What Farmer Educators Need to Know about Mortality Composting - Beyond the Basics

Pile Characteristics for Effective Animal Mortality Composting

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Vulture and Vermin Restaurant

The Least Desirable Method

OAB: FMD carcasses on an open pyre at a farm in UK

http://www.visitcumbria.com/footandmouth.htm, Accessed Nov. 6. 2006

Not a Compost Pile!

Compost Pile

Windrows

(Courtesy: John Kube of Elanco Animal Health, Greenfield, IN).

Pile Structure and Composition

- Pile is composed of a three-phase system
  - Solid, Water, Air
- Solids- Varying particle sizes, geometry and chemical composition
- Voids-Filled with air, water or both

- C:N ↓ Porosity ↓ Liquid ↑

Pile Composition…

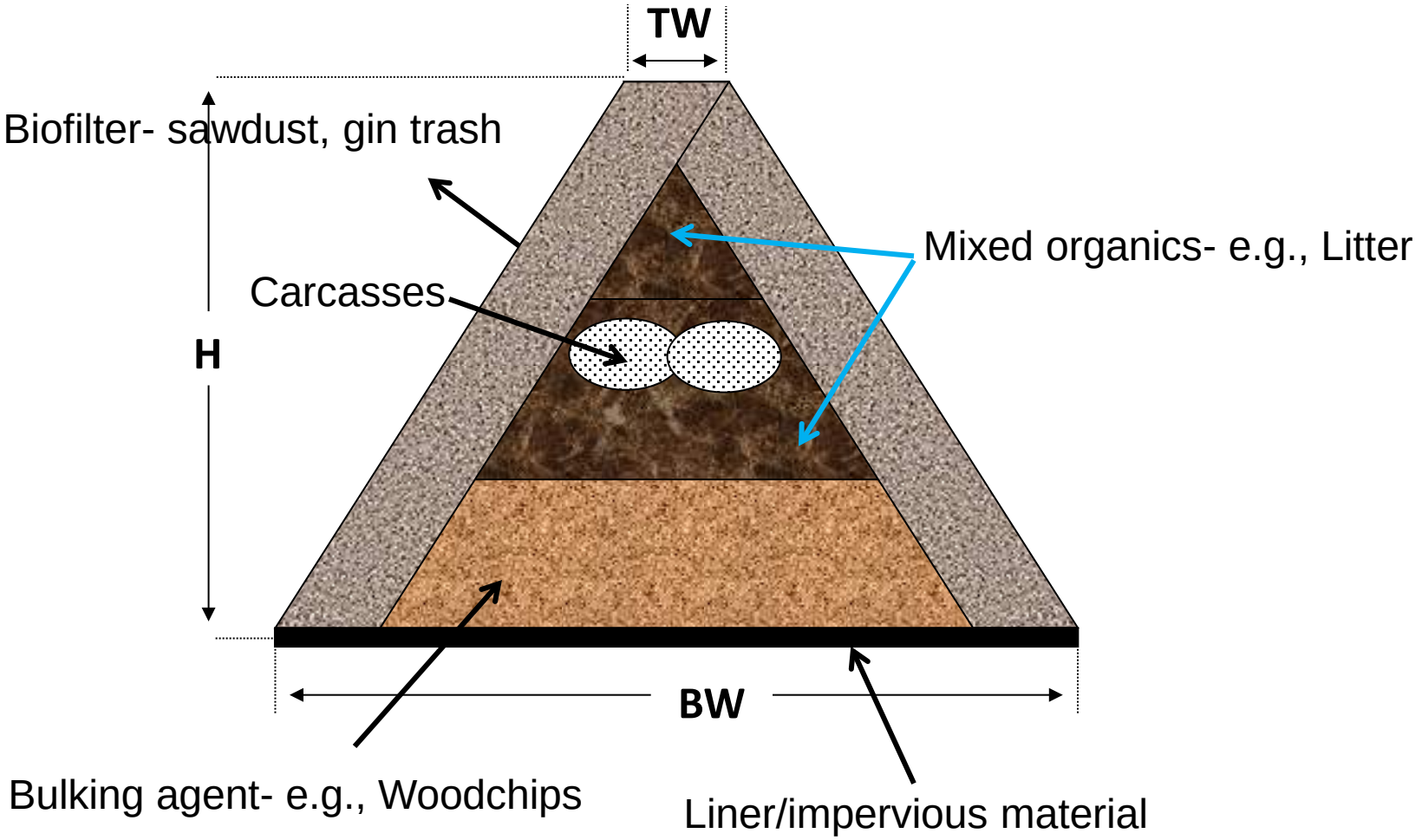
- **Composting Feedstock (C:N ~35)**
  - Plant and animal based with microorganisms
- Bulking Agent
  - Generally plant based for structural strength, bulking and drying wetter piles
- Biofilter
  - Dry, Carbon-rich plant-based materials for odor reduction, shedding moisture and predator control
- Shape and Dimensions

  Height: Five to seven feet

  Top: Pointed, Flat or Slightly concave

  Sides: Slopping to shed water

Carcass Compost Pile Cross-section



Effect of Pile Physical Properties

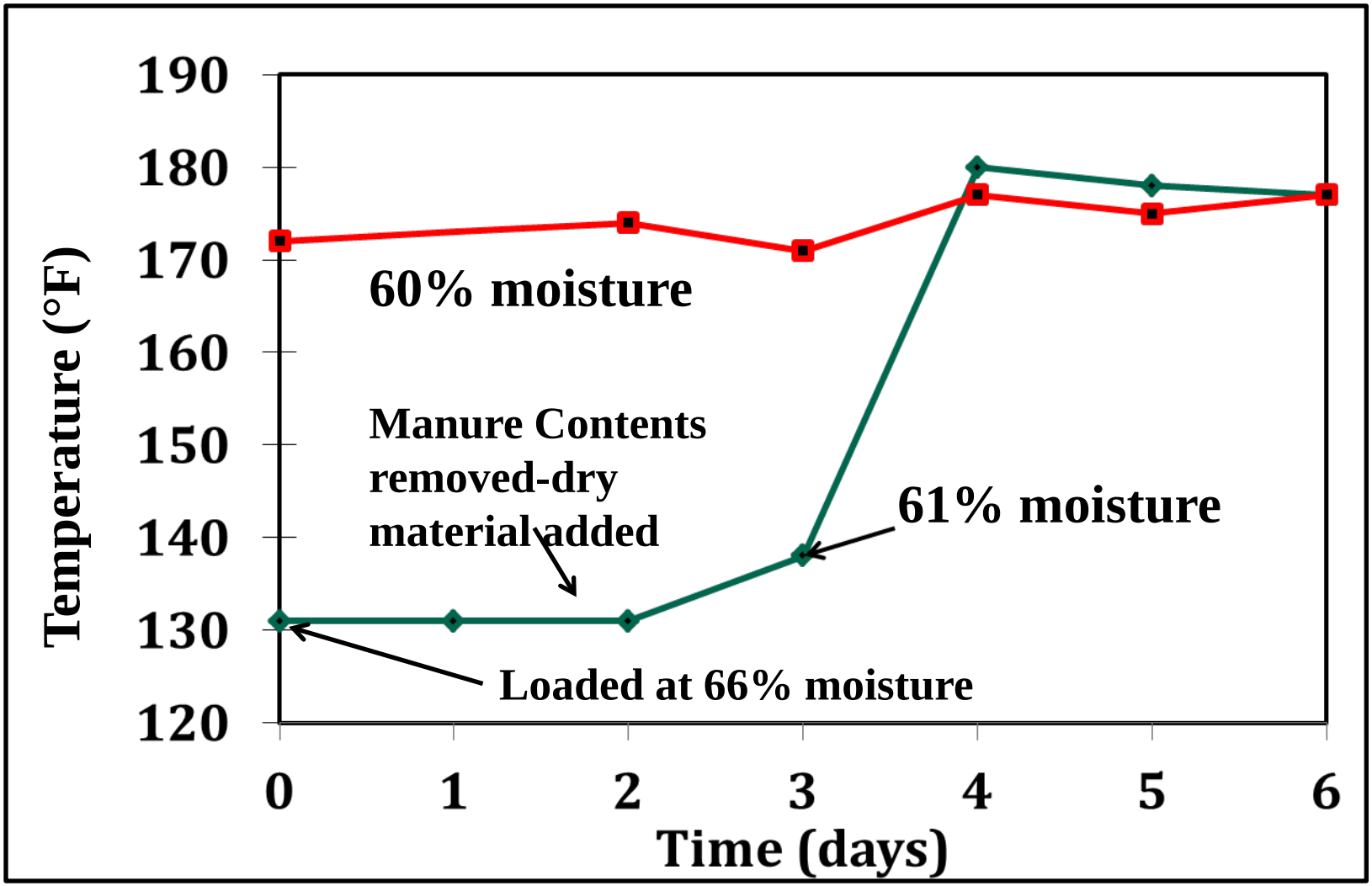
- **Water (50%-60%)**
  - For nutrient transport to microbes
  - Excessive moisture in pores reduces oxygen diffusion and transfer
  - Impedes aerobic composting activity
  - Fibrous/bulky materials such as wood shavings and straw absorb more moisture but maintain structure
  - Sludge and grass clippings may compact/settle under larger carcasses and reduce pile porosity

Maximum Recommended Moisture Content*

Type of Waste	Moisture Content (% of total weight)
Theoretical	100
Straw	75–85
Wood (sawdust, small chips)	75–90
Rice hulls	75–85
Municipal refuse	55–65
Manures	55–65
Digested or raw sludge	55–60
“Wet” wastes (grass clippings, garbage, etc.)	50–55

*Table reproduced from Haug, R.T. CRC Press, 1993

Effect of Initial MC on Temperature During Composting*

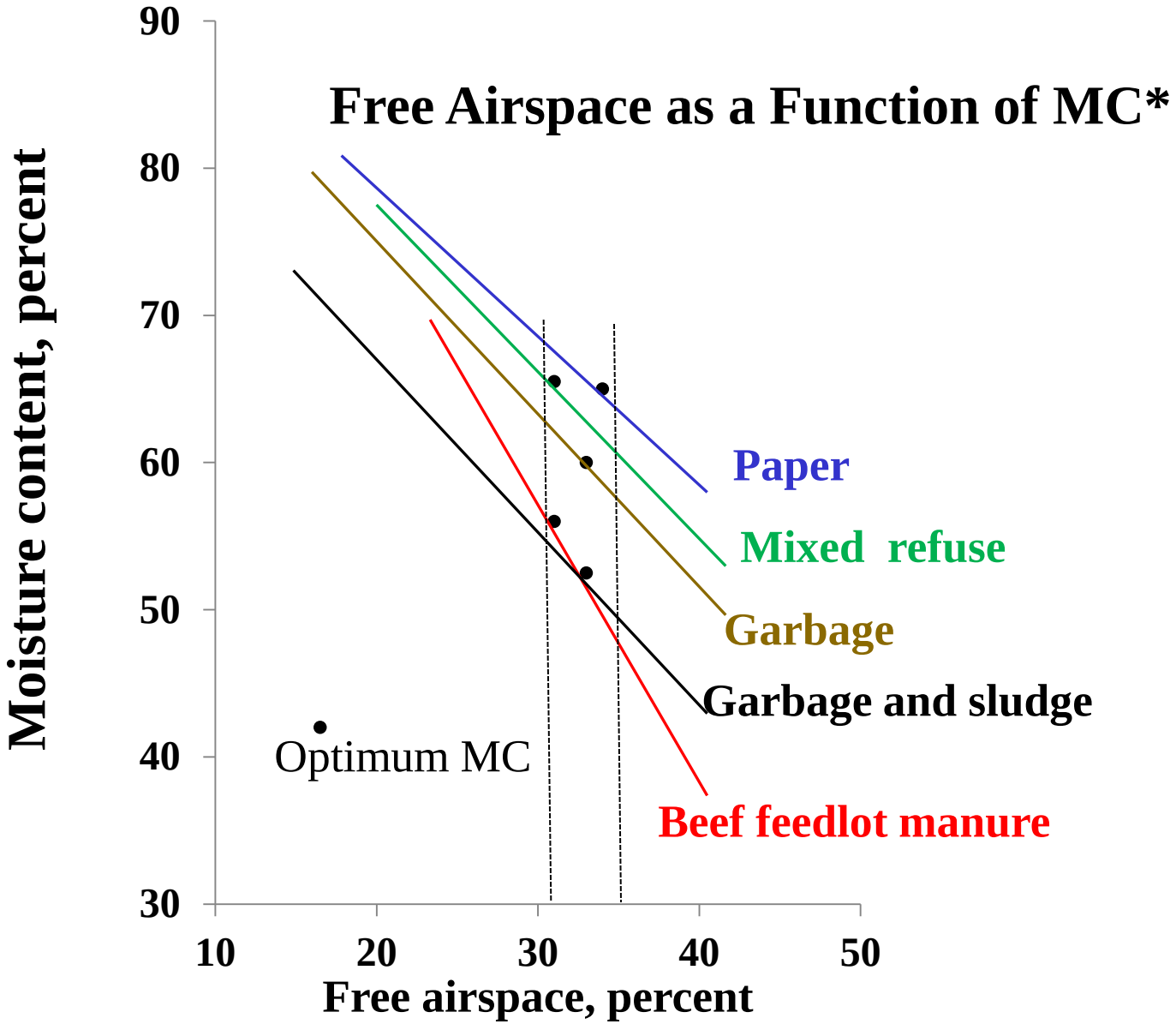


*Graph reproduced from Haug, R.T. CRC Press, 1993

Effect of Pile Physical Properties

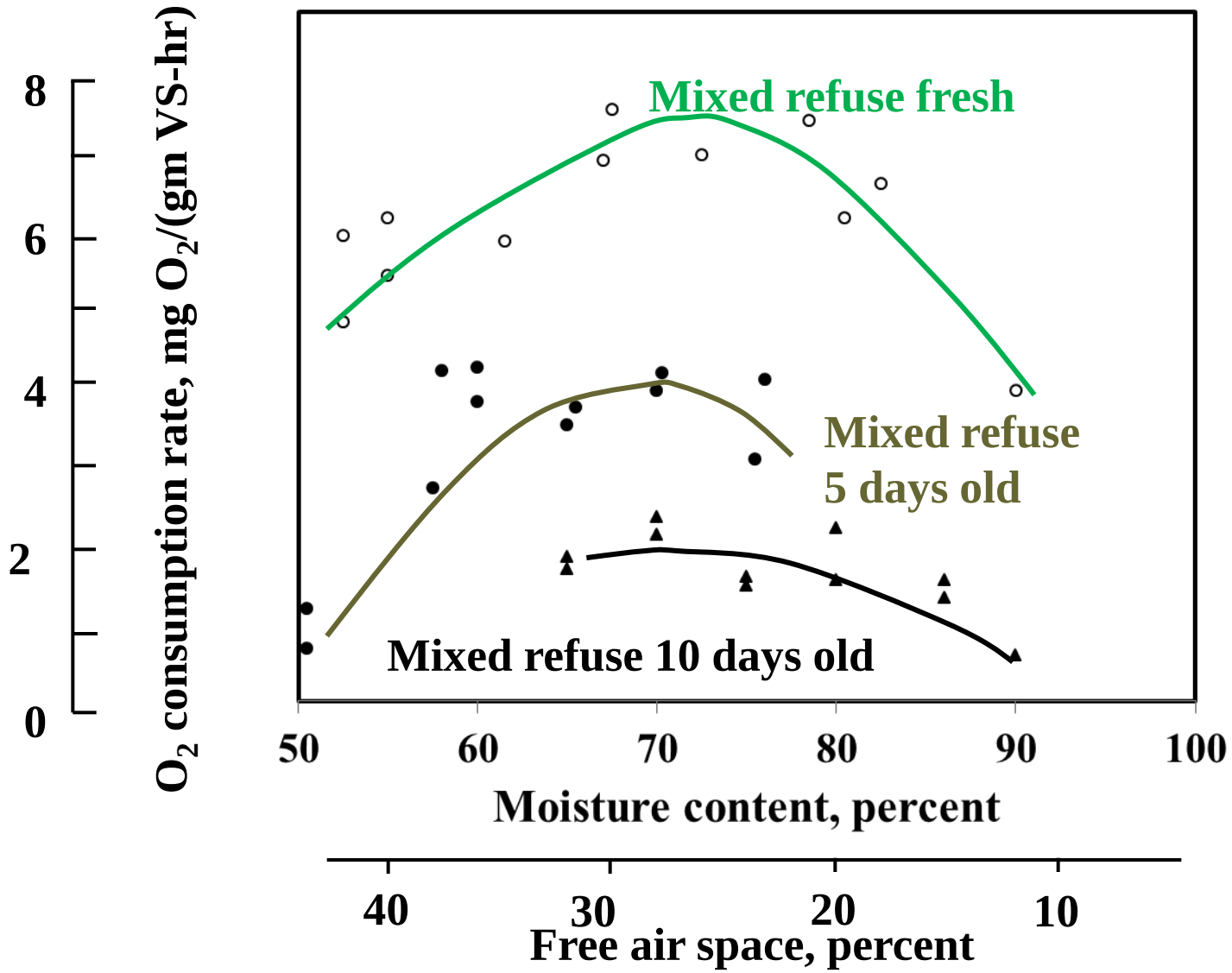
- **Porosity and Free Airspace**
  - Porosity → Vv/Tv
  - Free airspace → Gas volume/Total volume
  - Total porosity Vs. Free airspace

- Demo with water and woodchips



*Graph reproduced from Haug, R.T. CRC Press, 1993

Effect of MC and Free Airspace on the Oxygen Consumption*



*Graph reproduced from Haug, R.T. CRC Press, 1993

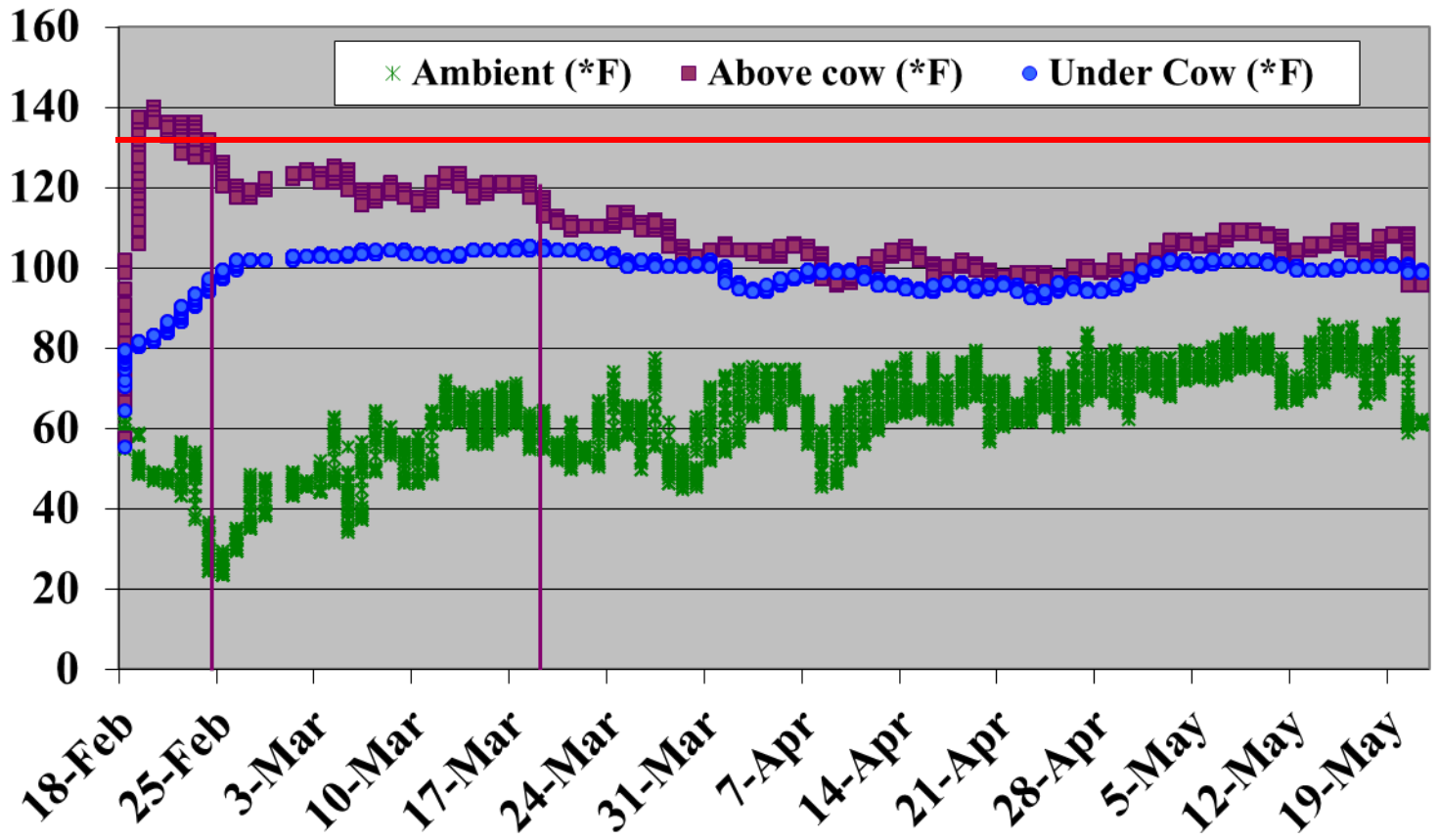
Case Studies – Pile Characteristics

Cow Mortality (1,300 Lbs) Compost

Feedstock: Fresh and Composted Manure Solids

C:N 20, MC 50%

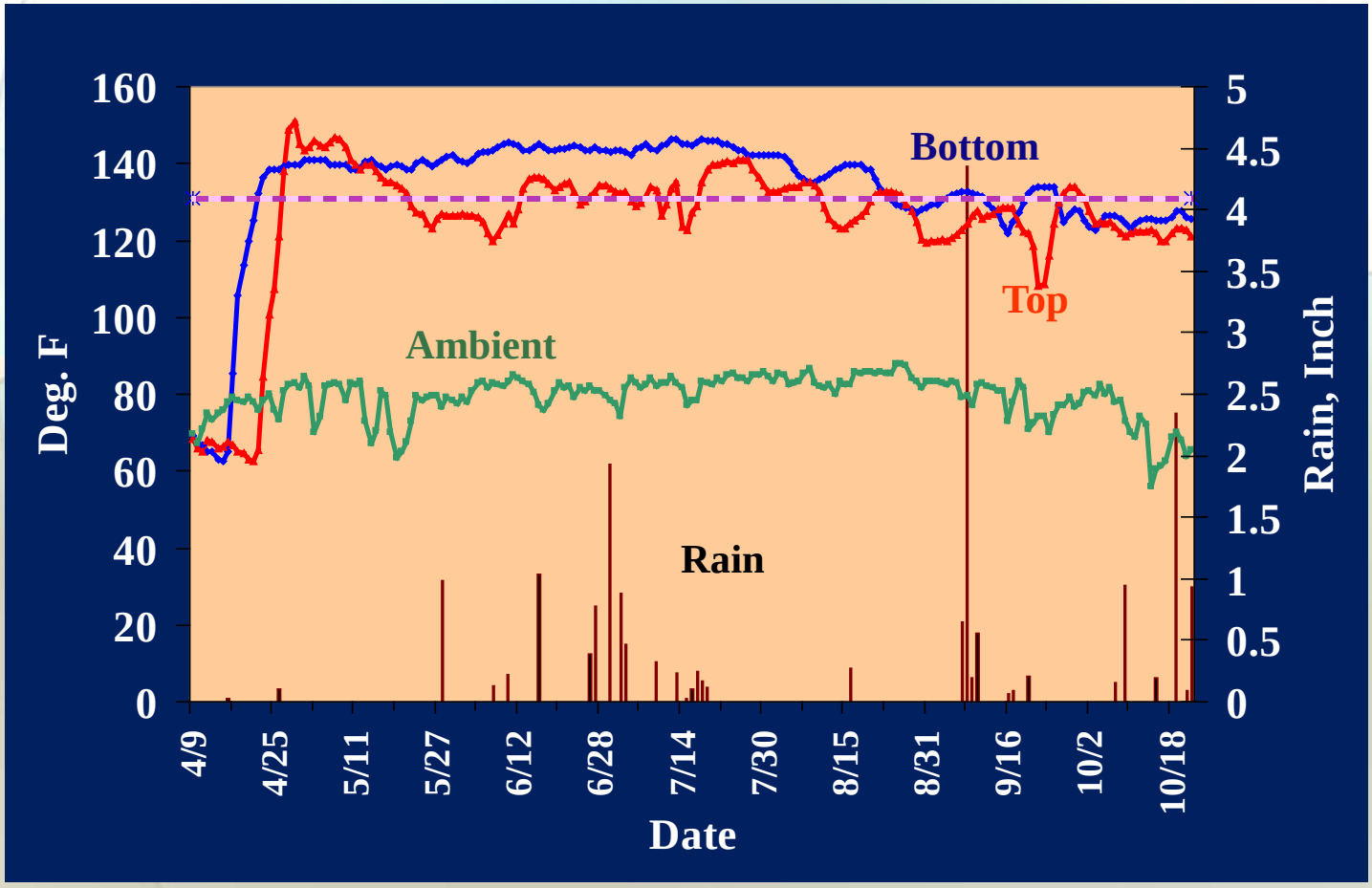
Pile and Ambient Temperatures



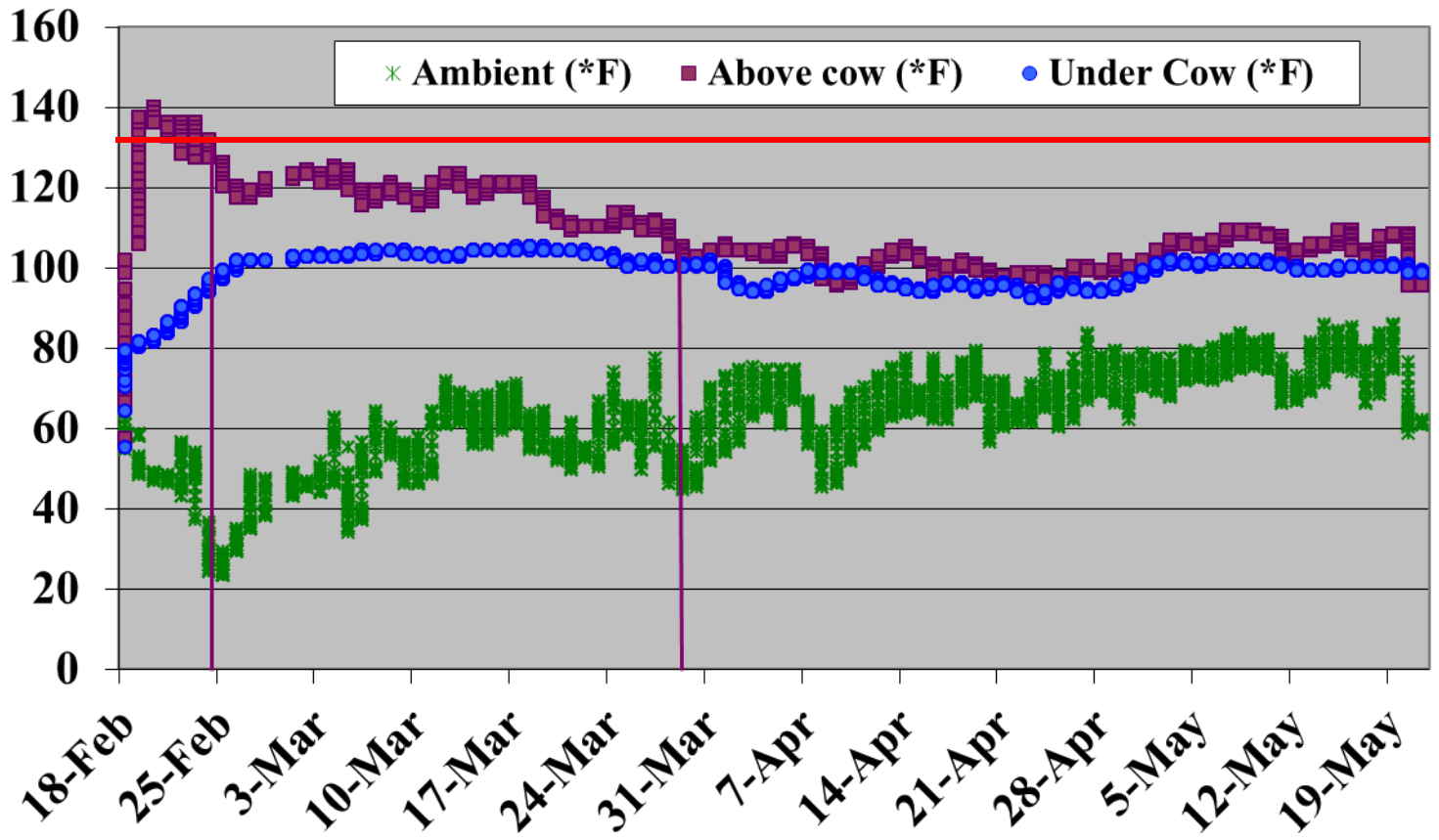
Cow Mortality (2,000 lbs) Composting
Feedstock C:N= 49, MC = 41.4%

HORSE BEDDING SUBSTRATE

Pile and Ambient Temperatures



Pile and Ambient Temperatures



Summary

Pile feedstock, moisture, porosity and free airspace impact the outcome of a composting carcass

- Start pile with a C:N > 25….35 is better
- Initial pile moisture at 50-60%, No less than 40%
- Use bulking and biofilter materials, if and needed
- Select proper feedstocks to maintain 30 to 40% airspace

Carcass composting requires a ‘common sense’ approach

Happy Composting!

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Thank You!