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Impacts of Carbon Material on Shallow Burial with Carbon (SBC) for Swine Disposal

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Shallow Burial with Carbon (SBC)

Guidelines for the Emergency Use of Above Ground Burial to Manage Catastrophic Livestock Mortality (USDA APHIS)

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Research Questions

- What impact(s) does carbon base material have on SBC?
- How is SBC is impacted by carcass state, i.e., whole vs. ground?

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Materials & Methods

Study Location

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Materials & Methods

Soil Types

FaB	Faceville fine sandy loam, 2 to 6 percent slopes
MaC	Marvyn loamy sand, 6 to 12 percent slopes

Emergency Disposal by Shallow Burial Rating - Web Soil Survey - (USDA NRCS)

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Materials & Methods

Carbon Materials

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Materials & Methods

Experimental Design

Randomized Block Design (RBD)

Blocking by excavation time (3, 6, or 12 month)

Carbon Materials

1	Hardwood Mulch
2	Corn Stover
3	Wheat Straw
4	Hay (Fescue)

Carcass state

A	Whole carcass
B	Ground Carcass

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Materials & Methods

1	Hardwood Mulch
2	Corn Stover
3	Wheat Straw
4	Hay (Fescue)

Plot preparation and sensor placement

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Materials & Methods

Ground Carcass Preparation

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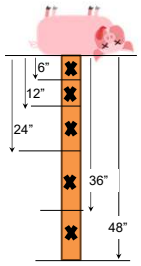
Experimental Data

- Carcass temperature,
- Change in carbon base composition,
- Decomposition extent, and
- Change in soil column nutrient concentration (NH_4-N, NO_3-N, Ortho-P),



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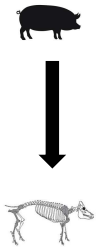
Materials & Methods

Decomposition Ranking

Rank	Criteria
1	Large amounts of flesh, hide and hair present. Internal fluid still visible. Carcass still discernible.
2	Flesh, hide, and hair still present in smaller amounts. Carcass no longer discernible. No internal fluid visible.
3	Slight amounts of hair and hide present. Numerous large and small bones present.
4	No hide present. Minimal hair visible. Flesh completely degraded and only large bones present.
5	No flesh, hide, or hair present. Few to no large brittle bones present.



(Source: Brown, 2007)

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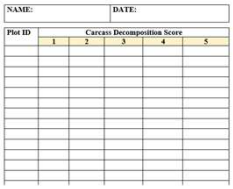
Materials & Methods

Decomposition scoring



Carcass Decomposition Scoring and score sheet

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Results and Discussion

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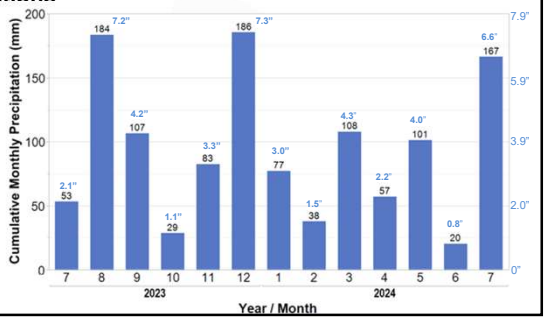
Results and Discussion

Site Conditions

Monthly Rainfall



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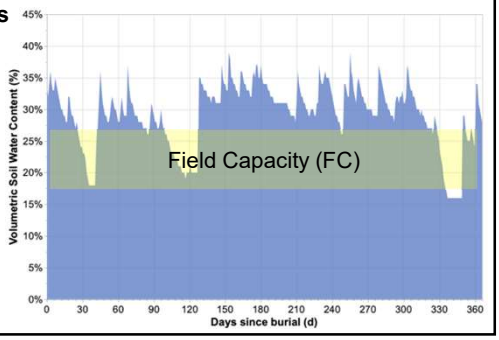
Results and Discussion

Site Conditions

Soil Water Content



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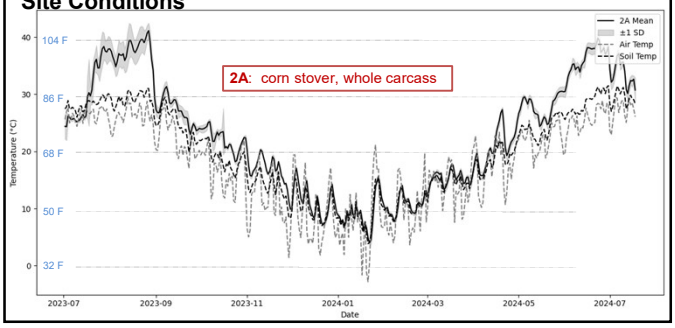
Site Conditions



2A: corn stover, whole carcass

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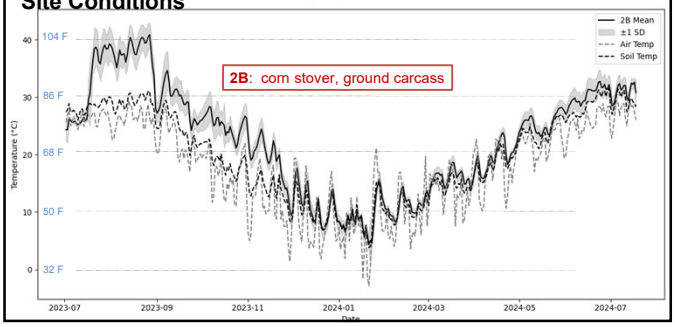
Site Conditions



2B: corn stover, ground carcass

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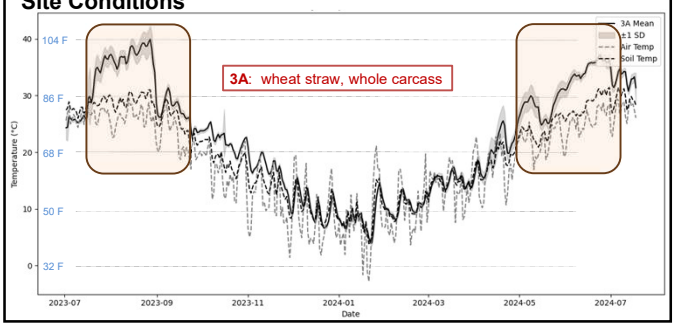
Site Conditions



3A: wheat straw, whole carcass

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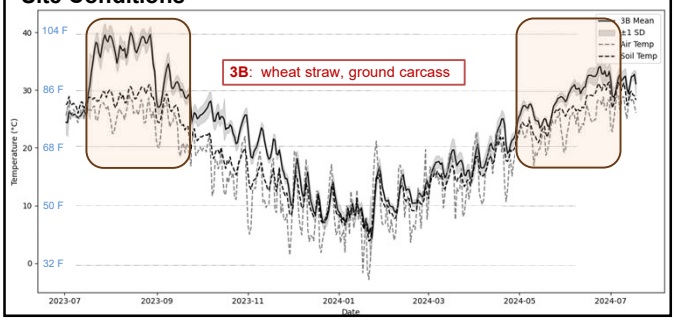
Results and Discussion

Site Conditions



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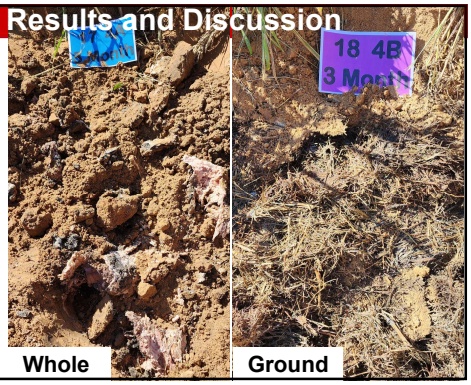
Results and Discussion

Decomposition Rate

Extent of decomposition **after 3 months** of SBC (Hay)



Whole Ground

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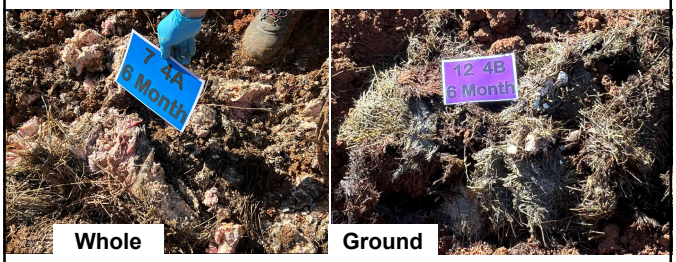
Results and Discussion

Decomposition Rate



Whole Ground

Extent of decomposition **after 6 months** of SBC (Hay)

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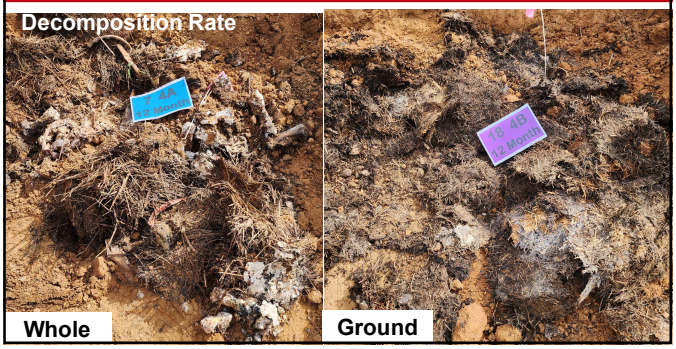
Results and Discussion

Decomposition Rate



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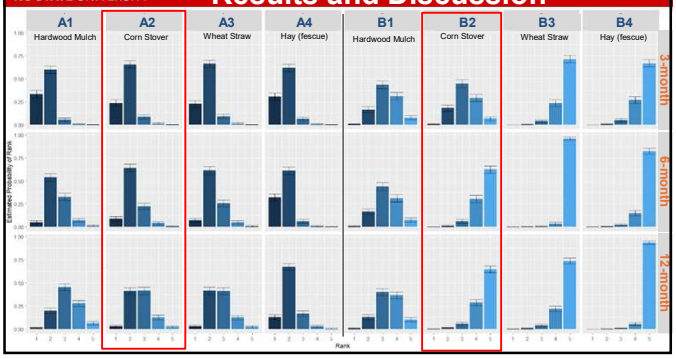
Results and Discussion



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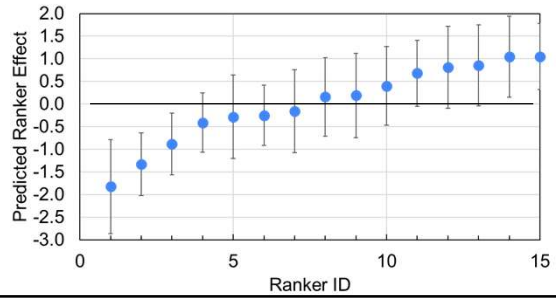
Results and Discussion

Decomposition Ranker Effect



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Results and Discussion

Soil Column Nutrients Concentration

Statistical analysis of variance – Fixed Effects, (X) indicates statistical significance

Effect	NO_3-N	NH_4-N	Ortho-P
Carcass state			X
Carbon Type	X		
Depth	X	X	X
Carcass state X Carbon Type			
Carcass state X Depth			
Carbon Type X Depth	X		
Carcass state X Carbon Type X Depth	X		

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Results and Discussion

[1] Soil Column (NO_3-N) Concentration

Carbon material and nitrate concentrations

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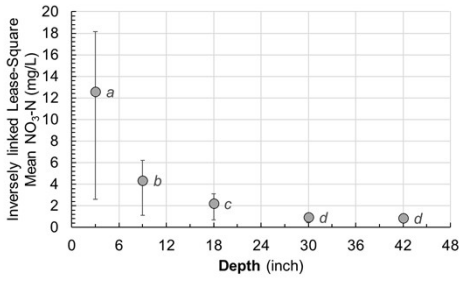
Results and Discussion

[1] Soil Column (NO_3-N) Concentration

Depth and nitrate concentrations



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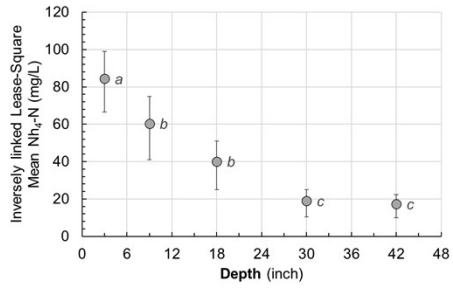
Results and Discussion

[2] Soil Column (NH_4-N) Concentration

Depth and ammonium concentrations



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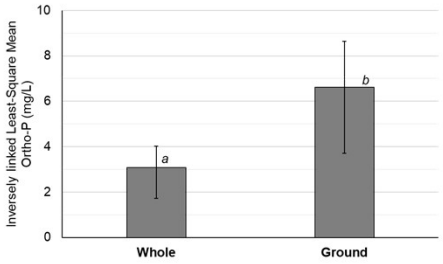
Results and Discussion

Soil Column (Ortho-P) Concentration

Carcass state and soluble P concentrations



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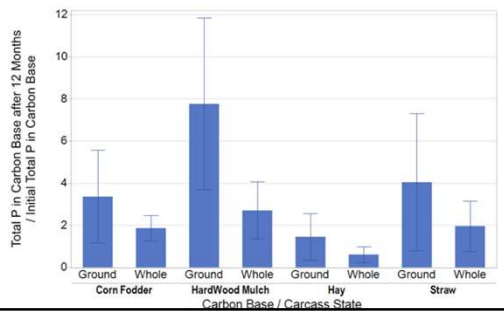
Results and Discussion

Carbon Base Nutrient Concentration



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Results and Discussion

Wildlife activity
(within 6 months of burial)

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Conclusions

- Shallow burial with carbon temperatures remained below 50 C (122 F) throughout the study.
- Decomposition extent depended on ***Carcass state > Burial period > Carbon types***
- Ground carcasses showed greater increase in nutrients captured by the carbon base.
- Nutrient leaching diminished with depth under all Shallow burial with carbon units.

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Thank You!

Acknowledgements

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