

### PAST WORK - WDTC

- ◆ Vertical mode of cattle hoof action
  - Drop energy
  - Manure depth
  - Bulk moisture content of manure layer
  - Degree of compaction of manure layer




### PAST WORK - WDTC

- ◆ Evaluation of dust-control measures
  - Surface water application
  - Surface amendments
    - ◆ Wheat straw
    - ◆ Sawdust
    - ◆ Magnesium chloride
    - ◆ Organic-based substance





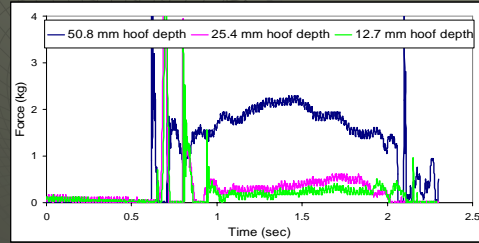

## HORIZONTAL MODE OF HOOF ACTION

- ◆ The horizontal mode of hoof action was incorporated into the WDTC.



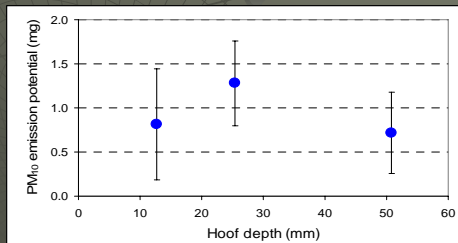
## HORIZONTAL MODE

- ◆ Force measurement



## HORIZONTAL MODE

- ◆  $PM_{10}$  emission potential



## HORIZONTAL MODE OF HOOF ACTION

- ◆ Modified horizontal mode set up to include two hooves.

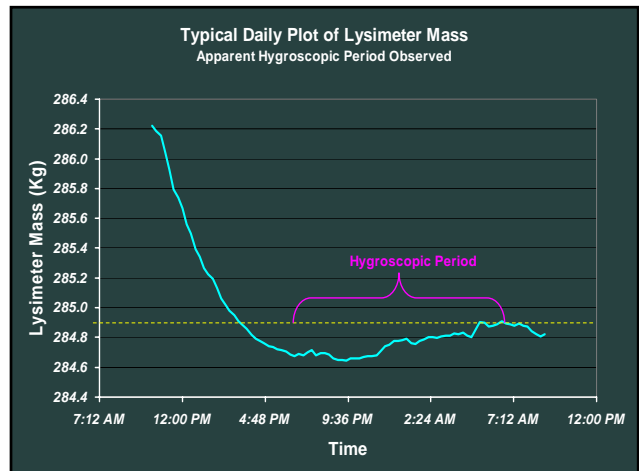
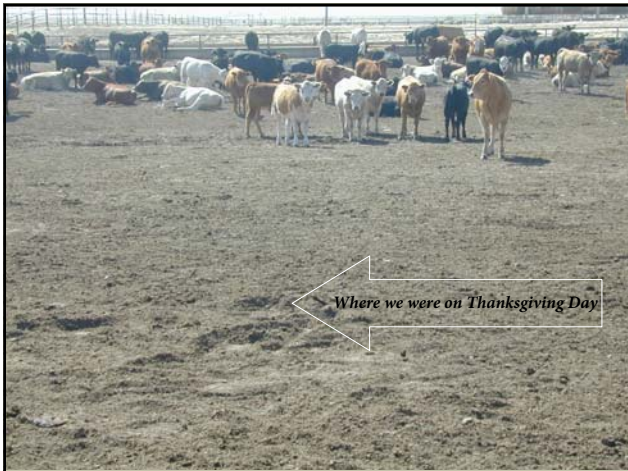


# WHY IS THIS STUFF IMPORTANT?

Case Study, Fall 2005

## WHAT WE'RE SEEING THIS YEAR IN THE PANHANDLE

- ◆ Last meaningful rainfall was around 9/1/05
- ◆ Some feedyards rolled the dice:
  - Winterized sprinkler systems in September in anticipation of the October freeze (SOP)
  - Built wintertime mounds using what they had available: *dry, uncompacted manure*
  - Banked on some timely rainfall to ensure compaction
  - *Didn't get it*
  - *September diesel fuel (\$\$\$) and labor costs (\$\$\$) were wasted*





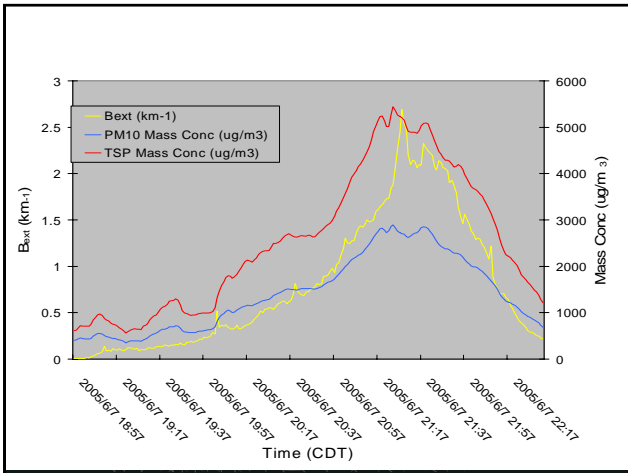
## A FEW TRUISMS

- ◆ Manure harvesting and moisture control will have a synergistic effect
- ◆ Building mounds with dry manure doesn't work; needs 25-30% moisture for compaction
- ◆ Manure harvesting makes supplemental water go further (Auvermann, 2003; Maghirang et al., 2005)

## FUTURE DIRECTIONS

- ◆ Hi-definition video training course in manure harvesting practices, mound building etc.
- ◆ Vary the timing of water applications to the lysimeter array





EXTINCTION EFFICIENCIES FOR UBIQUITOUS PARTICLE TYPES (MALM, 1999)

Particle Type	Dry Extinction Efficiency (m <sup>2</sup> /g)
Sulfates	3.0
Organics	3.0
Elemental Carbon	10.0
Nitrates	3.0
Soil Dust	1.25
Coarse Particles	0.6
<b>Feedyard PM<sub>10</sub>/TSP</b>	<b>0.5-0.6/0.3-0.4</b>

Observed 1-hour Observation by		Reported 1-hour Observation by	
TEUM	TEUM	TEUM	TEUM
TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>
PM <sub>2.5</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub>

**Frederick C Continuous-Monitoring Journal for August 1, 2005**

**Sampler Deployed**

Observed 1-hour Observation by		Reported 1-hour Observation by	
TEUM	TEUM	TEUM	TEUM
TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>
PM <sub>2.5</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub>

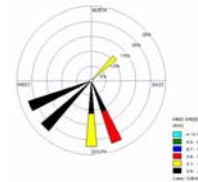
**Weather Synopsis and Visual Observations Log**

The day began with a very light west wind. The rest of the day was squally to a heavy cloud of dust as it shifted to the east during the morning. The day ended with a moderate southeast wind and a high temperature in the low 80s.

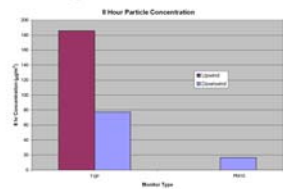


You can observe a lot by watching.

- Yogi Berra



**Continuous Monitoring Results**



\*\* Reported concentrations possibly affected by pollen or airborne residue from agricultural production (CRP) just upwind from the monitor. The airborne particulate on downstream monitors was reduced by a recent precipitation event.

**Start/Stop Times**

Monitor	Start	Stop
TSP-1	8:15	14:15
TSP-2	8:17	14:17
PM <sub>10</sub>	8:15	14:15

**Comparison of TEOM and FEM Data**

Examine the comparison between the FEM data and the applicable TEOM data average(s).

**Transmissometer Results**

Insert Graph of All TSP Data (might be too bright or too small)