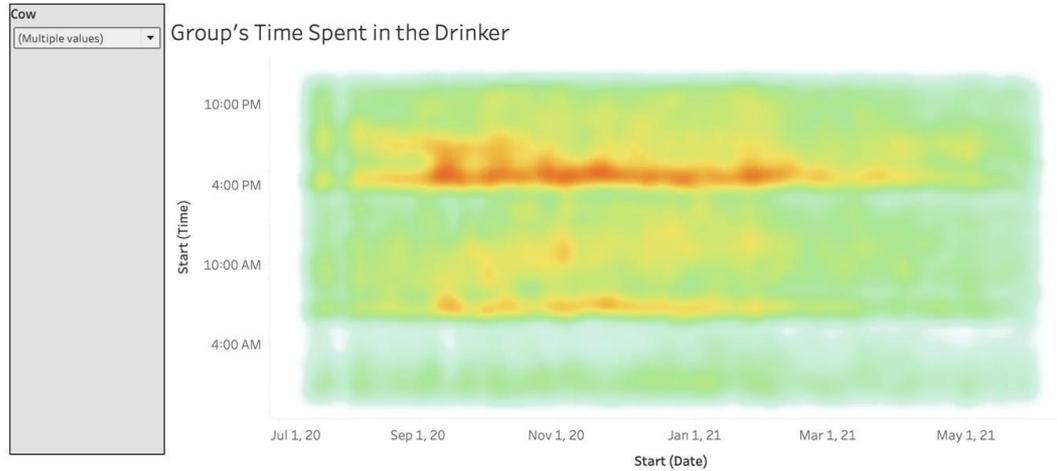


Bin Usage among Clusters



How? → The Solution (Seasoning)

Seasonality



Individuals' Time Spent in the Drinker

Time of Drinking



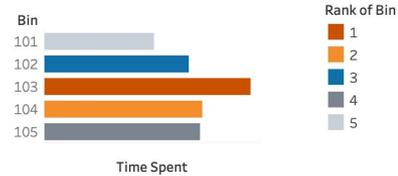
How? → The Solution (Individuals)

Individuals

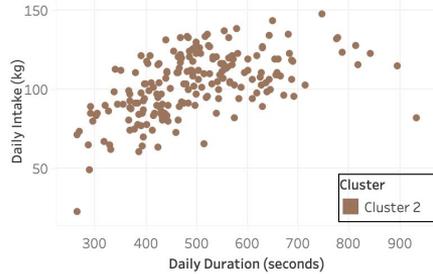
Cow
4044

Time Interval
August 6, 2020 — March 12, 2021

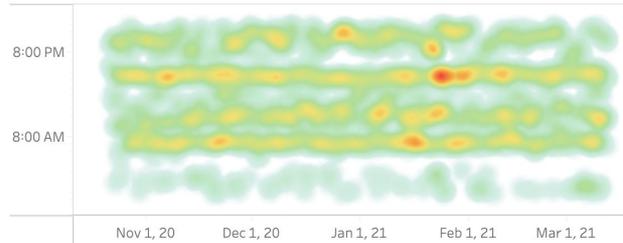
Preferred Bin



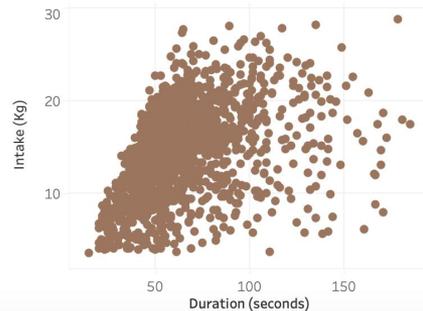
Daily Duration and Intake Correlation



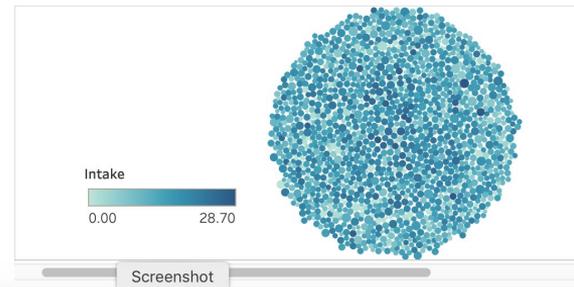
Time of Drinking



Visit Duration and Intake Correlation

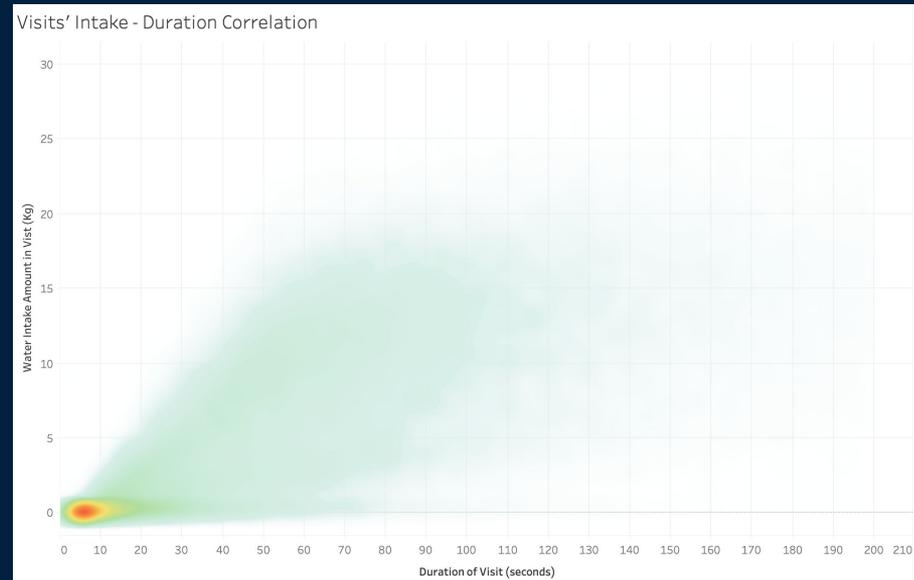


Visits Summary



Limitations and Future Work

- Time
- The dataset contains data from different time intervals for different cows
 - limits the comparisons
 - time filter
 - compare
- Visit-Level Analysis
 - high density of short visits
 - important
 - time
 - sequence
 - frequency



Limitations and Future Work (cont.)

- Aggregation
 - Different time scales
- Clustering
- Evaluation and interactive refinements



An aerial photograph of a dairy farm in Agassiz, BC, Canada. The farm features several large, light-colored buildings with blue roofs, surrounded by green fields and pastures. In the background, there are rolling hills and a prominent mountain range under a blue sky with scattered white clouds. The text "Thank you!" is overlaid in the center of the image.

Thank you!



Backup Slides



Dataset

- A dynamic group of 48 cows being watched for 10 months
- All visits to the water bins during 10 months of monitoring



Cow ID	Bin Number	Time	Duration	Intake
Categorical	Categorical	Ordinal	Quantitative	Quantitative

What? —→ The Data

- all the information for 10 months of all visits to the water bins
- The monitored cows were not the same during these 10 months and were being replaced
 - target group : 53 cows which were monitored more than 4 months



What is the question?

- Consistent individual differences in drinking behavior of cows
- Relationship between frequency and duration of visits and feed/water intake





Drinking Behaviour Patterns in Dairy Cattle



Negar Sadrzadeh | negar.sadr@ubc.ca

Arash Kamyabi | arash.kamyabi@ubc.alumni.ca

CPSC 547 Final Presentation

Task Abstraction

