

A FEW SURPRISES: WHAT ARE THE BEST RECIPES FOR COMPOSTING LARGE BOVINE CARCASSES IN THE SOUTHERN HIGH PLAINS?

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MAKING THE MICROBES UNHAPPY

- Imbalanced diet
- Not enough insulation
- Too much water (or not enough)
- Not enough air (or too much)

MICROBE NUTRITION

- Target carbon-to-nitrogen ratio (C:N) of 30:1

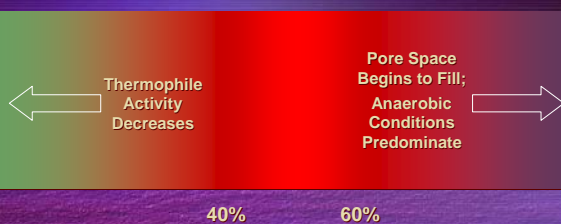
10 30 50

- Low-carb diet favors NH_3 release
- *Conventional wisdom: don't stray too far from 30:1*

AIR AND WATER

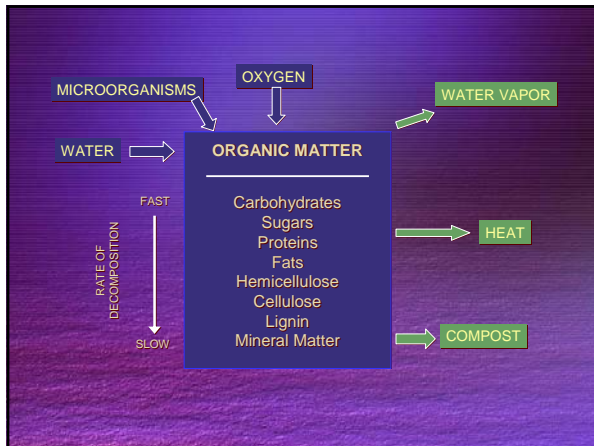
1. Screwing up a pile means getting air and water out of proper balance
2. Water displaces air in a pile
3. Too wet goes anaerobic; too dry goes dormant
4. Too wet = >60%; too dry = <35%

OPTIMAL MOISTURE CONDITIONS



TEMPERATURE CONSIDERATIONS

- The cooler the pile, the easier the screw-up
- Small piles can't insulate themselves as well
- Oversized piles reduce O_2/CO_2 exchange
- Optimal pile size depends on the distribution of pore sizes



C:N RATIOS OF SOME CARBON SOURCES

Feedstock	N (%db)	C:N Ratio	C (%db)
Fruit wastes	1.5	35	52.5
Yard wastes	1.3	23	29.9
Paper	0.3	173	51.9
Sawdust	0.1	511	51.1
Grass clippings	3.7	15	55.5
Leaves	0.9	48	43.2
Produce waste	2.2	20	44.0
Food wastes	3.2	16	49.9
Pine wood shavings	0.1	723	72.3
Oat straw	1.1	48	52.8
Wheat Straw	0.3	128	38.4

MATERIALS AND TOOLS

- Carbon-rich materials
 - Variety of pore sizes
 - Total C is not the same thing as available C
- Front-end loader or windrow turner
- Reliable water source
- Long-stemmed thermometer
- Weaponry





SOME SERIOUS NO-NOS

- Site selection
 - Right next to the road (or the mayor's house)
 - Bare, sandy soils
 - Sheltered from the wind
- Base material
 - Hydrophobic
 - Thin
 - Easily compressed

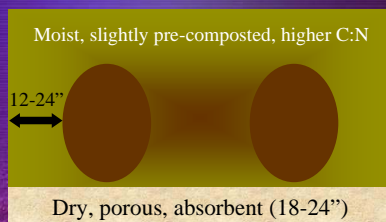
NATURE SOMETIMES WORKS AGAINST YOU

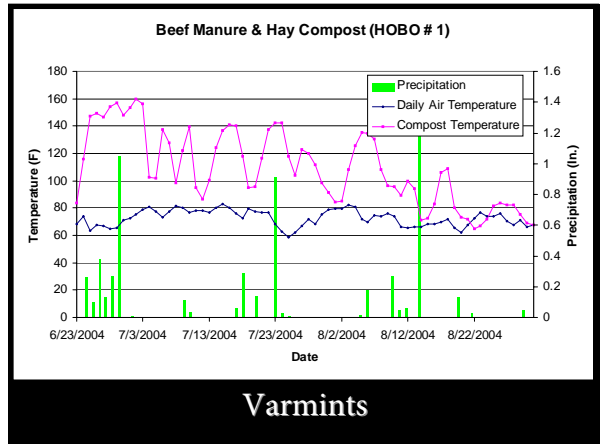
- Rain, snow and cold are the enemies
- Easterners and Southerners have one set of concerns
- Westerners have another
- Northerners have still another
- To shed, or not to shed, rainfall?

SUMMARY: DON'T DO THIS

- Choose a location with bare, sandy soil, nearby surface water and cozy neighbors
- Use whatever nasty waste materials you have on hand
- Soak 'er good
- Leave body parts partially exposed
- Walk away

"IDEAL" CARCASS PILE

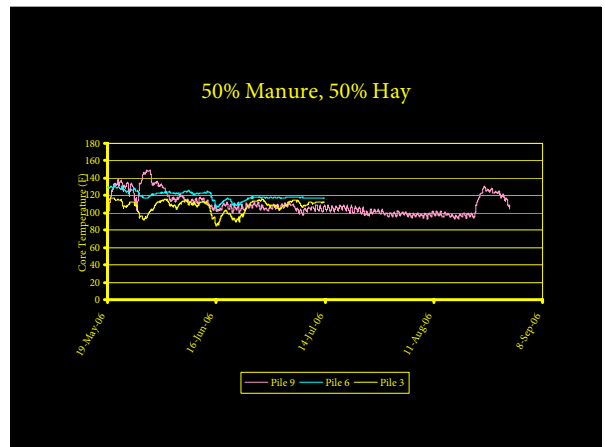
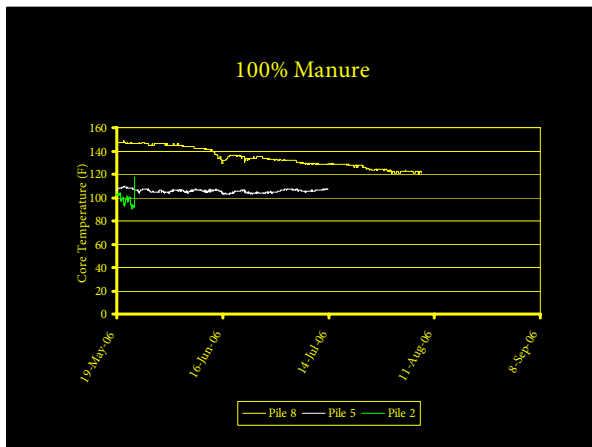
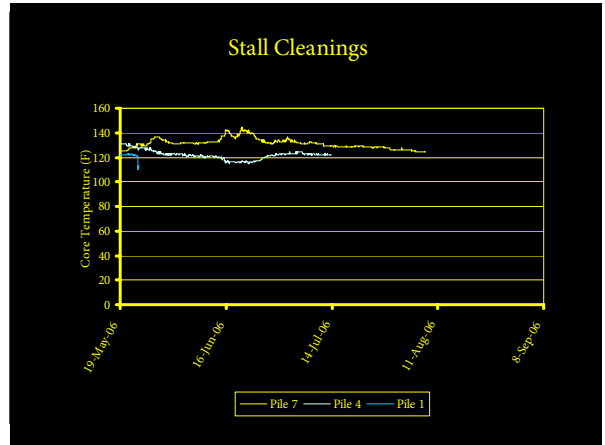
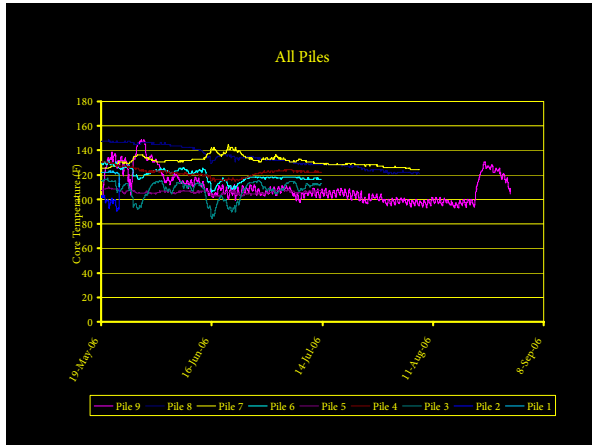




Varmints

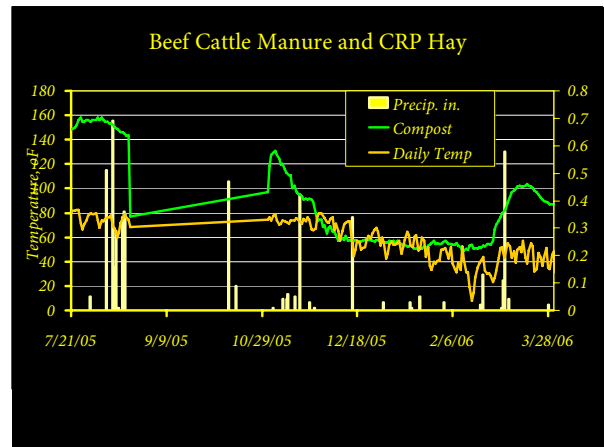
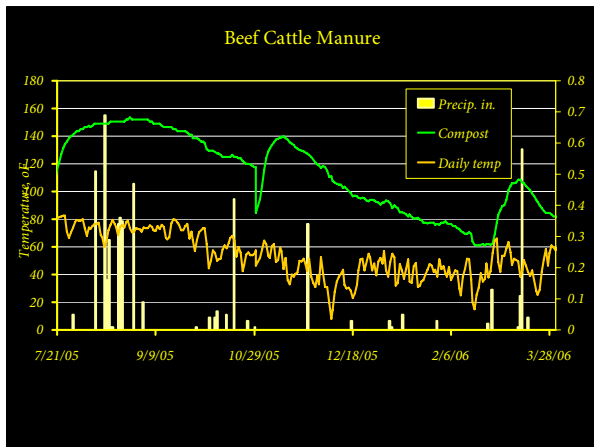
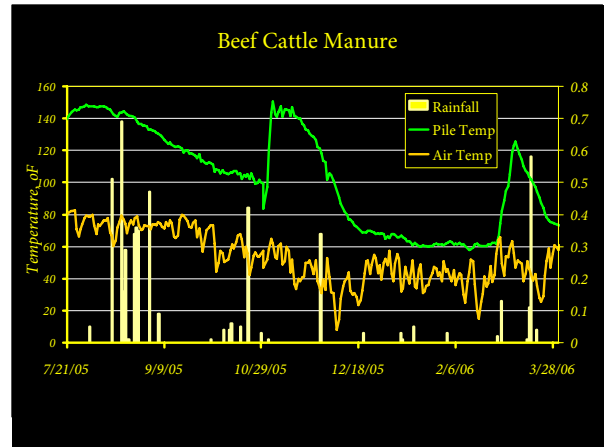
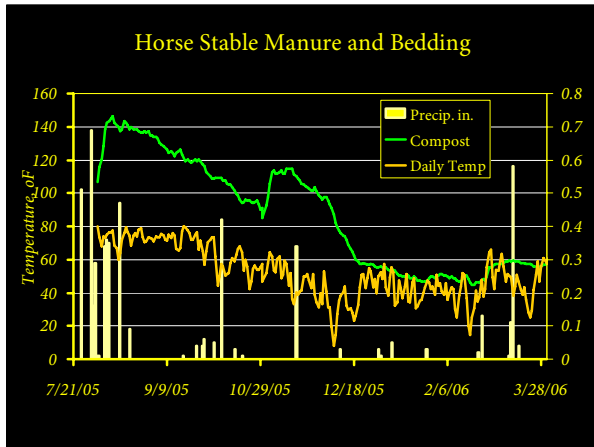
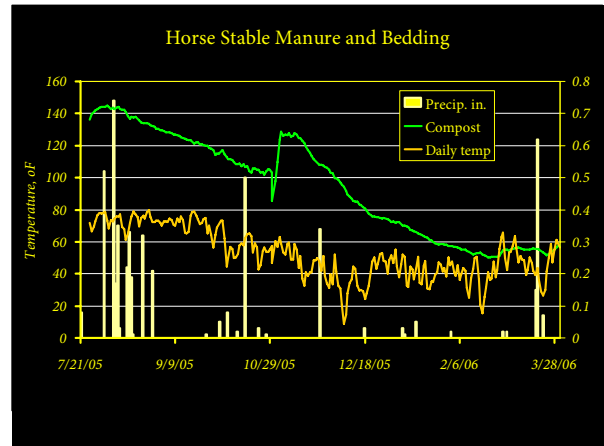
EQUINE CASE STUDY

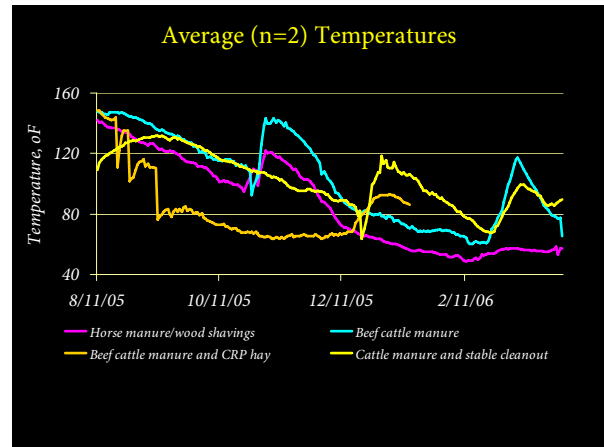
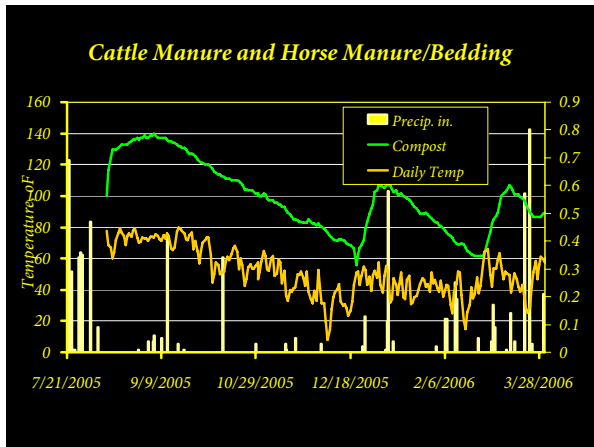
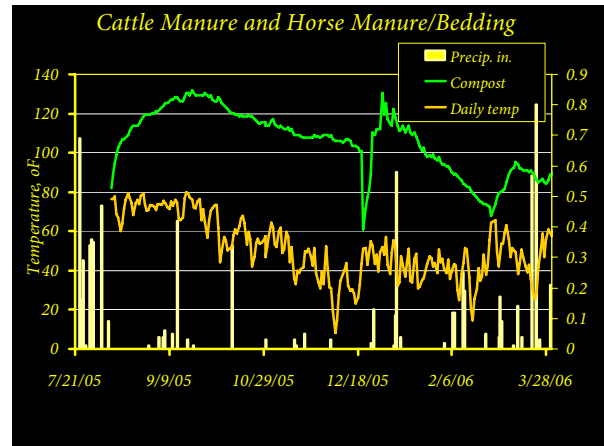
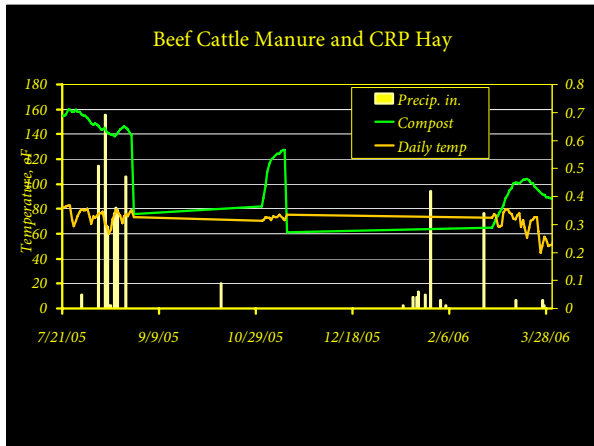
- Dr. Lance Baker and Ms. Laurie Brown, WTAMU
- 3 Treatments x 3 Replications
 - Beef feedlot manure only
 - Feedlot manure + hay
 - Horse manure/wood shavings (stall cleanout)
- Low-Ash Manure from Paved Pens
- Carcasses Slightly Smaller than Mature Dairy Cattle (900-1200 lb/hd)
- Interim Data (3 mos.) Only; 6-mo. Data Pending



BEEF CATTLE CASE STUDY

- 4 Treatments x 2 Replications
 - Beef feedlot manure only
 - Feedlot manure + hay
 - Horse manure/wood shavings (stall cleanout)
 - Horse manure/shavings + feedlot manure
- Low-Ash Manure from Paved Pens
- Smaller Carcasses (400-1000 lb/hd)





HOW THEY STACKED UP

Bin	Recipe	Overall Rank	Recipe Rank
1	Horse manure + wood shavings	5	
2	Horse manure + wood shavings	6	3
3	Cattle manure only	2	
4	Cattle manure only	1	1
5	Cattle manure + CRP hay	4	
6	Cattle manure + CRP hay	3	2
7	Cattle manure + stall cleanout	7	
8	Cattle manure + stall cleanout	8	4

- ## INTERIM CONCLUSIONS
- HOBO devices must be watched closely while in the pile (protected cables; check them weekly)
 - Horse manure/wood shavings bedding composts easily by itself but is not optimal for carcass composting
 - Low C:N ratios (~15:1) of cattle manure or manure + hay are not a major detriment temperature-wise

OTHER OBSERVATIONS

- Ending moisture contents ranged from 32-47% wet basis
- C:N ratio “conventional wisdom” needs to be reconsidered, or at least taken with salt grains
 - Excellent results in rainy weather (2004) even with C:N of 11 or 12
 - C:N ratio and porosity distribution show some interactions in overall pile performance
 - *Effective* carbon differs from *total* carbon