

# Erosion Control with Dairy Manure Compost



## *Dairy Compost Utilization Project*

Texas  
Cooperative  
Extension

Texas Commission  
on Environmental  
Quality

Texas Water  
Resources  
Institute

# The Watershed

Over **155 dairies** and **95,000 cows** within the Bosque and Leon River Watersheds



**223 million dollars**  
in milk sales annually





**350,000 TONS  
IN MANURE  
ANNUALLY**

 **COUNTRY  
Crafters**



# Bosque River Watershed

Excess Manure



Runoff

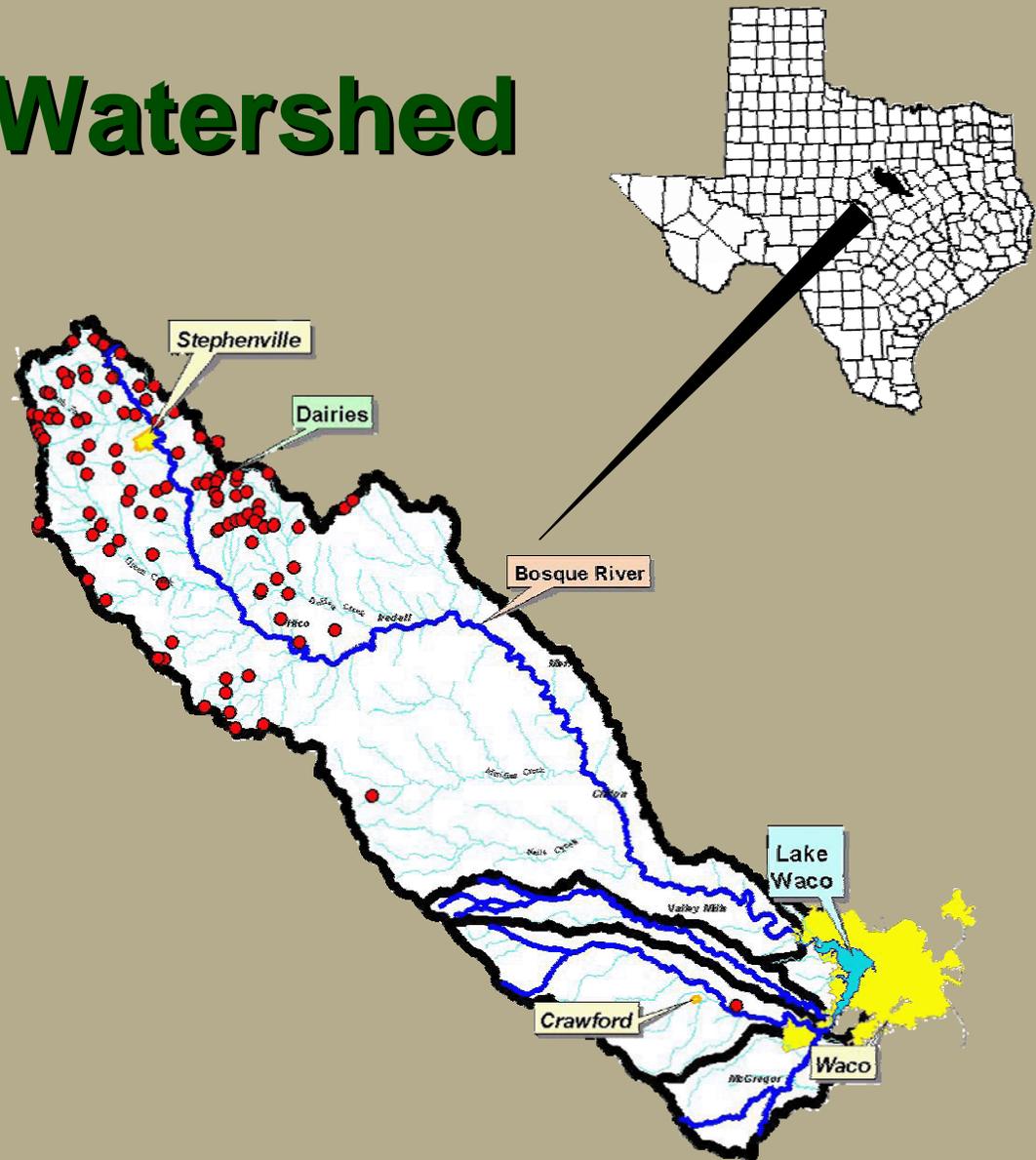


Increased phosphorus

Increased bacteria

Increased algae

AND...





**Reduced water quality!!!**

# TMDL Implementation Plan

- ◆ Reduce P loading by 50 percent

*Water testing conducted by BRA*

- ◆ Export 50% of manure produced by dairies and other animal waste sources

*DMES and CMIP Projects*



# Dairy Manure Export Support

- ◆ TSSWCB developed incentive plan to supplement costs of exporting manure from dairy farms to closest compost facility
- ◆ Over **915,000 tons** of dairy manure has been exported by DMES (Nov 2000 to Sept 2005)
- ◆ Program scheduled to end August 2006



# Composted Manure Incentive Project



- ◆ TCEQ developed incentive plan to supplement the cost of compost for public entities including Texas DOT
- ◆ Over **400,000 CY** of dairy manure compost have been sold (Sept 2001 to Aug 2004)
- ◆ Over **300,000 CY** have been exported out of the Watershed (Sept 2001 to Aug 2004)



# TxDOT Uses of Compost?



Without compost...



With compost



# Dallas Spur 408 Demonstration August 1999



# Dallas Spur 408 Demonstration May 2000



# TxDOT Specifications

- ◆ Initial Specifications: 1027 and 1034  
*Solvita Test Kit*
- ◆ Revised Specifications: 1058, 1059, 1081  
*STA Certification (TMECC Methodology) – variance*
- ◆ Current Specifications: 1001  
*STA Certification (TMECC Methodology)*



# Categories of Compost

- ◆ General Use Compost

*100 % compost, no incorporation, level surfaces*

- ◆ Compost Manufactured Topsoil

*25% compost and 75% topsoil*

- ◆ Erosion Control Compost

*50:50 compost and wood chips, 2 inch application, 3:1 slopes*

- ◆ Mulch/Filter Berm

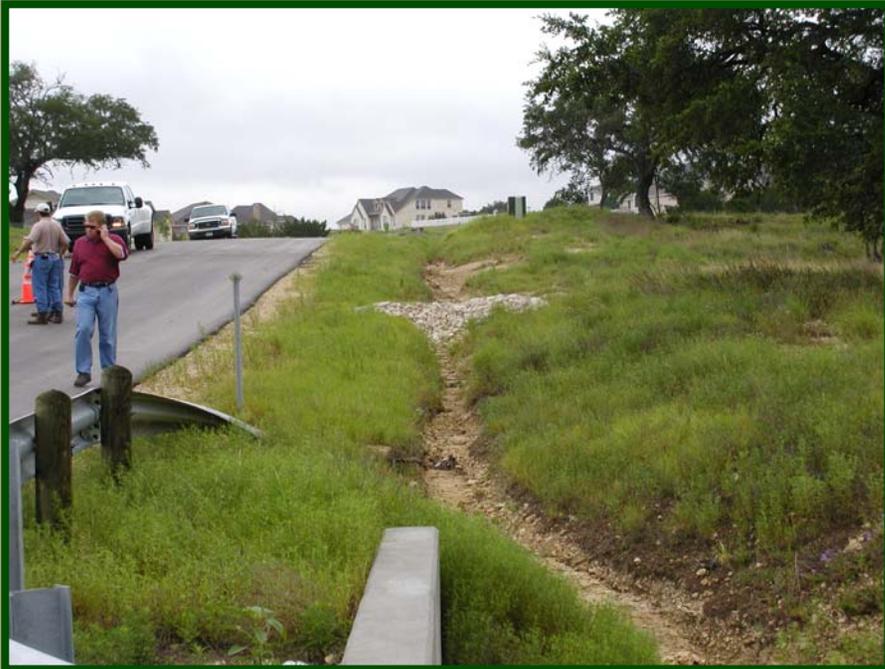




**Erath County Maintenance Operation Jan 1999**

# Erath County Maintenance Operation Feb 1999





*Filter Socks  
Sawyer Ranch  
Development  
Austin, TX*



# Water Quality Study

- ◆ 1 X 2 meter plots with 15 cm metal borders
- ◆ Randomized block design
- ◆ Constructed embankment to mimic roadside
- ◆ 3:1 slope
- ◆ Clay Soil (26% sand, 27% silt, 47% clay)

# Rainfall Simulation



- ◆ Two rainfall simulators used simultaneously on unvegetated plots (*A worse case scenario*)
- ◆ 3.6"/hr (92 mm/hr) average intensity
- ◆ Rainfall applied on each plot until 30-min of runoff was obtained
- ◆ Each simulator equipped with one HH-SS50WSQ nozzle



# Treatments

1. CF

*Commercial Fertilizer*

2. ACR

*Agronomic Rate of Compost*

3. CMT

*Compost Manufactured Topsoil*

4. ECC

*Erosion Control Compost*



# Data Collection

First Flush

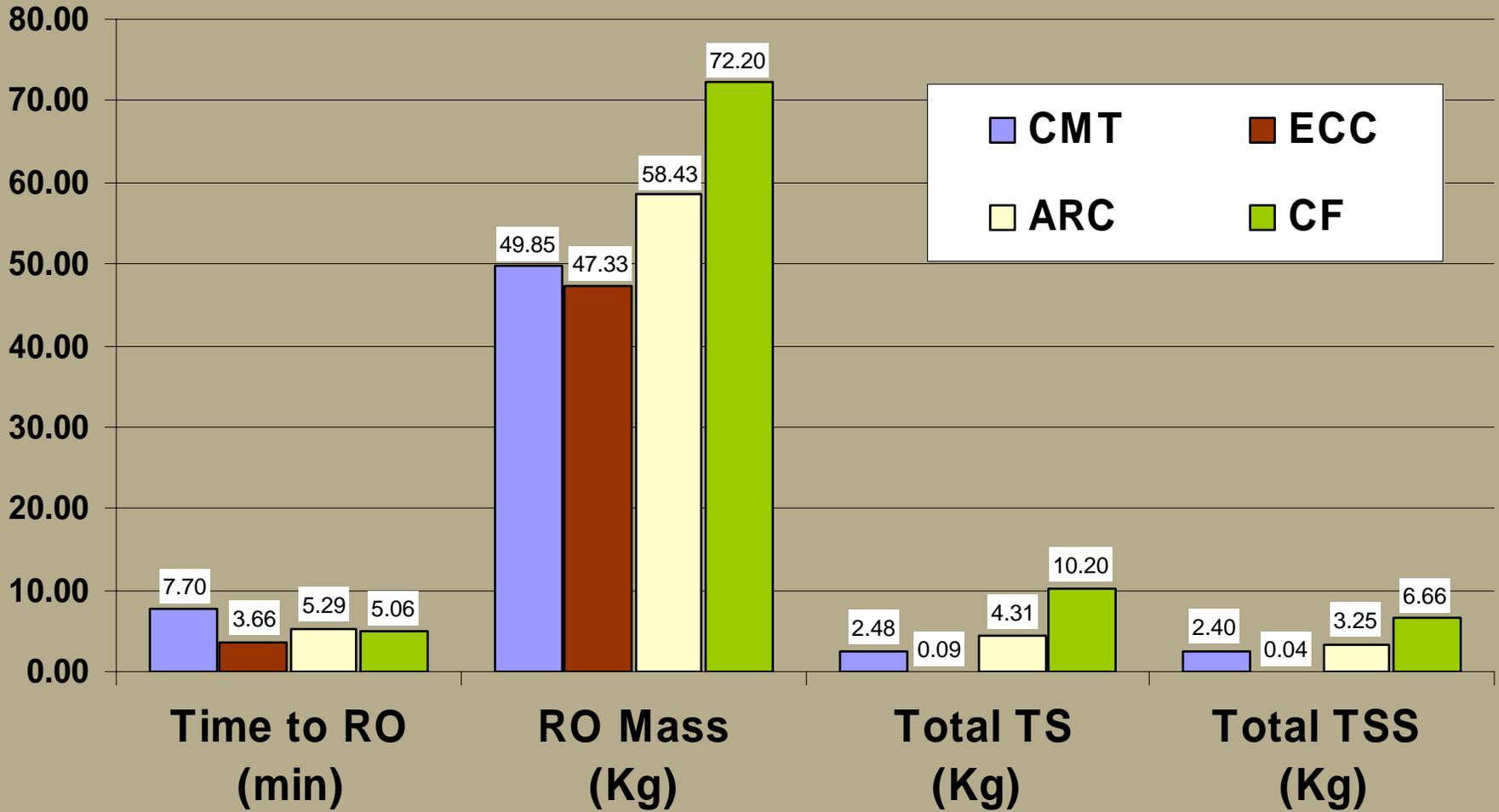


Composite

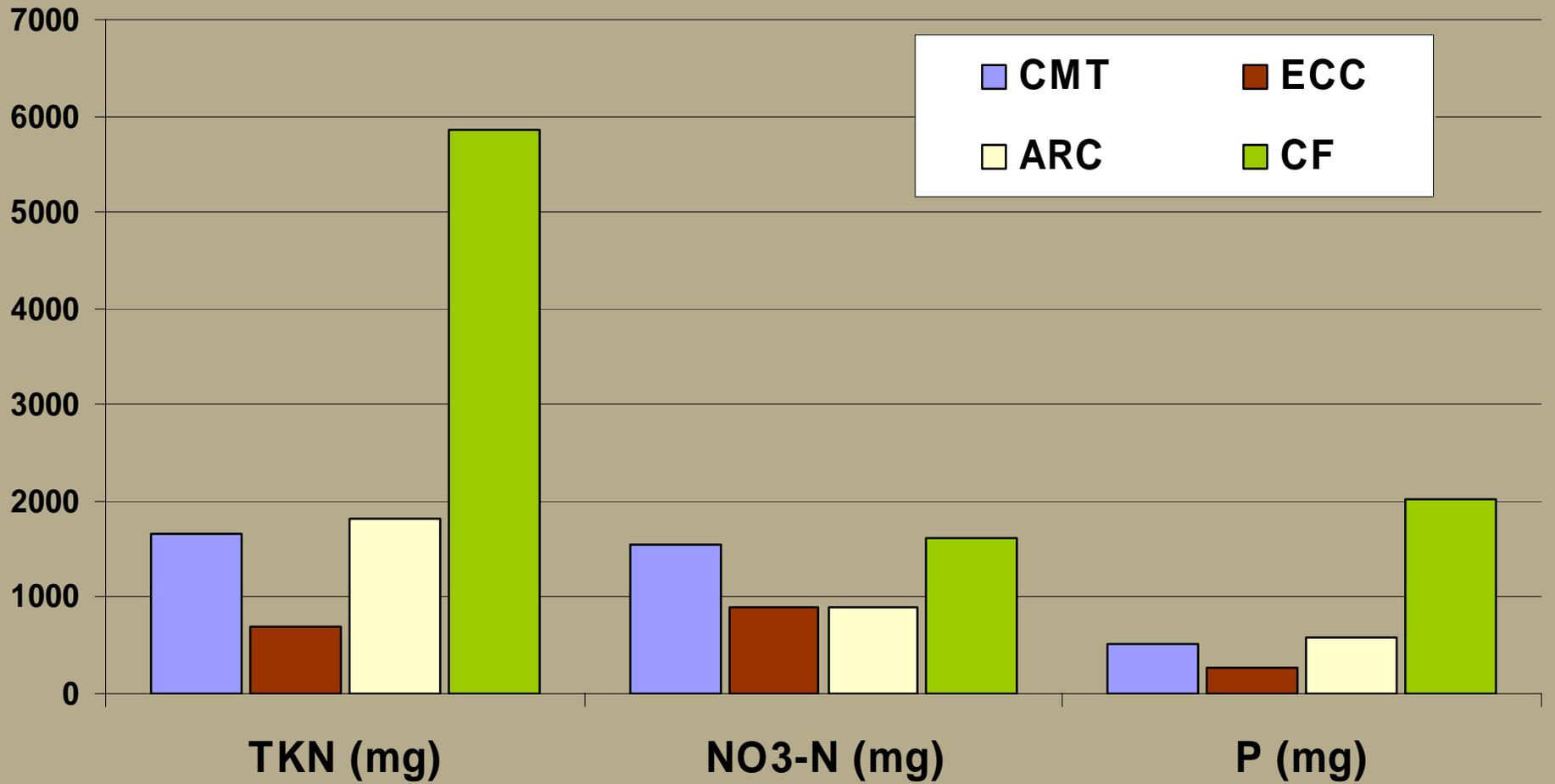


pH  
Nitrogen  
*TKN, NO<sub>3</sub>, NH<sub>4</sub>*  
Phosphorus  
*TP & DP*  
Potassium  
*TK & DK*  
Total Solids  
Total Suspended Solids

# Results



# Results



# Conclusions – Solids & Runoff

- ◆ ECC and CMT treatments adequately controlled erosion in a newly constructed road-right-of-way
- ◆ ECC - Shortest time to initiate runoff, but smallest total runoff mass
- ◆ ECC, CMT & ARC - significantly lower TS and TSS in the runoff as compared to CF



# ECC Treatment After Rainfall



# ARC Treatment After Rainfall



# CF Treatment After Rainfall



# Conclusions - Nutrients

- ◆ TKN in runoff from the ECC, CMT and ARC plots was significantly lower than CF plot runoff
- ◆ Total P in runoff from the ECC, CMT and ARC plots was significantly lower than CF plot runoff
- ◆ Total K from the ECC and ARC runoff was significantly lower than the CF plot runoff

*ECC, CMT and ARC received greater application of N, P and K as compared to CF plots*



# Conclusions

- ◆ Plots amended organically produced smaller runoff, less sediment, less nutrients as compared to CF
- ◆ However, N and P concentrations in the runoff of ECC and CMT were high from a water quality standpoint



# TCE – Other Activities

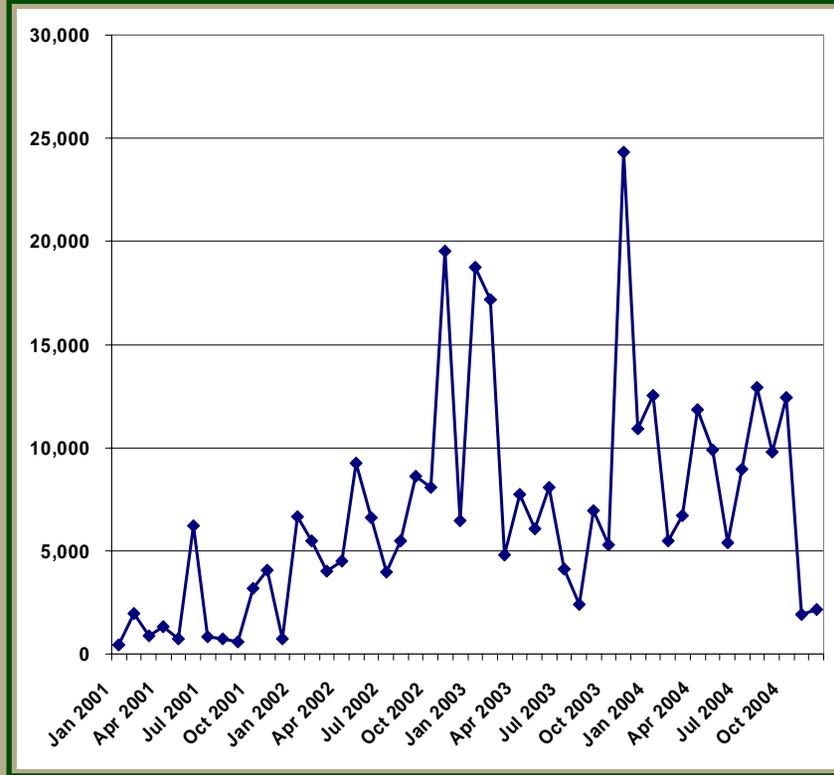


- ◆ Research
  - 1) Newly constructed landscapes
  - 2) Turfgrass varieties
  - 3) Forages and rowcrops
- ◆ Education and Outreach
  - 1) County Demos
  - 2) Fact Sheets
  - 3) Compost Production
  - 4) Compost Quality Assessment



# Project Obstacles

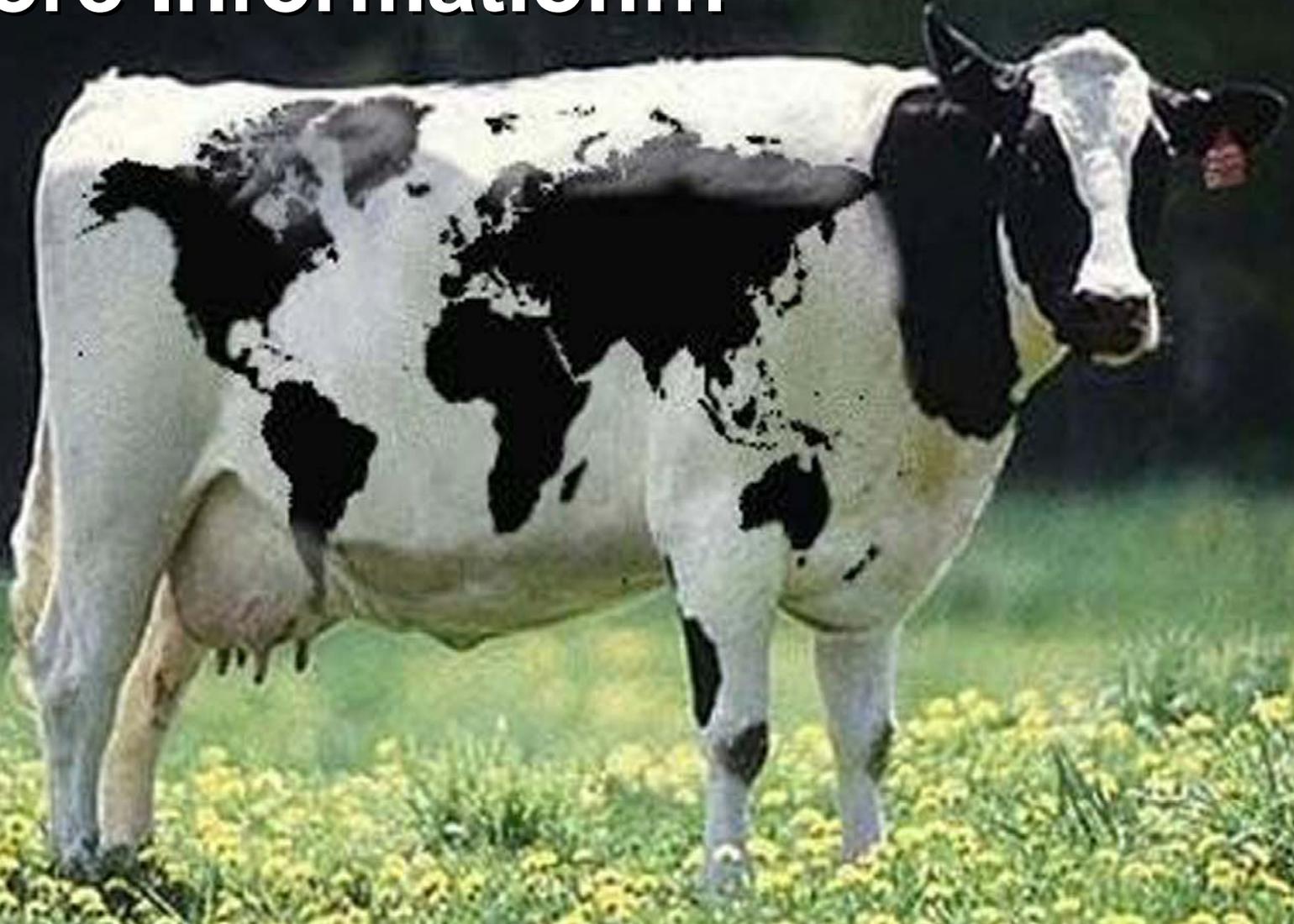
- ◆ Low quality product
- ◆ Inconsistent product
- ◆ Inorganic contaminants
- ◆ Lacked sound quality data



- ◆ Transportation of product
- ◆ Competition with other organic markets
- ◆ Behavior change



**More Information...**



**<http://compost.tamu.edu>**

# Rangeland Restoration

Fort Hood Training Facility



*Training activities have left areas barren and vulnerable to erosion, particularly sediment loss, causing a delta to form in Lake Belton.*



# Rangeland Restoration

## Fort Hood Training Facility



*Application of compost has become quite an obstacle. Researchers are developing a compost spreader designed specifically for Fort Hood terrain.*



# Rangeland Restoration

Fort Hood Training Facility



*Favorable climate and compost exceeded our expectations. Military activity already resumed in restored areas.*



# Rangeland Restoration

## Fort Hood Training Facility



*Treated areas are visibly greener and thicker. Further, these areas have a higher population of desirable vegetation.*

