Applications for Drone Use in the Feedyard

Haley Larson, Ph.D.

K-STATE
OLATHE

Classifying Drone use on Cattle Operations

- Inventory Purposes
- Animal Management
- Yard Management

Photo credit Larson Lab K-State Olathe

Classifying Drone use on Cattle Operations

- **Inventory Purposes**
  - Cattle Head Count
  - Silage pit measurements
- Animal Management
- Yard Management

Photo credit Alltech

Photo credit HeadCount

Classifying Drone Use on Cattle Operations

Inventory Purposes

- Cattle Head Counts

Drone cattle counts can improve:

- Yard inventory records
- Task of reconciling yard sheets for client owned cattle, insurance, or bank audits
- Transition of ownership or management
- Data collection with low stress, low labor input method

Classifying Drone Use on Cattle Operations

Inventory Purposes

- Silage pit measurements

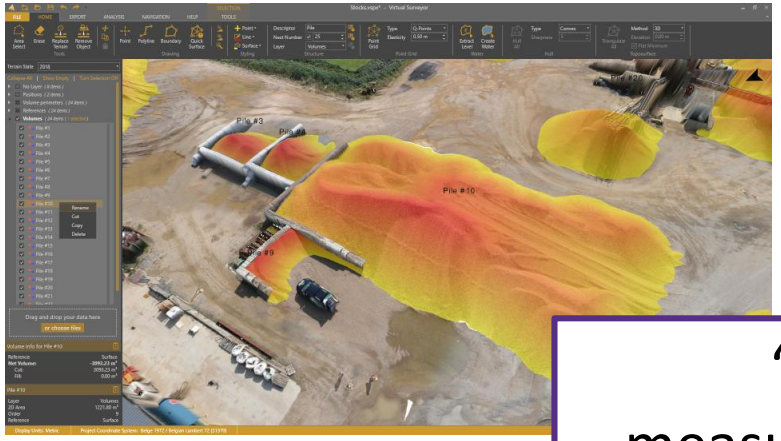


Photo courtesy of Virtual Surveyor

"Stockpile measurements" have been completed for years by mining and aggregate industry

Alltech®

Photo courtesy of Alltech InTouch

Implementation in Cattle feeding is within larger platform due to machine learning algorithm integration

Commercialization more challenging due to improvements in basic drone flight patterns

Classifying Drone use on Cattle Operations

- Inventory Purposes
- **Animal management**
  - Bunk calls
  - Moving cattle
  - Animal Behavior
- Yard Management

Photo credit Larson Lab K-State Olathe taken at Beef Stocker Unit in Manhattan

Classifying Drone Use on Cattle Operations

Animal Management

- Bunk Calls

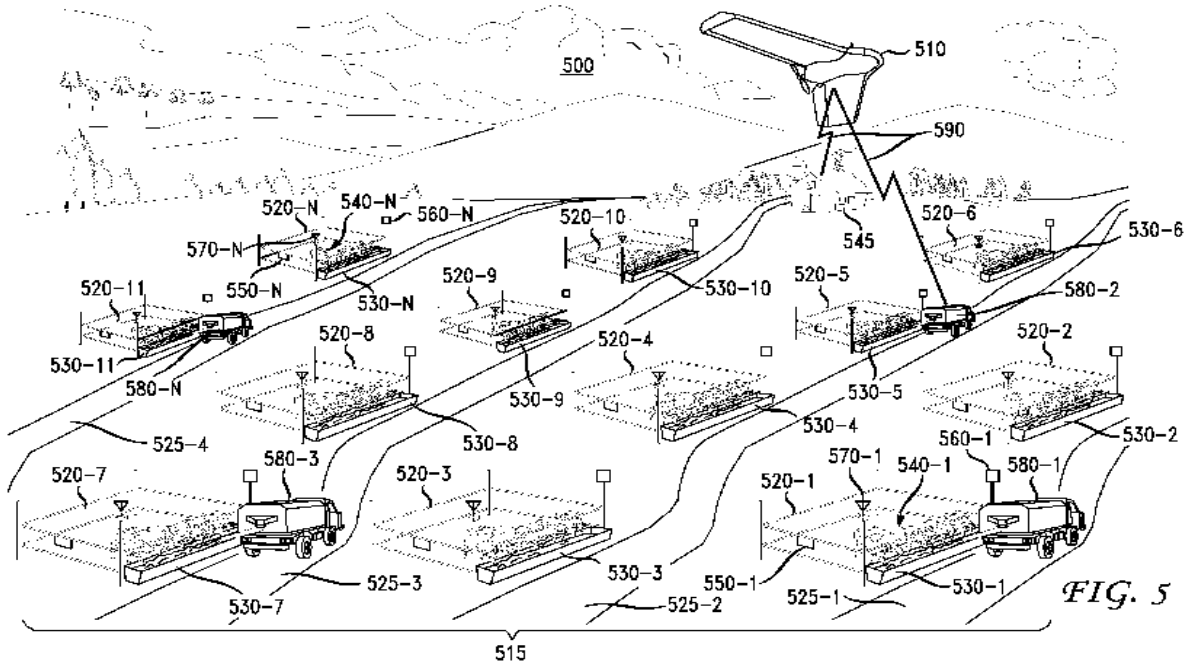


FIG. 5

Classifying Drone Use on Cattle Operations

Animal Management

- Bunk Calls

MANABOTIX

BunkBot UGV

Micro Technologies™
AmerisourceBergen

Accu-Trak Vision

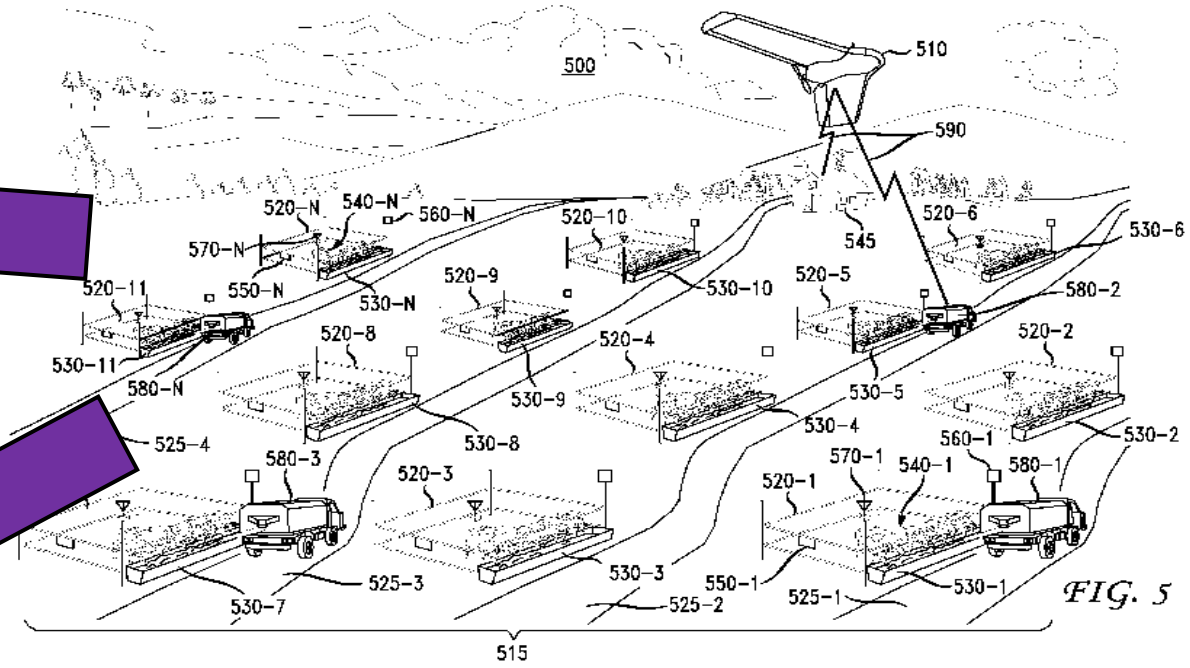


FIG. 5

Classifying Drone Use on Cattle Operations

Animal Management

- ~~Bunk Calls~~ Mixer Tests

Drone surveillance during feeding:

- Ensure proper mixer function/operation
  - Ex. Detecting wrong gear/auger velocity
- Early identification of mixer errors before cattle are misfed
  - Ex. Feed caught on outer edges of mixer impacting feed consistency

Photo credit Larson Lab K-State Olathe taken at Beef Stocker Unit in Manhattan

Classifying Drone Use on Cattle Operations

Animal Management

- Moving Cattle?

Classifying Drone Use on Cattle Operations

Animal Management

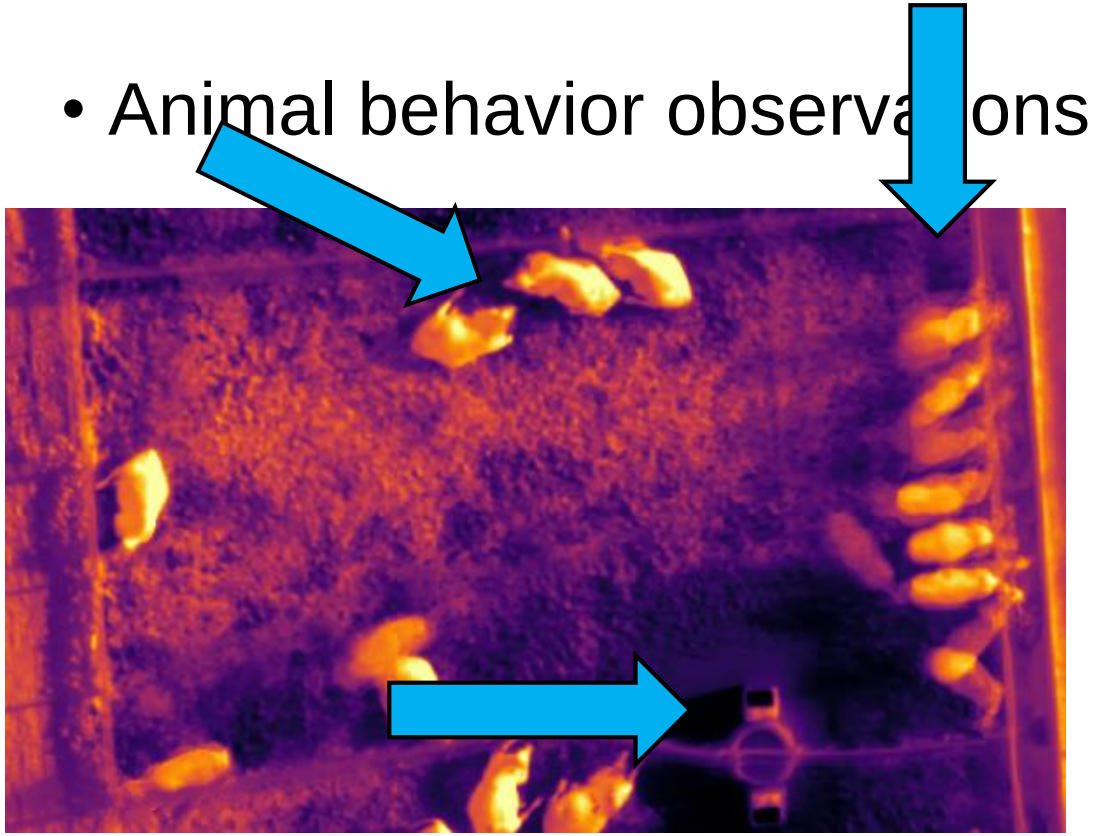
- Moving Cattle?

Cargill™

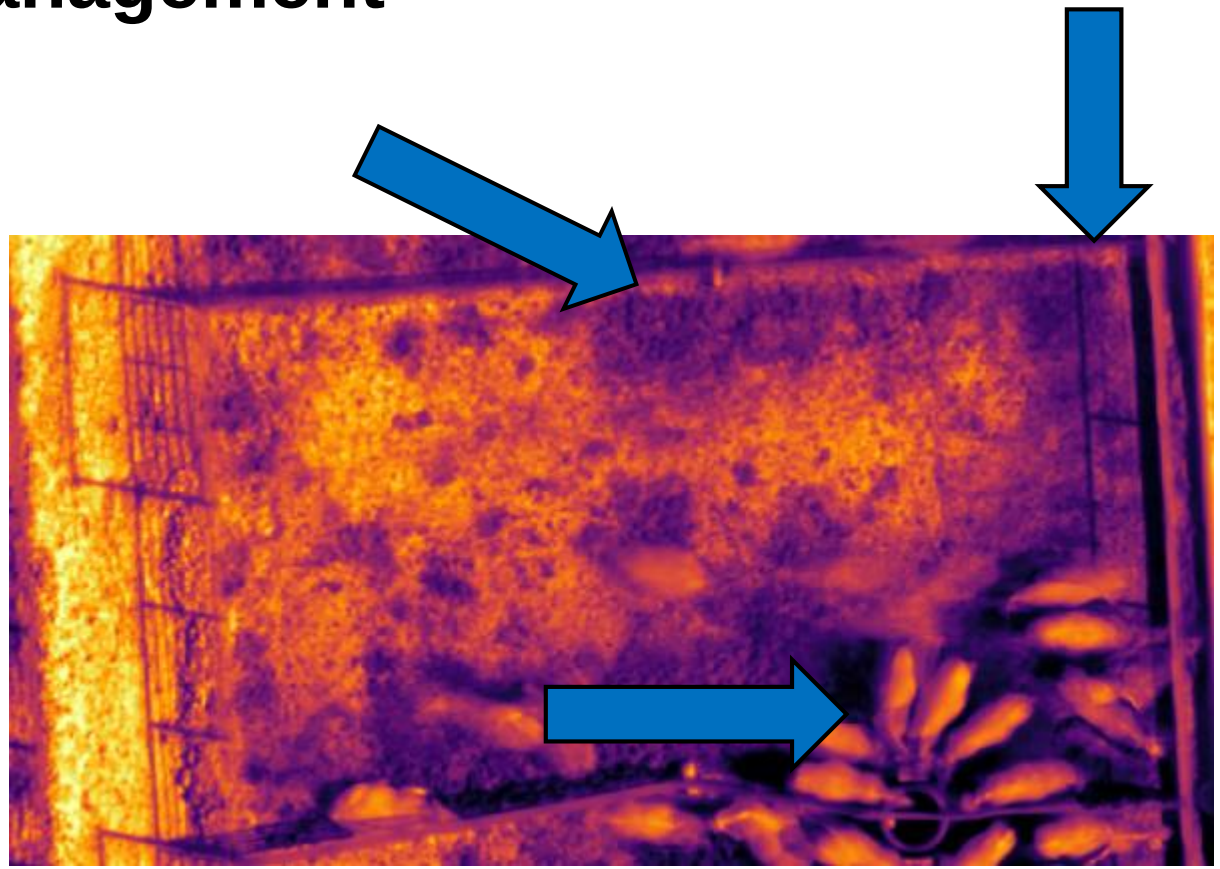
Classifying Drone Use on Cattle Operations

Animal Management

- Animal behavior observations



Earlier in morning (8am in July)



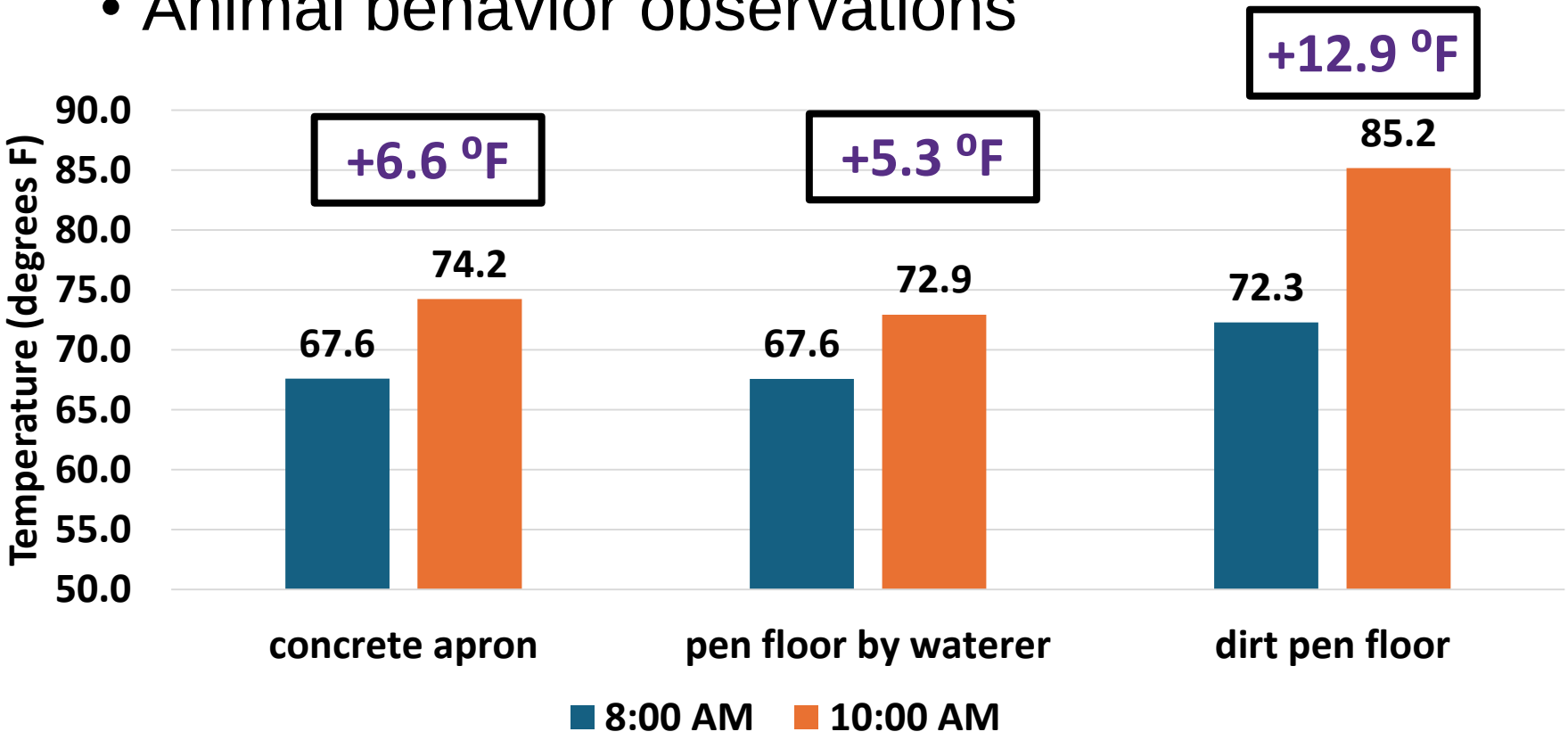
Later in morning (10am same day in July)

Photo credit Larson Lab K-State Olathe taken at Beef Stocker Unit in Manhattan

Classifying Drone Use on Cattle Operations

Animal Management

- Animal behavior observations



(Diller et al., unpublished)

Classifying Drone Use on Cattle Operations

Animal Management

- Animal behavior observations

Photo credit Larson Lab K-State Olathe taken at Alberta Beef Producer Feedyard

Classifying Drone Use on Cattle Operations

Animal Management

- Animal behavior observations

Simple, but key to remember :
Cattle are the experts of their environment, observing them helps us better understand conditions impacting their performance and health

- Manure hot spots in cooler pen zones
- Ammonia emissions from urine correlate to animal health

Photo credit Larson Lab K-State Olathe taken at Alberta Beef Producer Feedyard

Classifying Drone use on Cattle Operations

- Inventory Purposes
- Animal Management
- **Yard Management**
  - Pen conditions

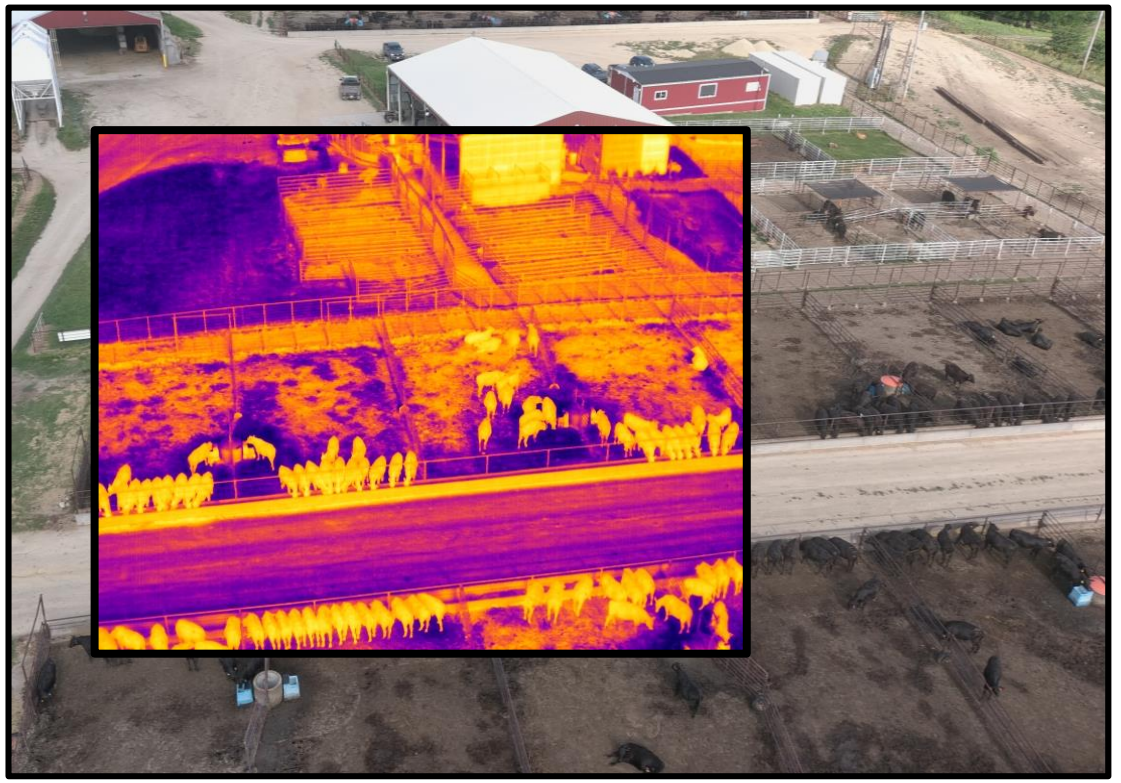


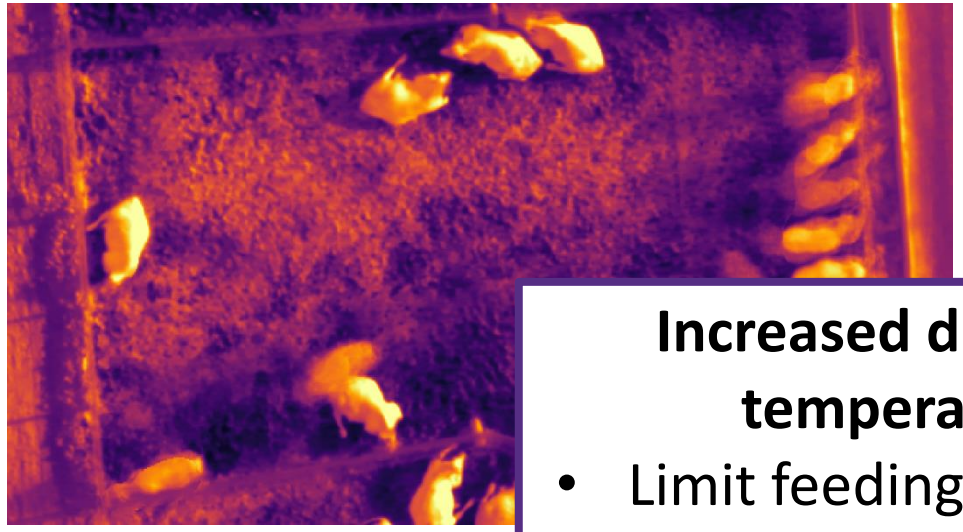
Photo credit Larson Lab K-State Olathe taken at Beef Stocker Unit in Manhattan

Classifying Drone Use on Cattle Operations

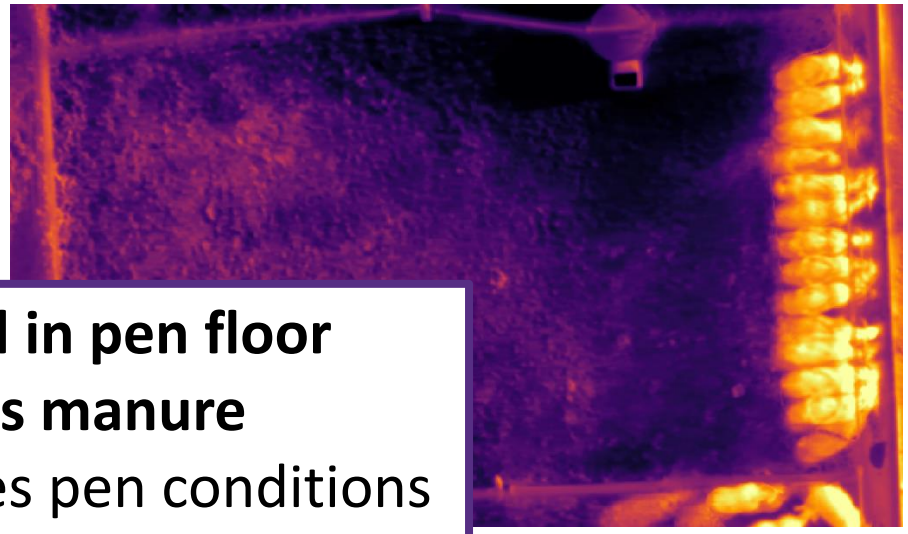
Yard Management

- Pen Conditions - manure

Cattle limit fed 64 NEg ration



Cattle fed 50 NEg ration



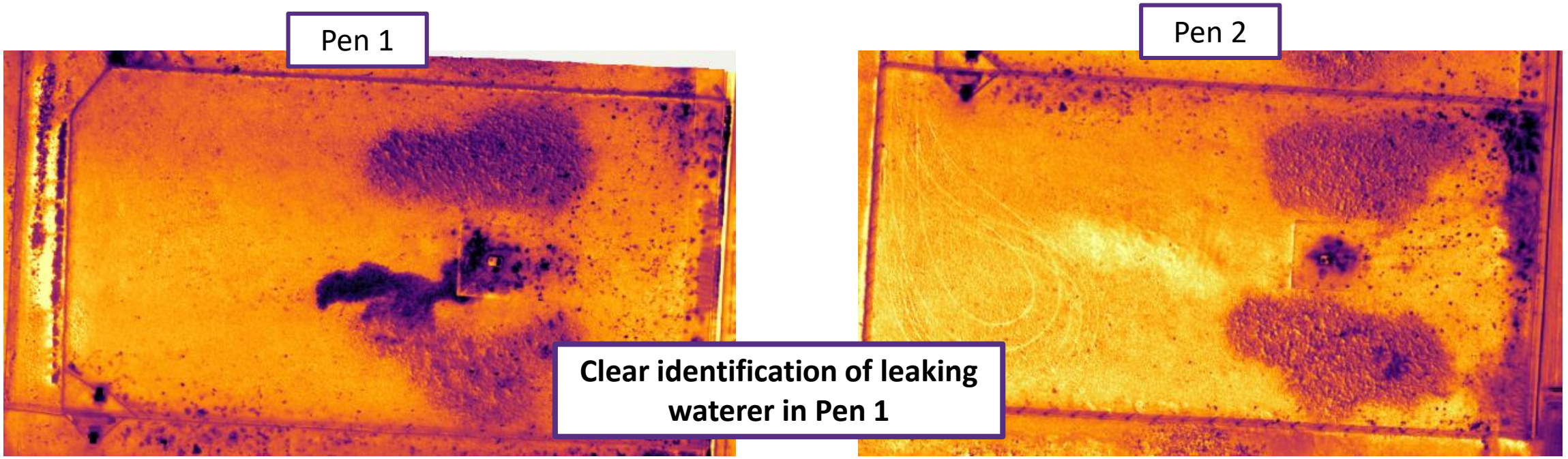
Increased differential in pen floor temperature = less manure

- Limit feeding influences pen conditions
- Pen conditions influence temperature differential and environmental conditions throughout pen

Classifying Drone Use on Cattle Operations

Yard Management

- Pen Conditions - equipment



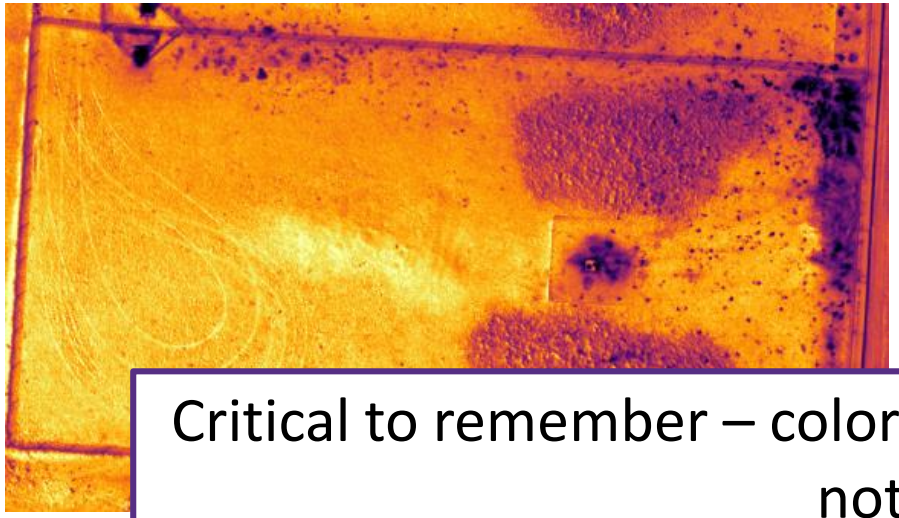
Photos courtesy of Larson Lab taken on a commercial feed yard in SW Kansas

Classifying Drone Use on Cattle Operations

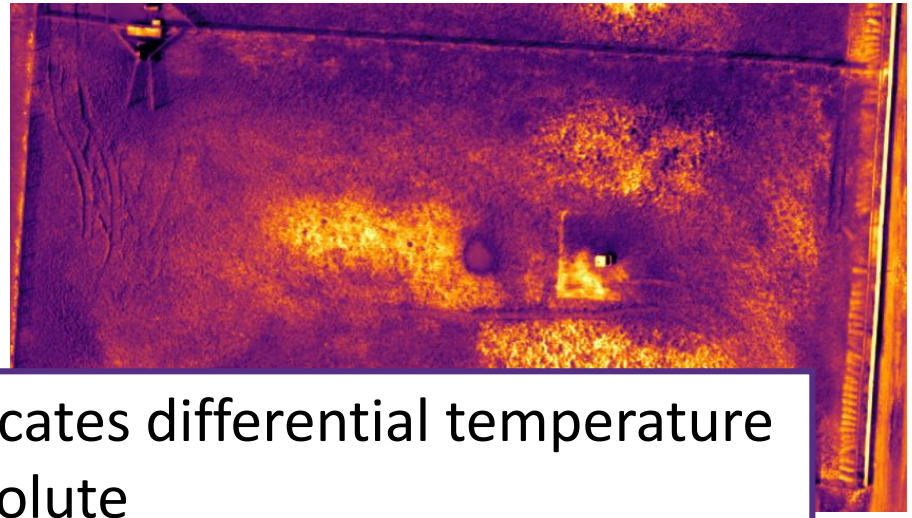
Yard Management

- Pen Conditions

Day 1 Before rain



Day 2 After overnight rain



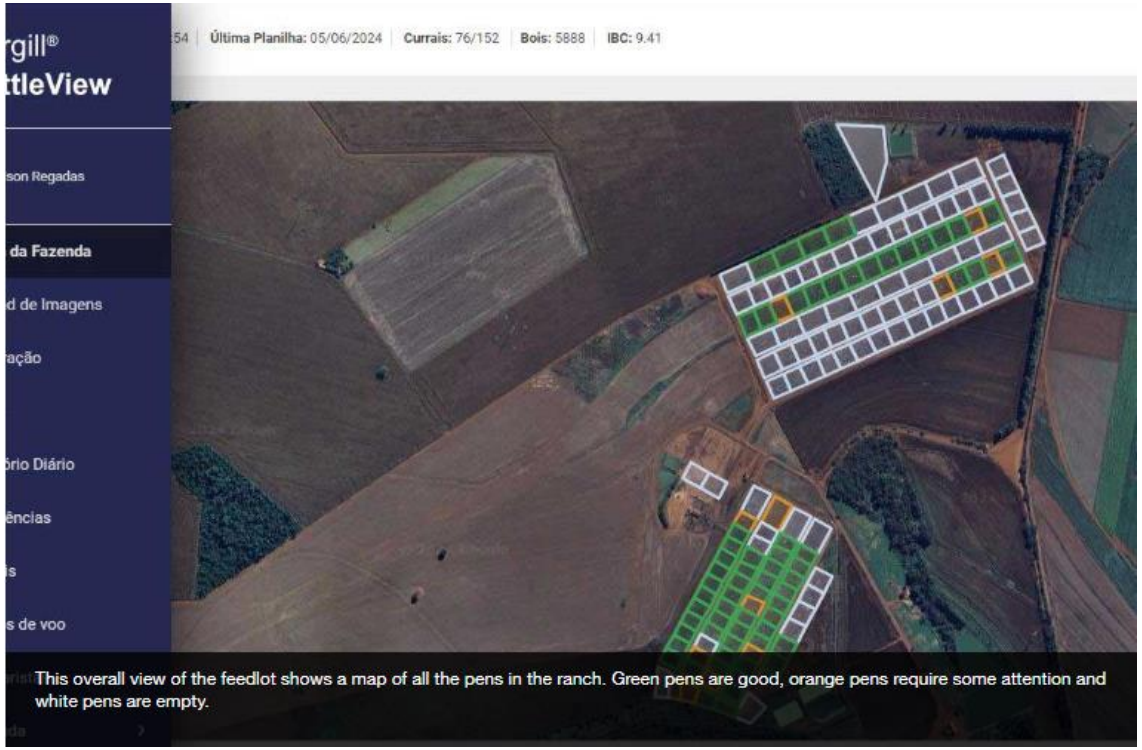
Critical to remember – color indicates differential temperature not absolute

Our tools are only as good as our interpretation

Classifying Drone Use on Cattle Operations

Yard Management

- Pen Conditions



Green: good
Orange: need attention
White: empty

Photo courtesy of Cargill CattleView

Key takeaways for consideration of Drone use in Feedyard

- Opportunities exist
- Applications are diverse
- Limitations must be considered
- BUT…Technology continues to evolve

Photo credit Larson Lab K-State Olathe taken at Beef Stocker Unit in Manhattan

THANK YOU

Contacts

Haley Larson, Ph.D.
haleyls@ksu.edu
Logan Diller, M.S. Student ASI
logandiller@ksu.edu