

Dust Control from Animal Activity on Open Lots

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Upcoming AQ Webinars

- **Sept. 18 – Agricultural Odor Management: Pit Additives; Shelterbelts; National Guidance; and PA Odor Plan Troubleshooting**
- **USDA-ARS Livestock GRACEnet series**
 - **Oct. 9 – Introduction to Livestock GRACEnet and How ARS Research can be Transferred to NRCS**
 - **Nov. 13 – Feed Management for Beef Feedlots to Reduce Air Emissions**
 - **Jan. – Feed Management for Dairy Operations to Reduce Air Emissions**
 - **Feb. – Ammonia Recovery in Manure Management Systems**
 - **Mar. – Acid Scrubbers for Removal of Ammonia from Mechanically-Ventilated Broiler Houses**



Webinar Goals

- Provide an overview of CPS 375 – Dust Control from Animal Activity on Open Lot Surfaces
- Discuss the various technologies included in the standard



Open Lot Dust Control Overview

- **Definition**

- Reducing or preventing the emissions of particulate matter (PM) arising from animal activity on open lot surfaces at animal feeding operations

- **Purpose**

- Improve air quality by addressing the air quality resource concern for PM by mitigating direct emissions of PM caused by animal activity

- Improve animal health by reducing impacts caused by inhalation of emitted PM



Open Lot Dust Control Overview

- **Conditions Where Practice Applies**
 - Any open lot surface subject to animal activity at animal feeding operations.
- **What is an open lot surface?**
 - Holding pen
 - Corral
 - Working alley
 - Other open surfaces





Overall Criteria

- Incorporate a dust prevention and control strategy into the site conservation plan
- Reduce PM emissions by employing:
 - Manure harvesting and/or
 - Water application



Using NRCS Conservation Practice Standard 375 for Dust Control on Open-Lot CAFOs

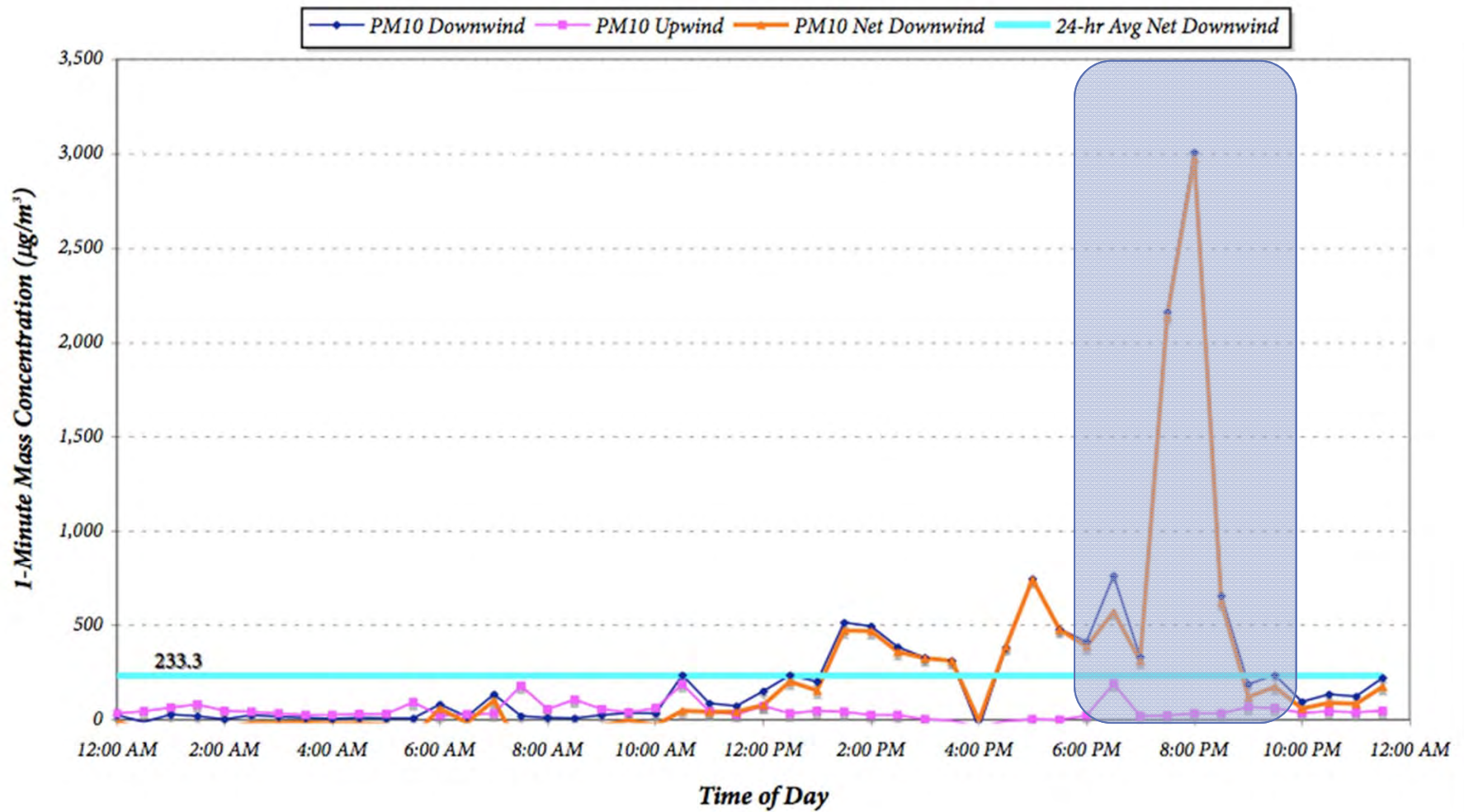
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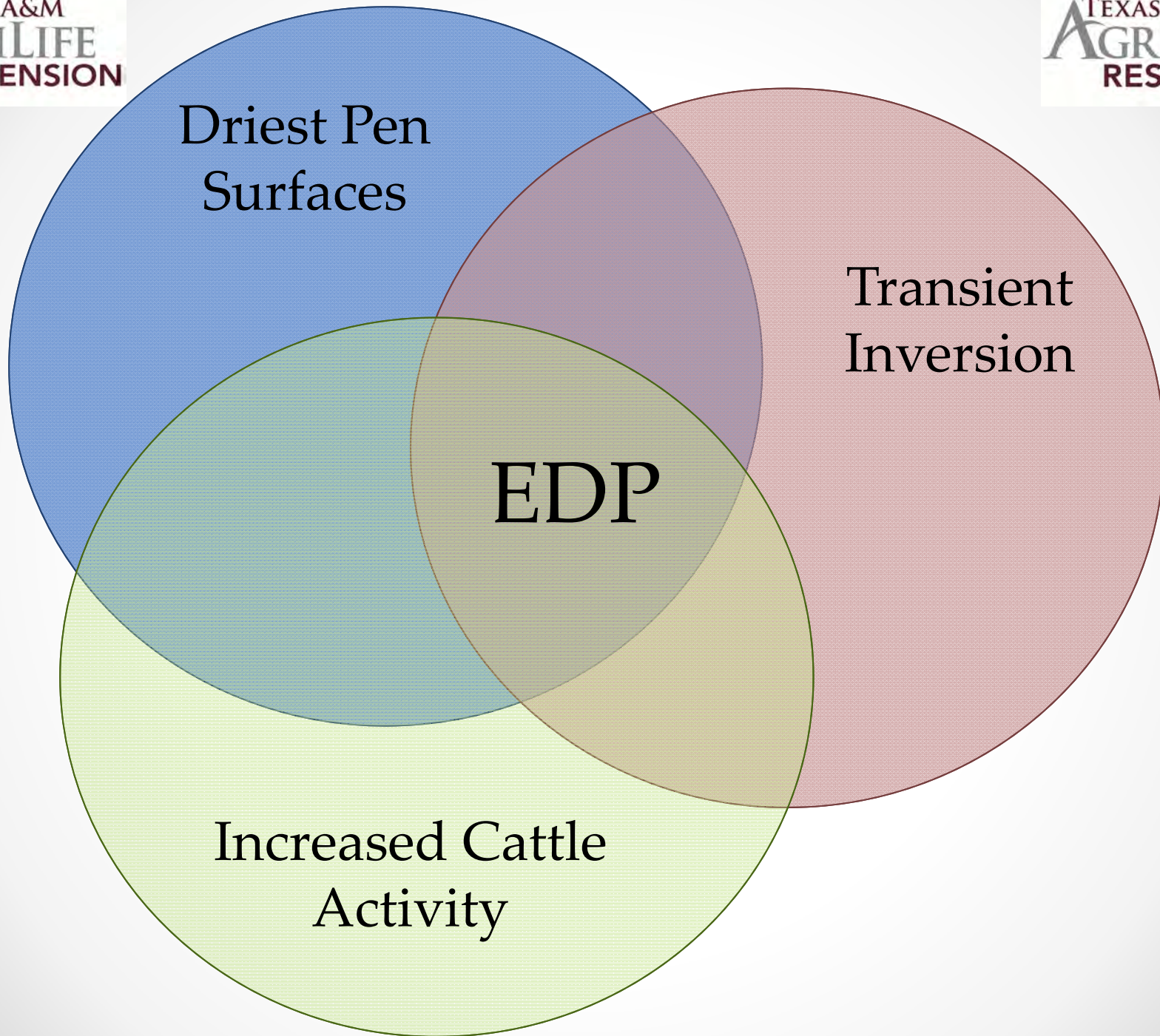






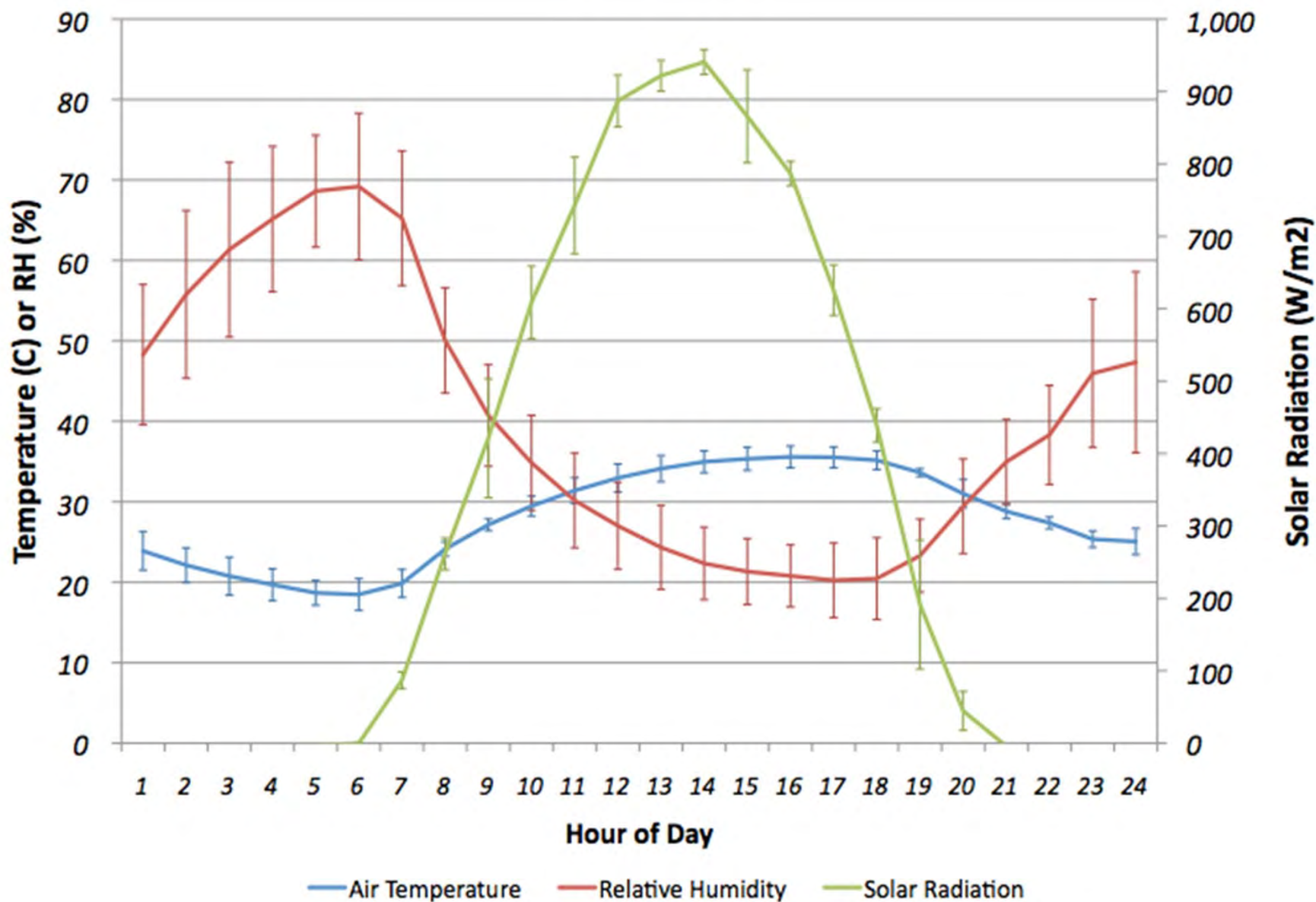
PM₁₀ Mass Concentrations - Feedyard A Upwind and Downwind
March 20, 2007





Temperature, RH, and Solar Radiation

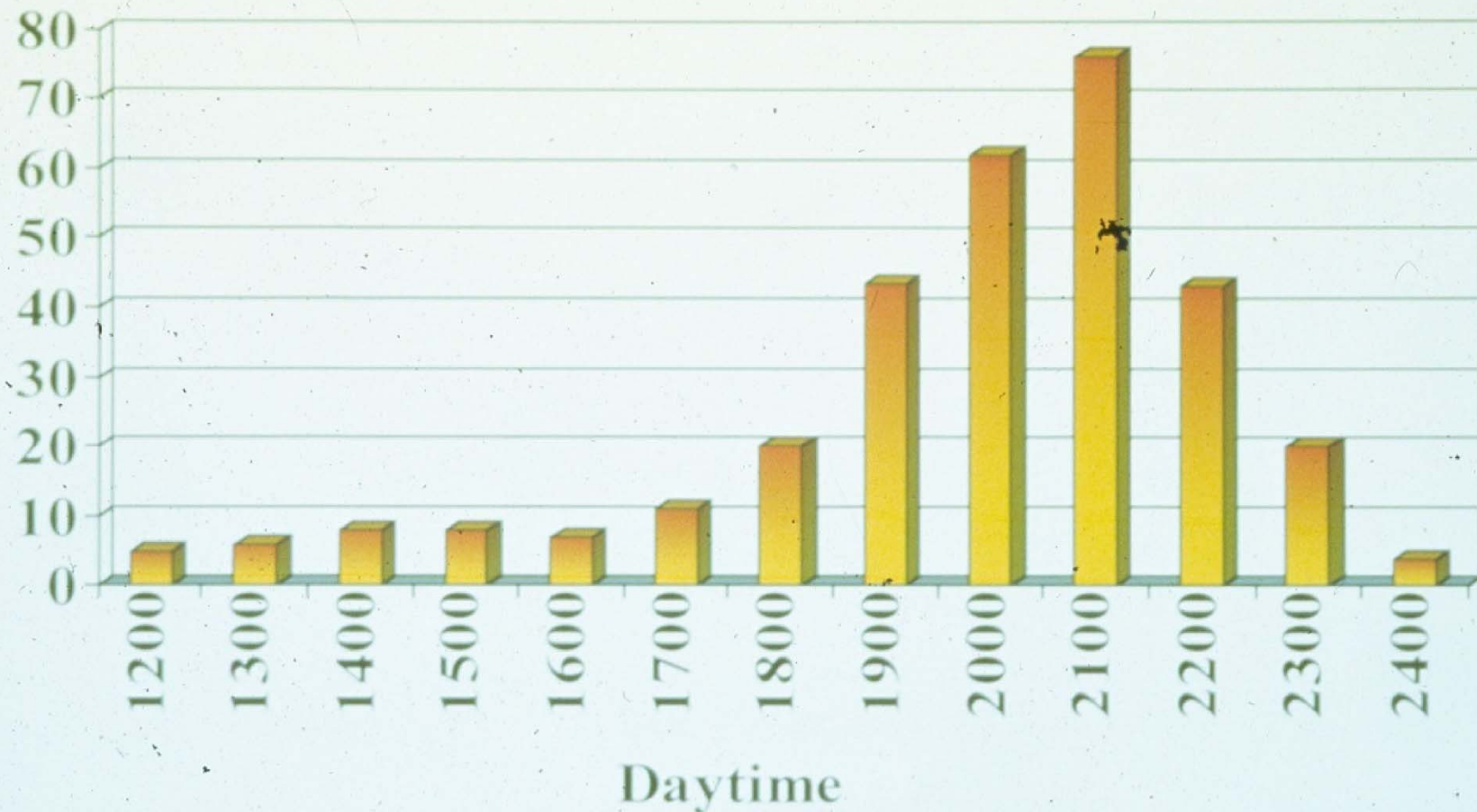
11-15 JUL 2009





Dust Generating Behaviors

(agonistic behavior, bulling and locomotion)



Slide courtesy Texas Tech University





Rationale for the Standard



Critical Control Points for Fugitive Dust from Feedyards and
Dairies



Conceptual Model

Emission Factor, EF (g/hd/d)

=

Pen Surface Dustiness, S (g/kJ)

X

Animal Activity, AA (kJ/hd/d)



Key Factors Affecting S

- S = “ [Intrinsic] dust susceptibility”
- Varies spatially and temporally through these properties of the surface layer:
 - Moisture content
 - Bulk density
 - Depth
- Standard 375 addresses all three

Abatement Measures: PM

- Manure harvesting
- Solid-set sprinklers
 - 50-80% effectiveness
 - Cost/benefit ~ \$0.75-1.00/lb PM₁₀
- Stocking density manipulation
 - Reduces water requirements
 - Extends rainfall effects
 - Must preserve bunk space per head
 - >50% effectiveness (not yet published)

Manure Harvesting

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The Feedyard Manager's #1 Tool



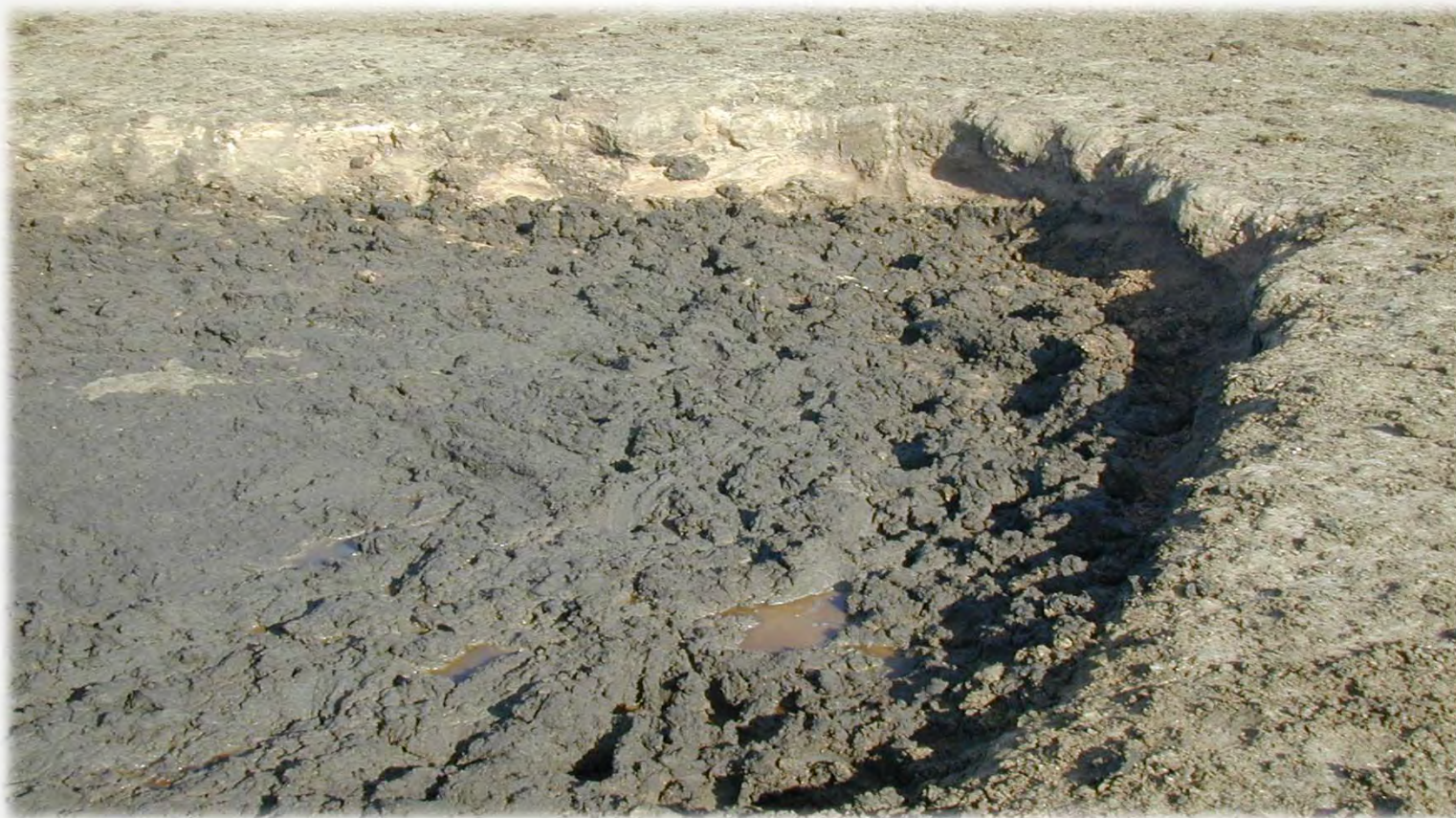












Manure Harvesting

- If resources are limited, how to prioritize and focus operations?
 - If possible, begin on the downwind side and work upwind
 - Pens with animals near slaughter weight
 - Conduct operations when sun is highest
 - Box blades fill quickly; plan circuits to reduce spillage
 - Remove manure immediately or compact in place to reduce redistribution

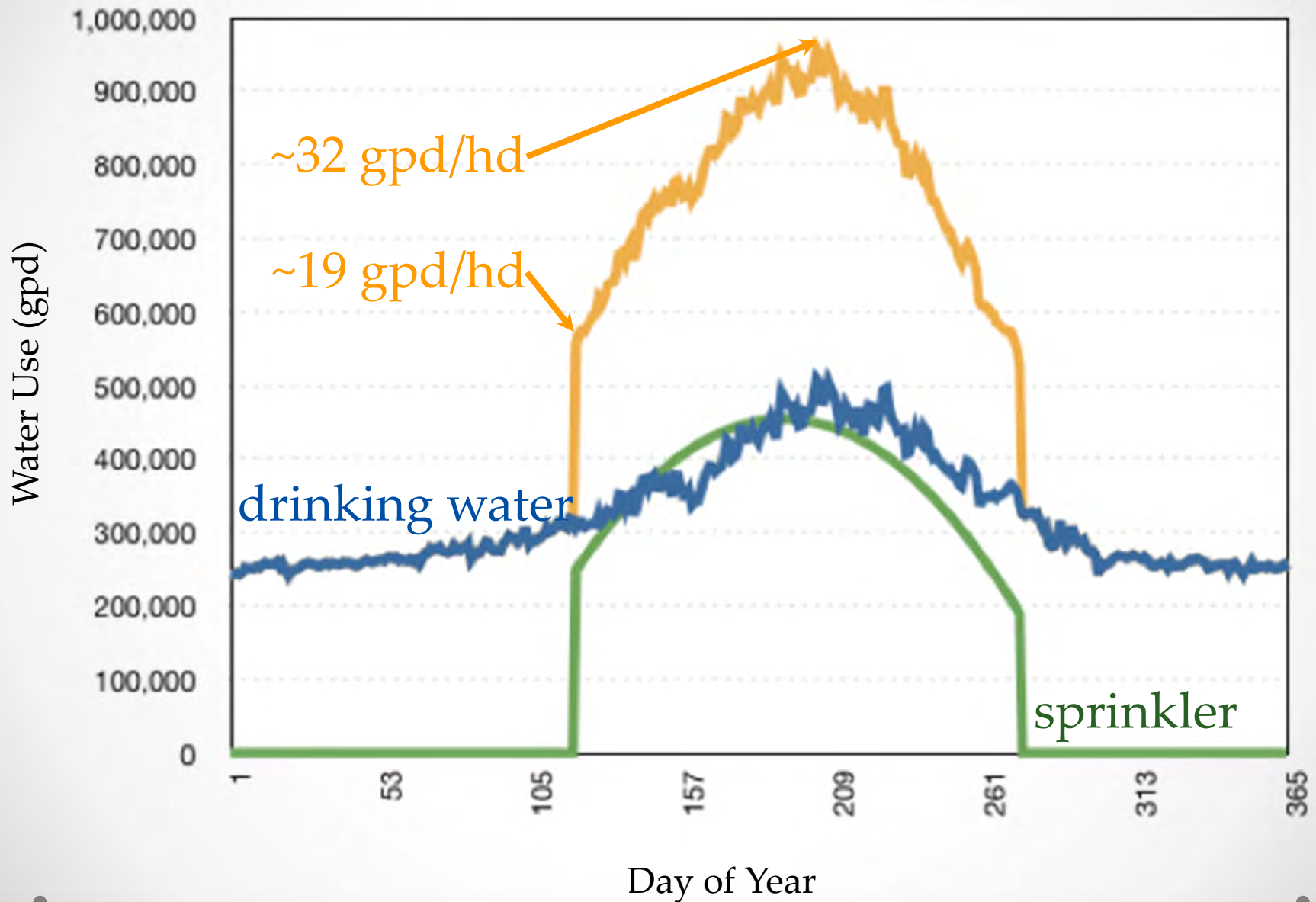
Solid-Set Sprinklers



Water Requirements and System Management











Water Application

- Don't rely on water ALONE if uncompact manure is deeper than 1/2" - 1"
- Longer sprinkler sets rather than more numerous, IF POSSIBLE
- The last set of the day should be the downwind set, if layout permits

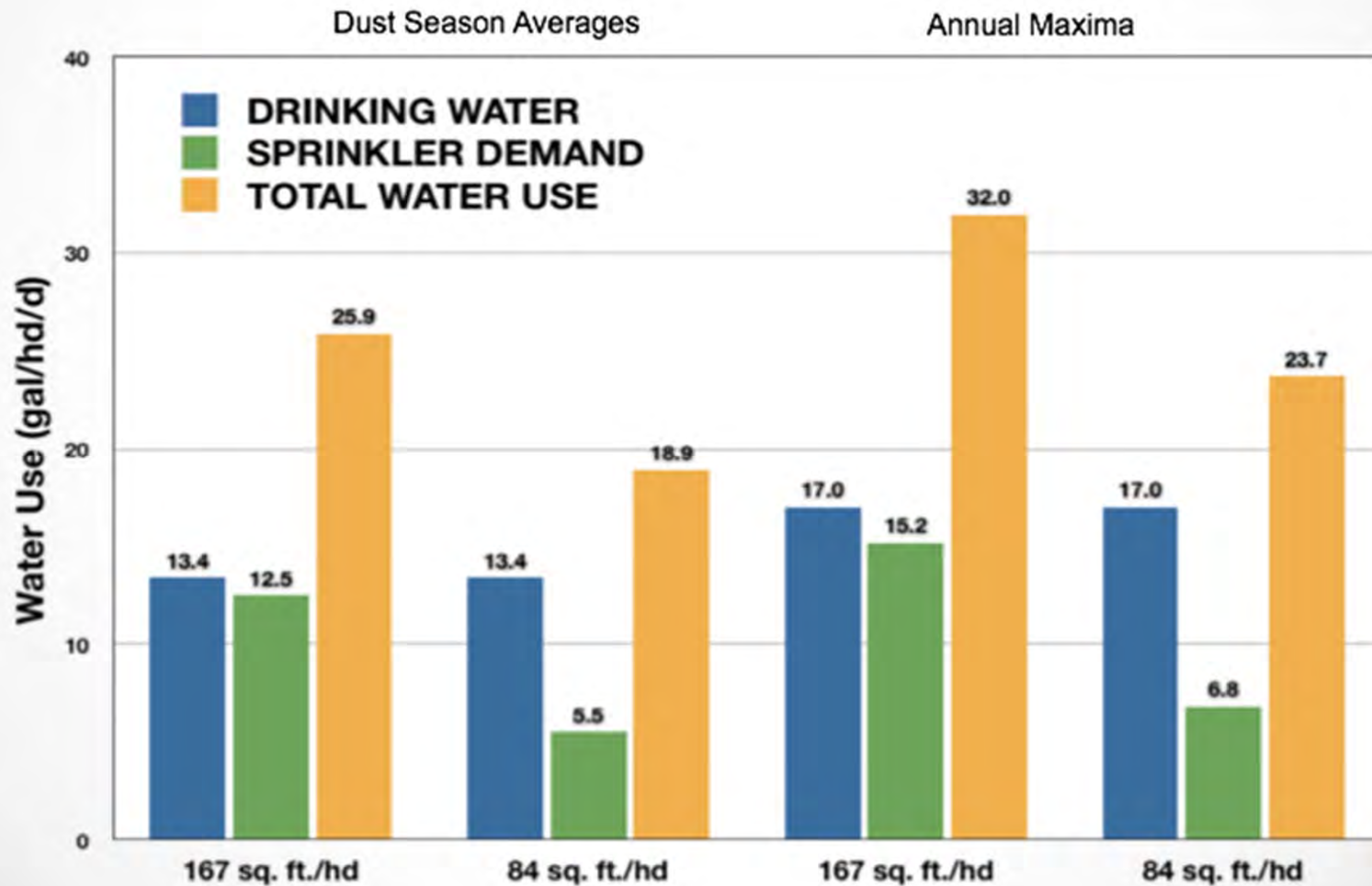


Manipulating Stocking Density

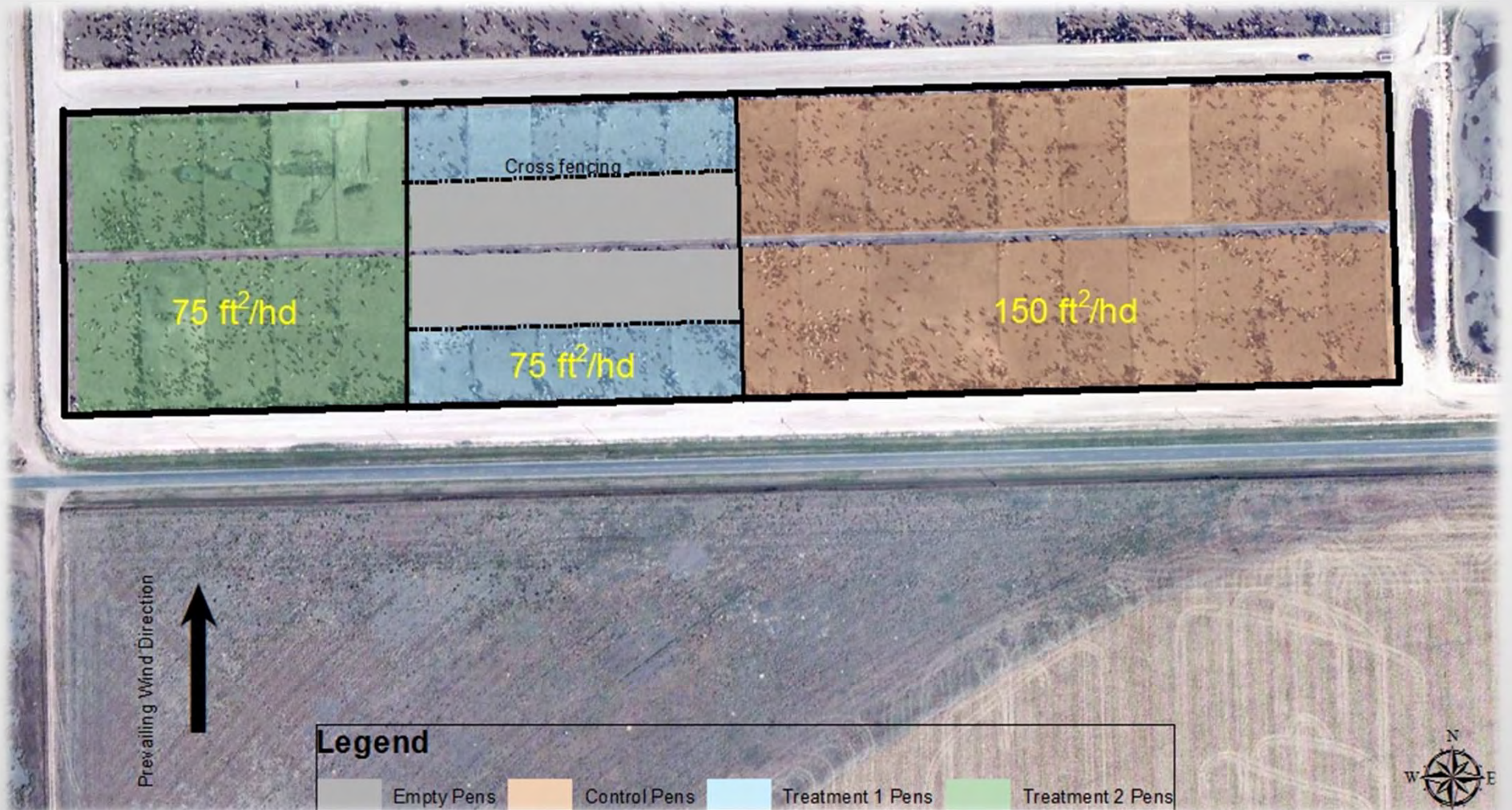
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The Next ARQM Component?

Theoretical Water Demand vs. Stocking Density



Stocking Density Treatments



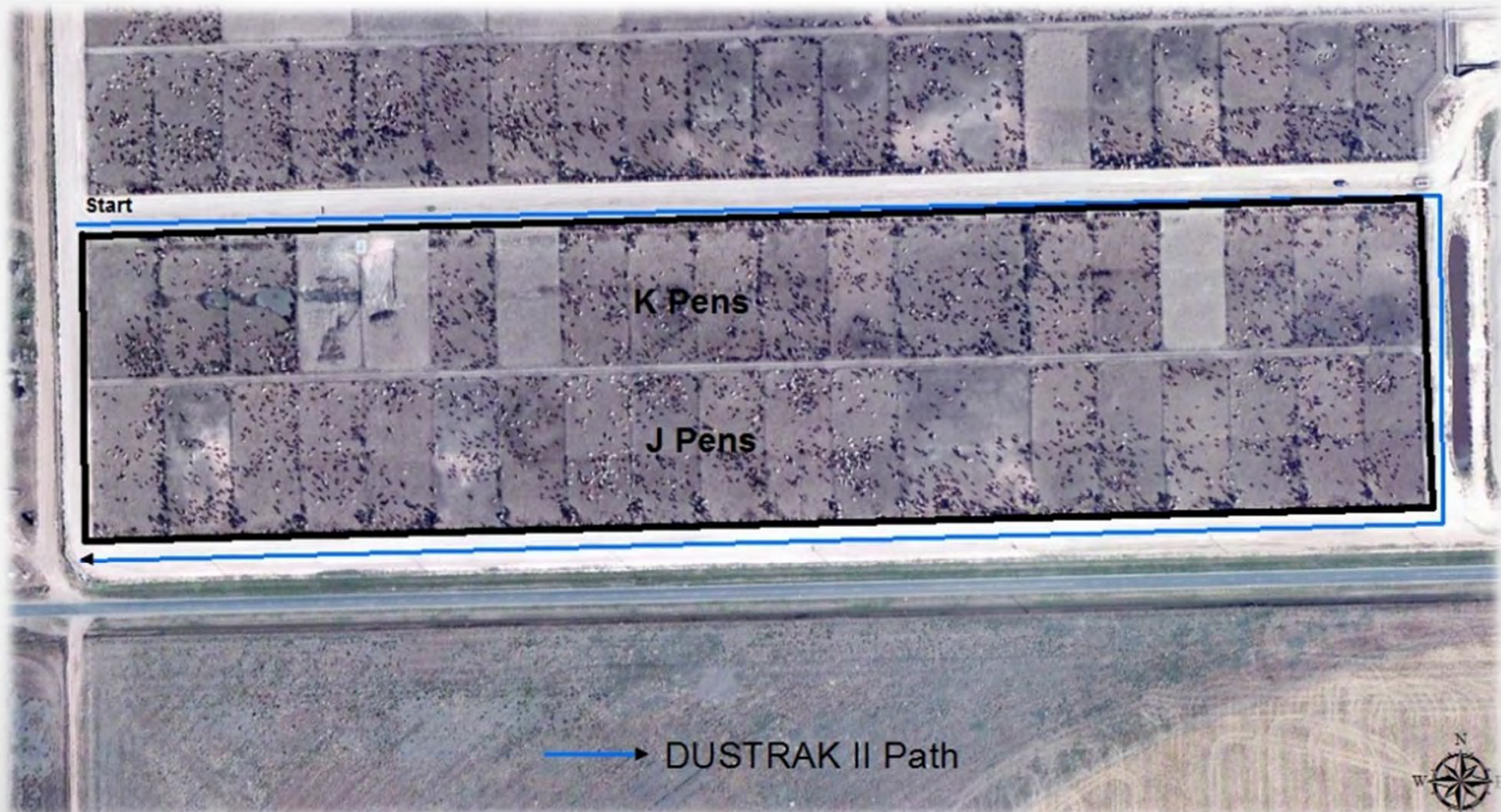
Stocking Density Treatments

TREATMENT	CTRL	TRT1	TRT2
J-Row Block	Pens J11-J19	Pens J6-J10	Pens J1-J5
K-Row Block	Pens K11-K19	Pens K6-K10	Pens K1-K5
Cattle Spacing	150 ft ² hd ⁻¹	75 ft ² hd ⁻¹	75 ft ² hd ⁻¹
Method	Industry Standard	Doubled Animal Numbers per Pen	Pen Area Reduced 50% by Fence

Mobile Monitoring Platforms

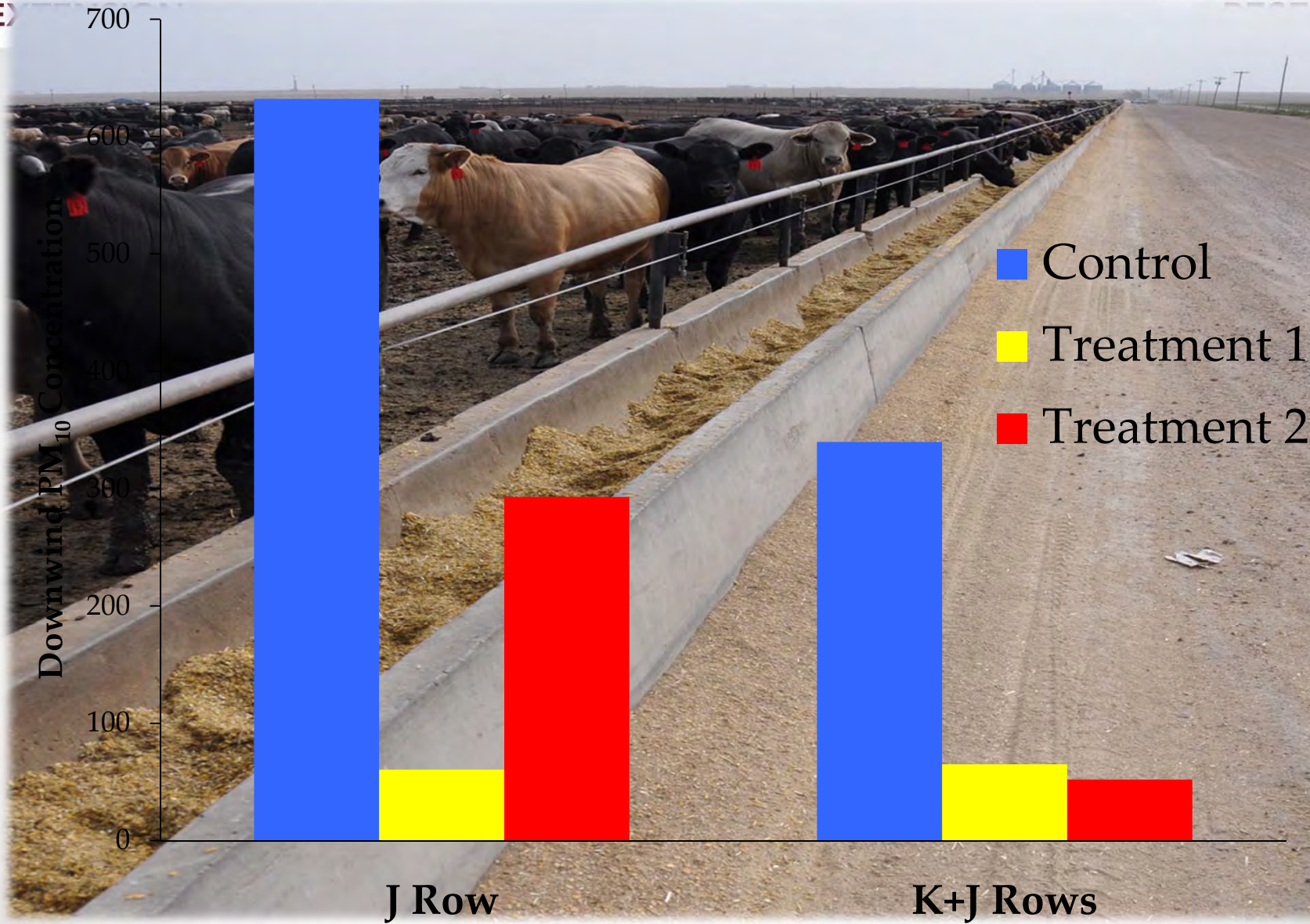


Monitor #2 Path



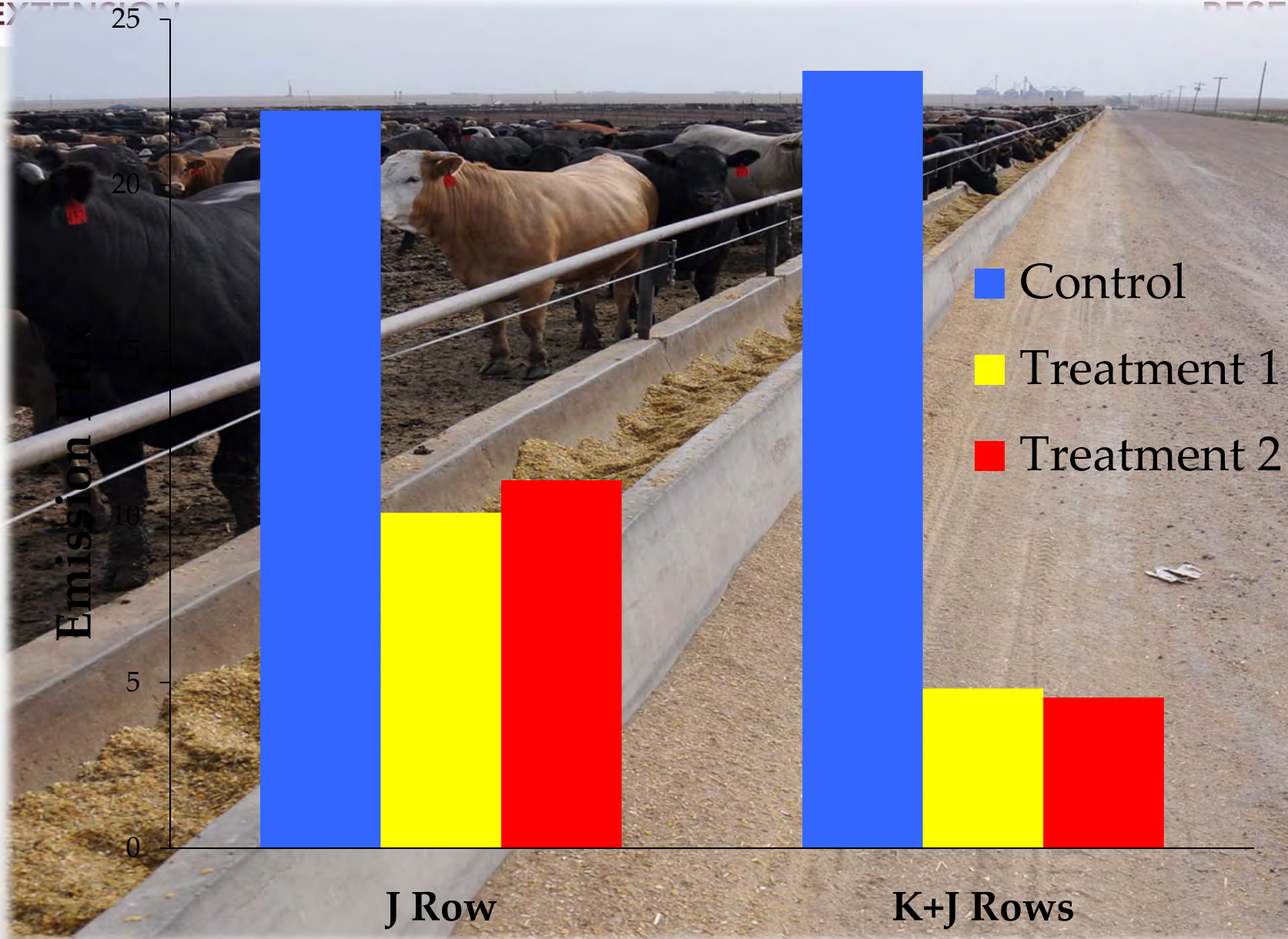
Monitoring Criteria

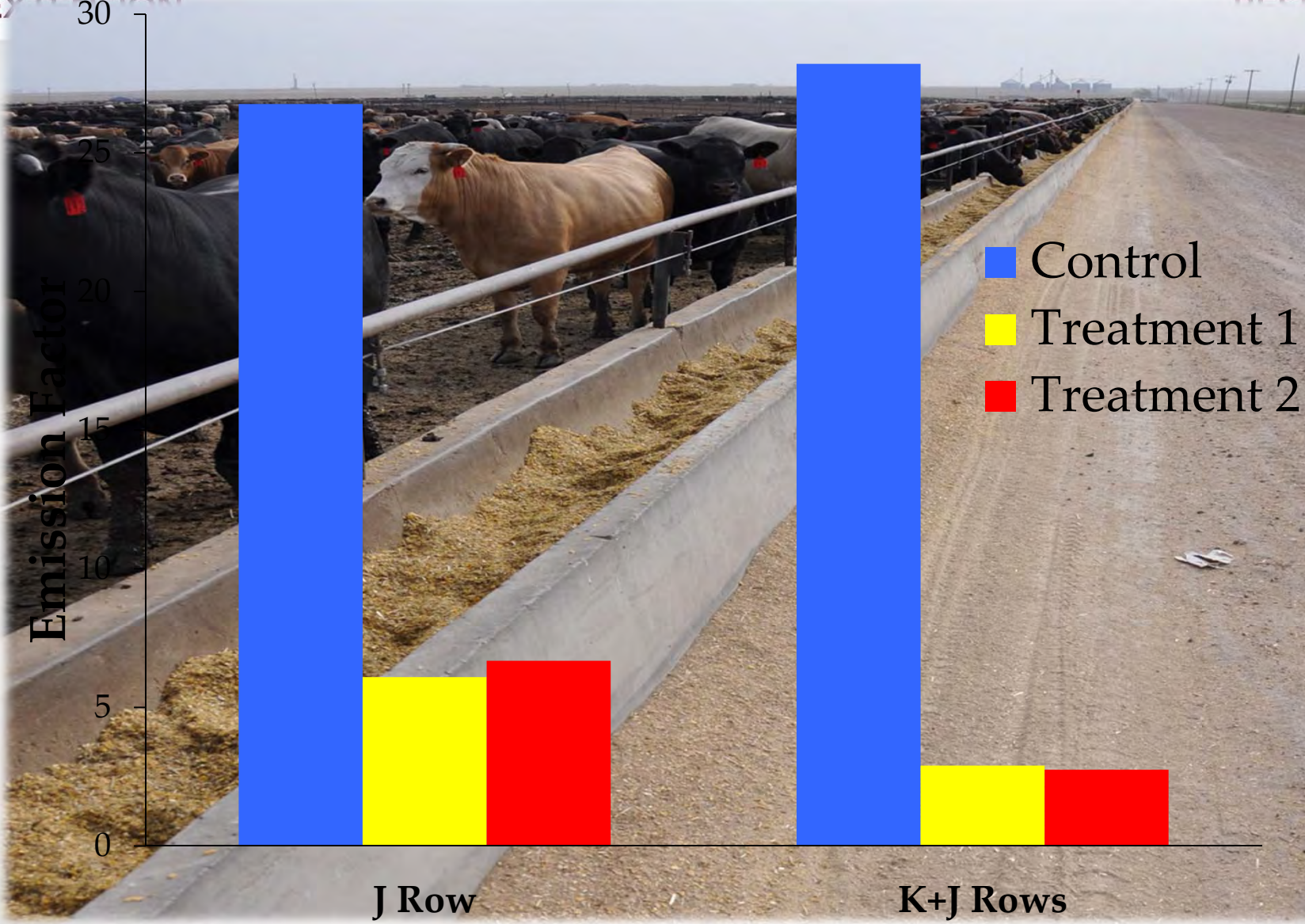
- Southerly winds
- Dry conditions
- Focus activities on the “evening dust peak”



Results









Pen-Surface Assessment



Documenting Successful Dust Control



Pen Surface Assessment

Condition	Description
A	Little to no uncompacted manure visible on the corral surface; hard and smooth, may be moist to dry
B	Well compacted surface easily visible; small clods of uncompacted manure present
C	Compacted surface sparsely visible, nearly covered with small manure clods
D	Compacted layer not visible, completely covered with dry, uncompacted manure in chunks and/or clods
E	Completely covered with <1" of finely textured, dry, uncompacted manure "fluff"
F	Completely covered with >1" of finely textured, dry, uncompacted manure "fluff"
W	Wet; sloppy and/or uneven surface >25% of corral area

Pen Surface Condition "B"



Pen Surface Condition "E"

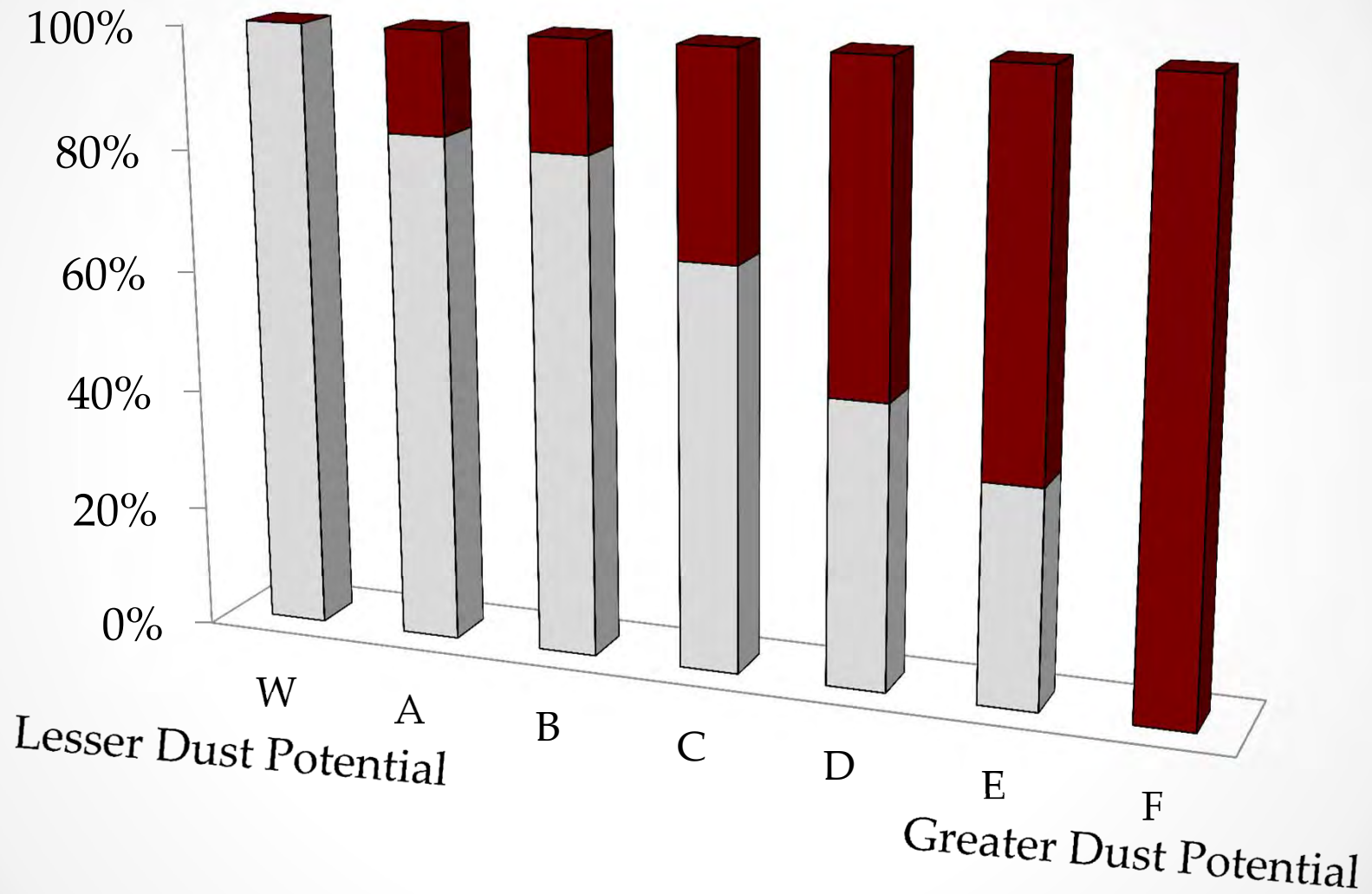


Pen Surface Condition “W”



□ Double Stocked Pens

■ Control Pens



<http://amarillo.tamu.edu/files/2011/01/SP417.pdf>

SP-417
07/11



Feedyard Dust Control in an
Epic Panhandle Drought,
2010-2011

<http://amarillo.tamu.edu/files/2011/01/E52.pdf>



Texas Agricultural Extension Service
THE TEXAS A&M UNIVERSITY SYSTEM

E-52
11-00

Manure Harvesting Frequency— The Key to Feedyard Dust Control in a Summer Drought

Brent W. Auvermann, David B. Parker and John M. Sweeten*

Recent summer droughts in Texas have made dust control in feedyards in the semi-arid High Plains for

Feeders Association in June 1995 presented these holistic management principles in a compelling way.

Q&A

