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Lunch Speaker

Jessica Rollins

Executive Director, Farmamerica

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WELCOME

TO MINNESOTA'S AGRICULTURAL INTERPRETIVE CENTER

Explore. Discover. Connect.

Dec 1, 2022
Jessica Rollins,
Executive Director

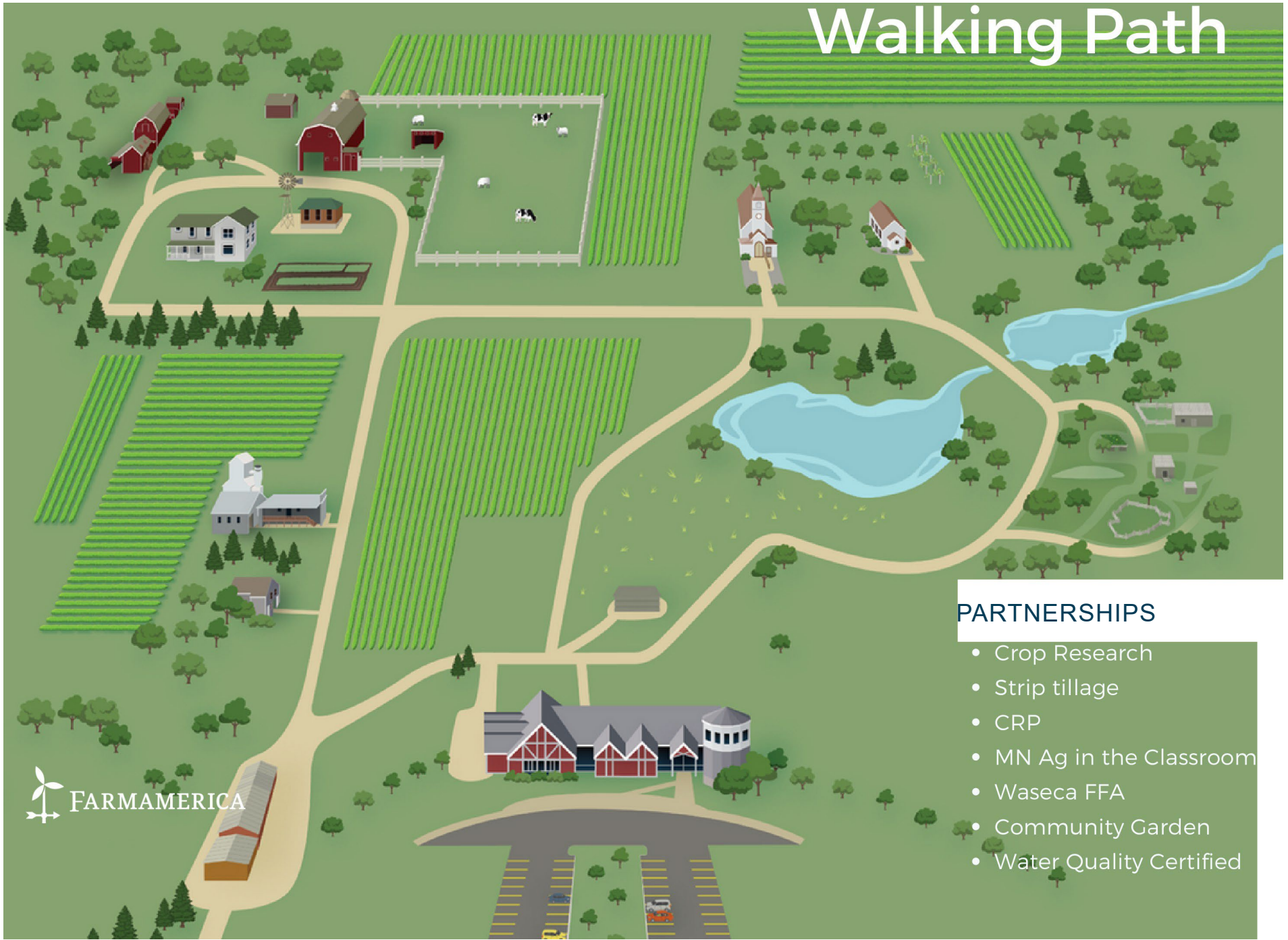
Mission

To connect Minnesotans to the evolving story of agriculture through hands-on educational experiences, partnerships, & community engagement.

Vision

Minnesotans & consumers view agriculture as part of the solution to our food, fiber, energy, & environmental challenges.

Walking Path



PARTNERSHIPS

- Crop Research
- Strip tillage
- CRP
- MN Ag in the Classroom
- Waseca FFA
- Community Garden
- Water Quality Certified

360 acres of Educational Opportunities

Youth Programs

Family Fun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After


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Dinner q:ab

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Crystal Valley Classroom


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(soy) bean.
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Questions?
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Use of Digestate

Erin Cortus, Ph.D.

Associate Professor & Extension Engineer, University of Minnesota

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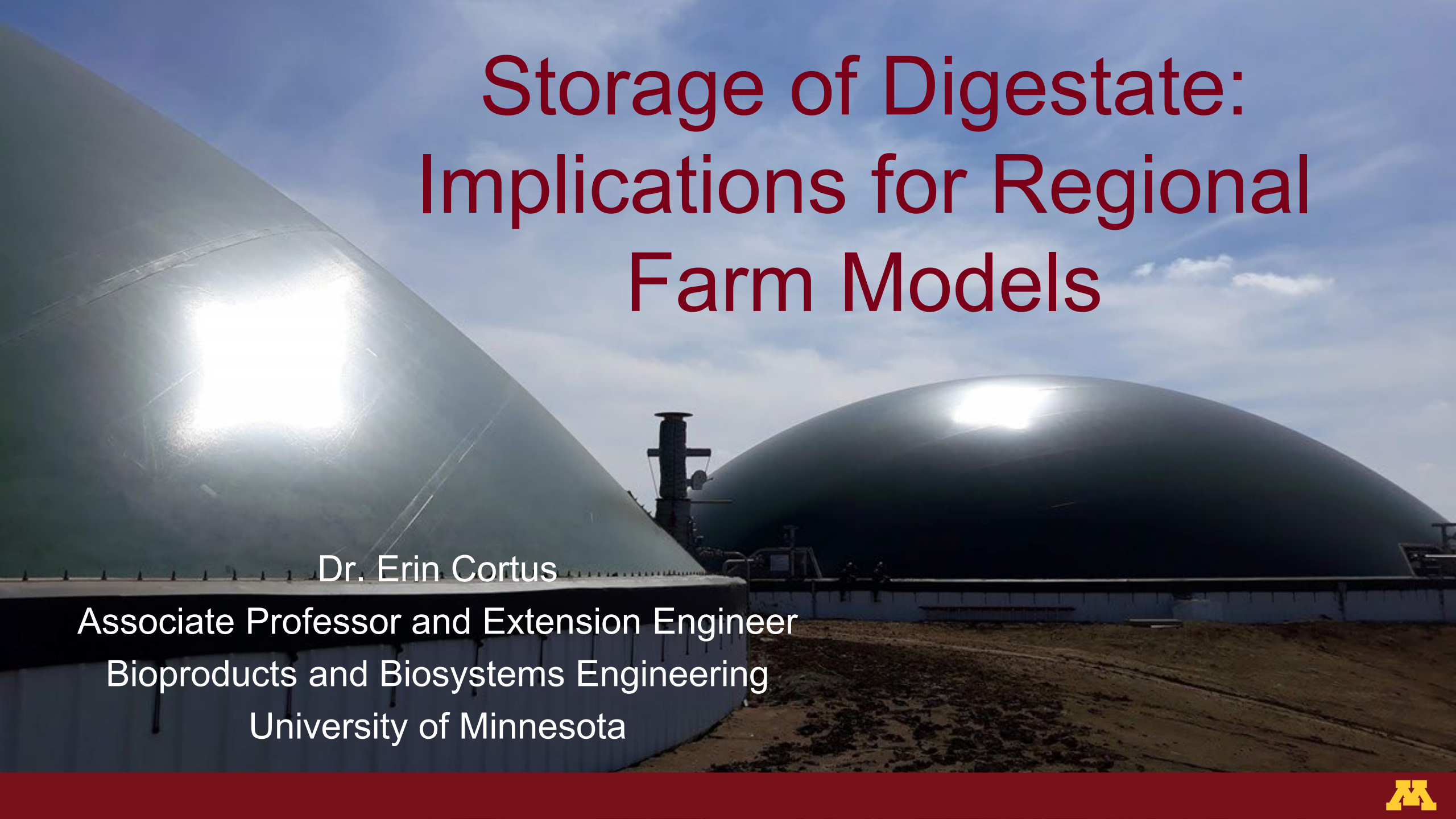
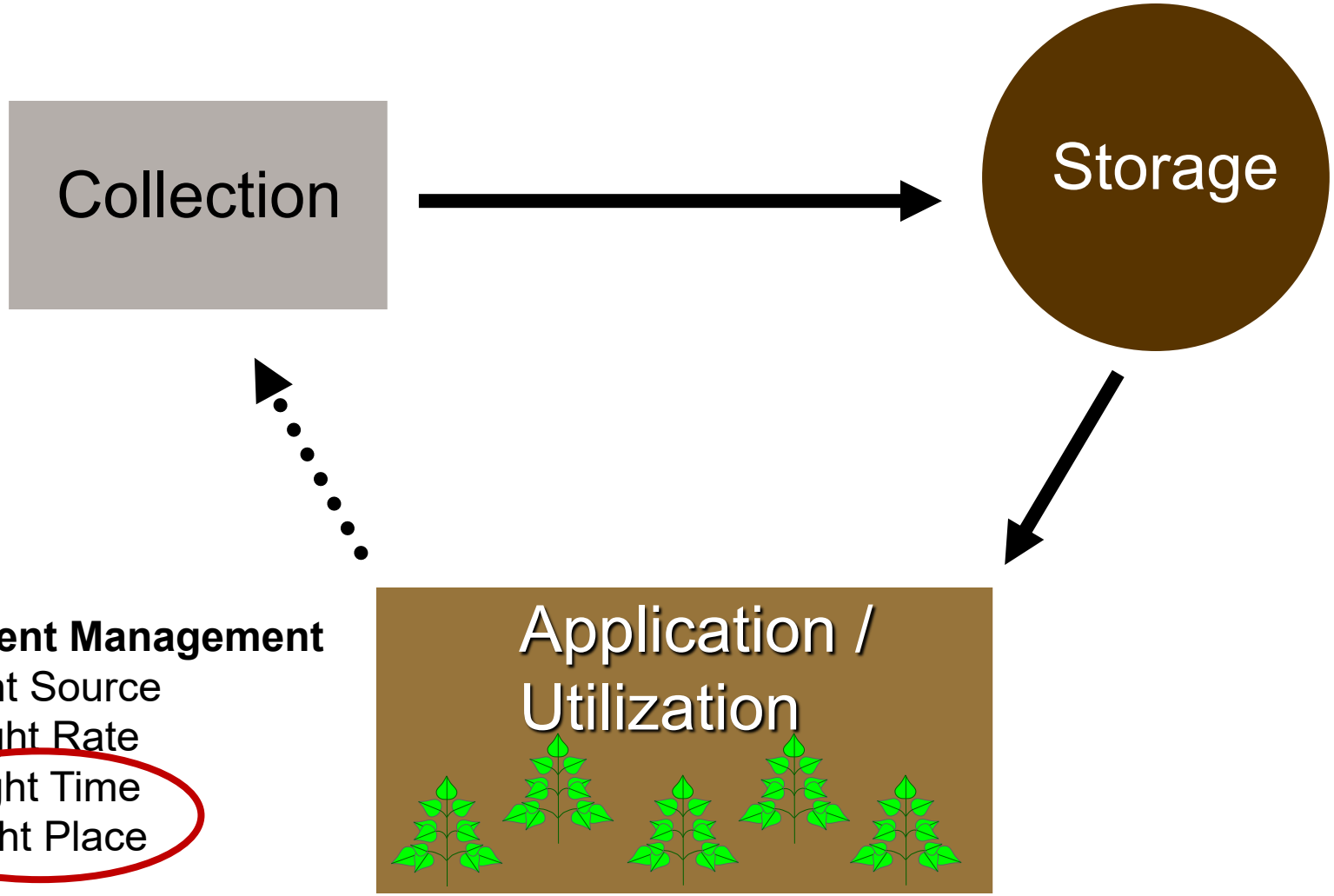


Storage of Digestate: Implications for Regional Farm Models

Dr. Erin Cortus
Associate Professor and Extension Engineer
Bioproducts and Biosystems Engineering
University of Minnesota

Animal Manure Management System

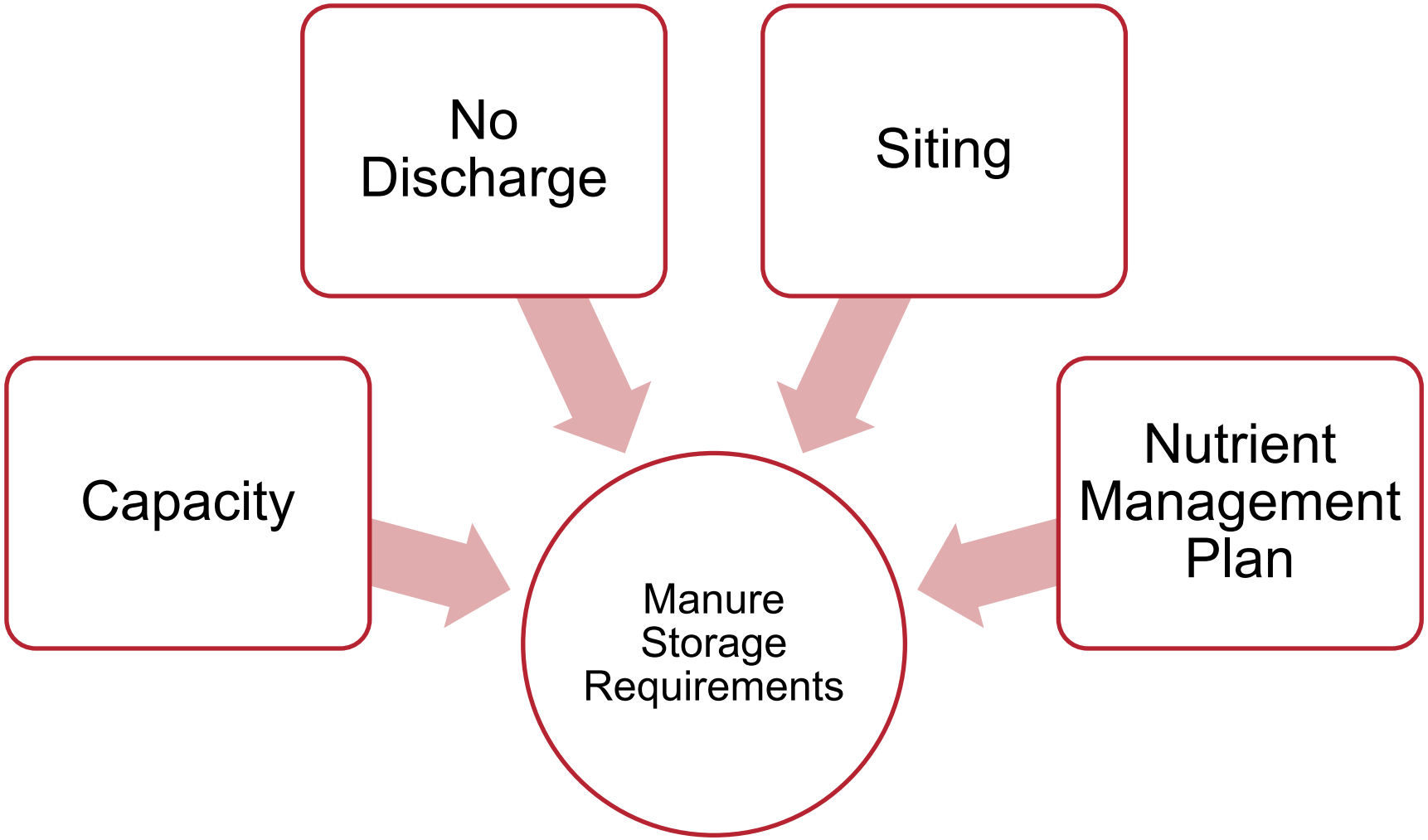


4Rs of Nutrient Management

Right Source
Right Rate
Right Time
Right Place

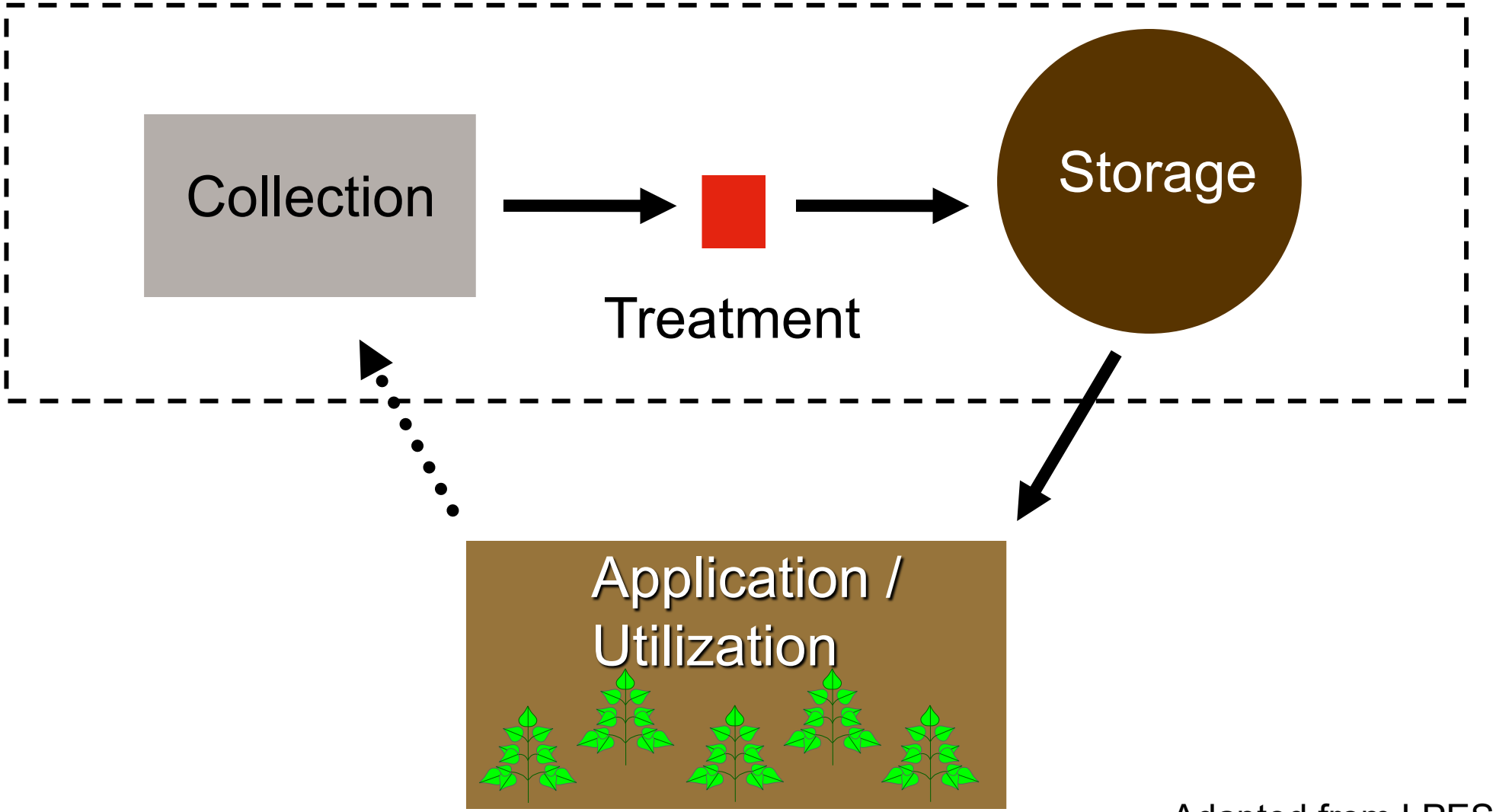
Adapted from LPES Curriculum

National Pollutant Discharge Elimination System (NPDES) and/or similar permit requirements



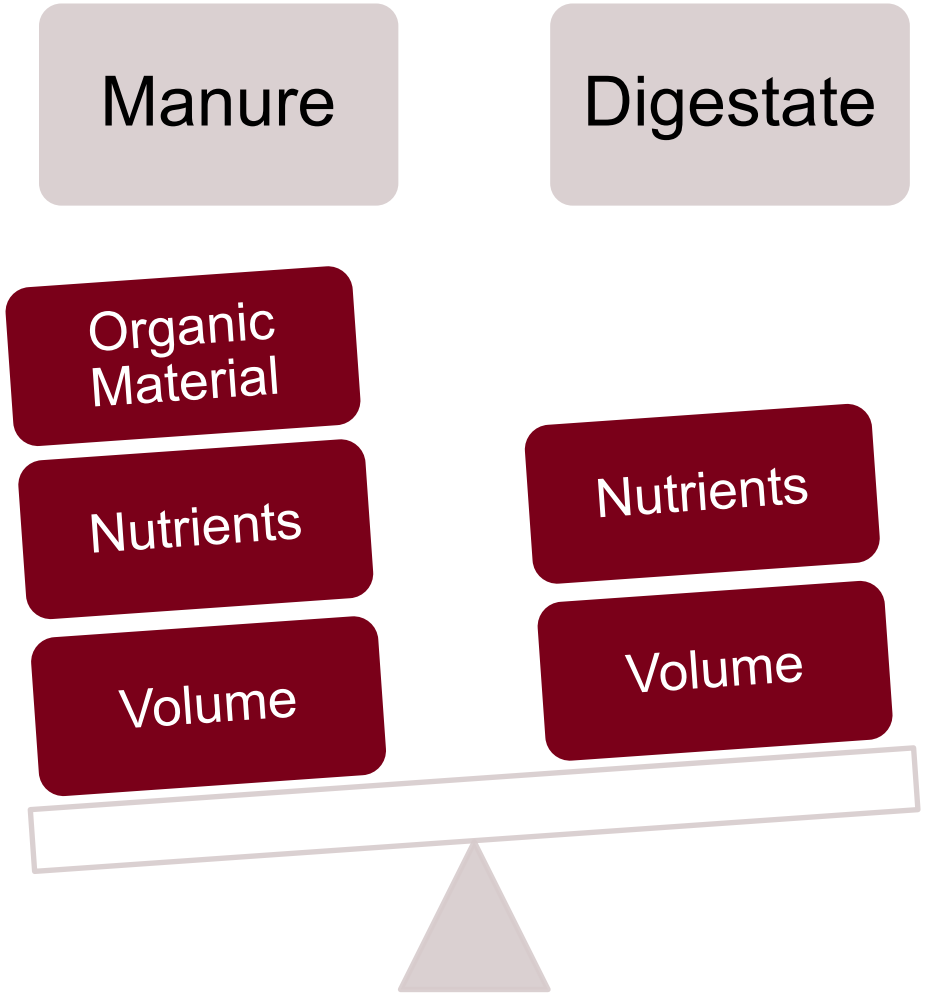
Implications of digesters for regional farm models?

Animal Manure Management System with an On-Farm Digester

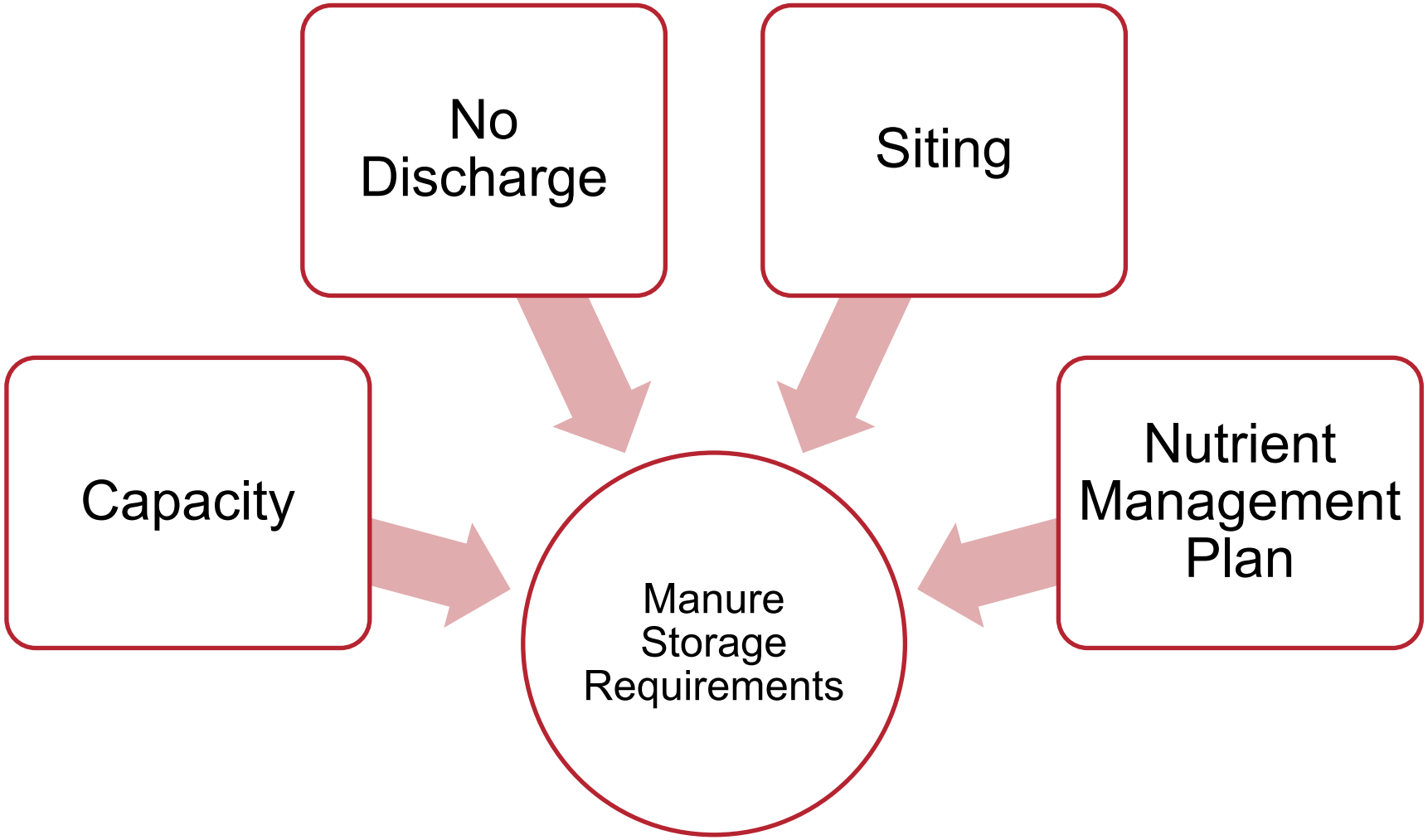


Adapted from LPES Curriculum

Anaerobic digestion is the consumption of organic material

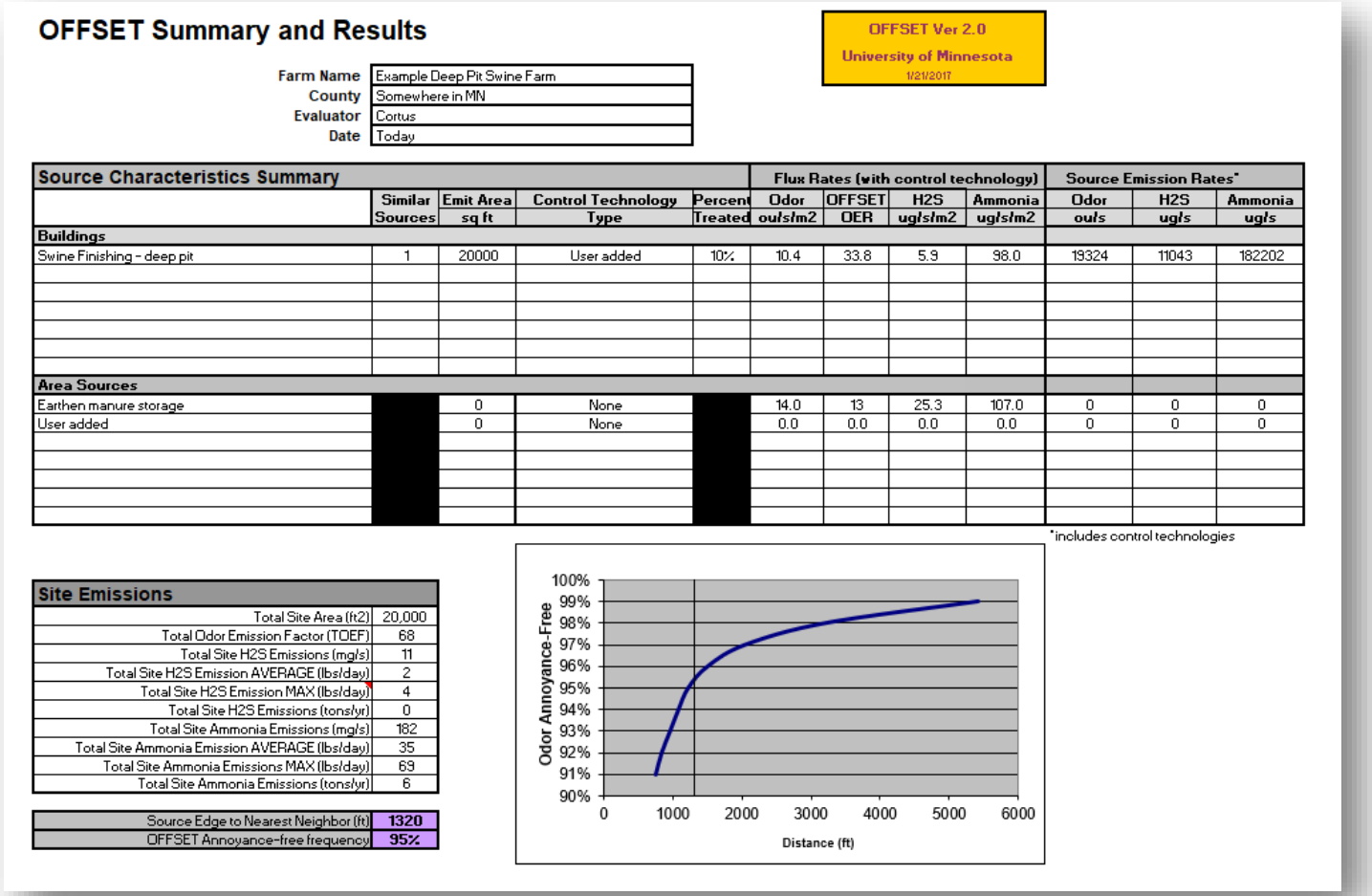


Notes:
-Anaerobic digestion does not remove all organic material.
-Some nutrients are transformed to different forms.


No Discharge
Siting
Capacity
Nutrient Management Plan
Manure Storage Requirements

Odor and gas impacts are expected, but hard to estimate

- Reduction in odor
- Increase in ammonia
- Lack of data for existing impact assessment tools



OFFSET Summary and Results

OFFSET Ver 2.0
University of Minnesota
1/21/2017

Farm Name	Example Deep Pit Swine Farm
County	Somewhere in MN
Evaluator	Cortus
Date	Today

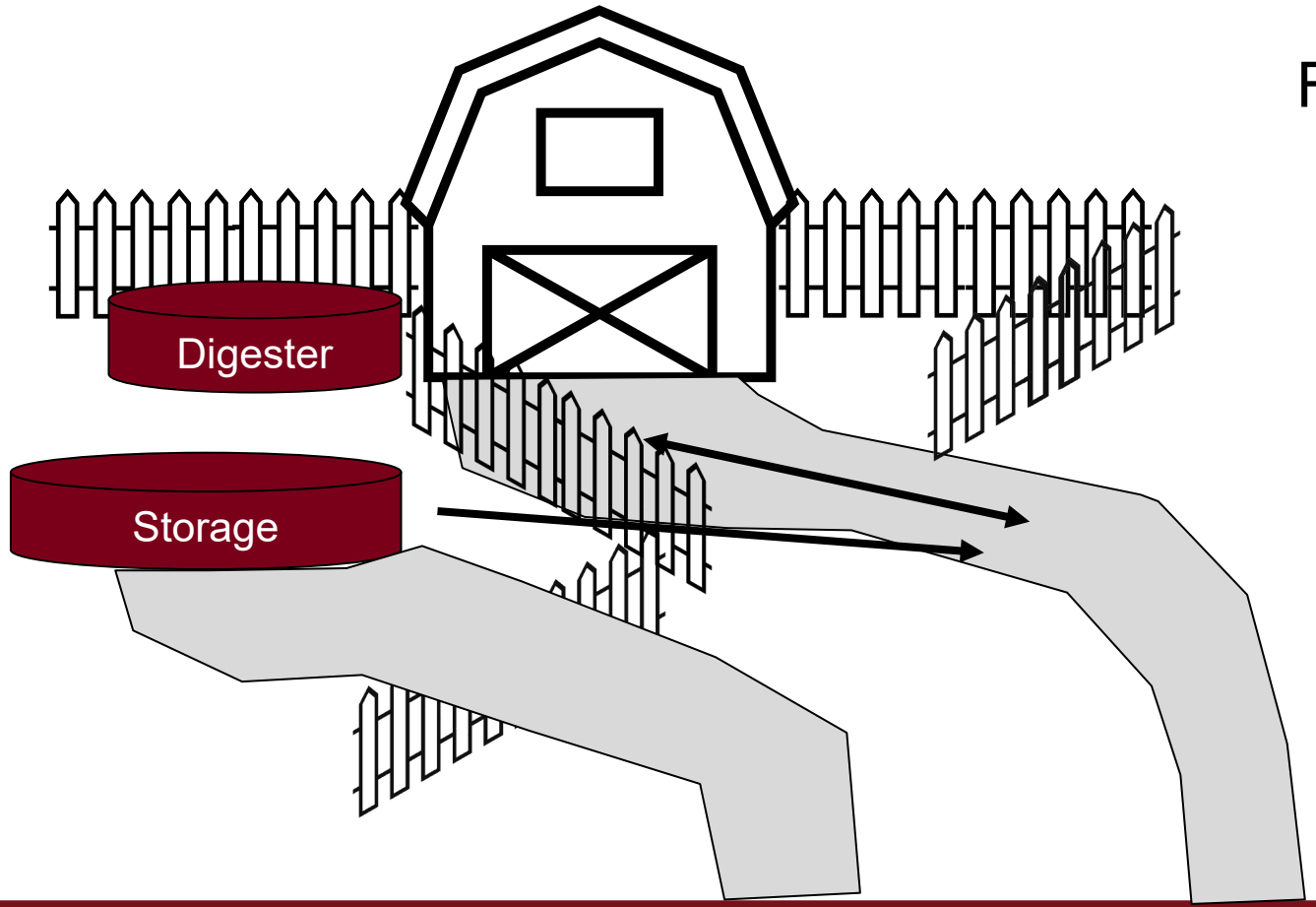
Source Characteristics Summary					Flux Rates (with control technology)				Source Emission Rates*		
	Similar Sources	Emit Area sq ft	Control Technology Type	Percent Treated	Odor ou/s/m2	OFFSET OER	H2S ug/s/m2	Ammonia ug/s/m2	Odor ou/s	H2S ug/s	Ammonia ug/s
Buildings											
Swine Finishing - deep pit	1	20000	User added	10%	10.4	33.8	5.9	98.0	19324	11043	182202
Area Sources											
Earthen manure storage		0	None		14.0	13	25.3	107.0	0	0	0
User added		0	None		0.0	0.0	0.0	0.0	0	0	0

*includes control technologies

Site Emissions	
Total Site Area (ft2)	20,000
Total Odor Emission Factor (TOEF)	68
Total Site H2S Emissions (mg/s)	11
Total Site H2S Emission AVERAGE (lbs/day)	2
Total Site H2S Emission MAX (lbs/day)	4
Total Site H2S Emissions (tons/yr)	0
Total Site Ammonia Emissions (mg/s)	182
Total Site Ammonia Emission AVERAGE (lbs/day)	35
Total Site Ammonia Emissions MAX (lbs/day)	69
Total Site Ammonia Emissions (tons/yr)	6

Source Edge to Nearest Neighbor (ft)	1320
OFFSET Annoyance-free frequency	95%

Biosecurity



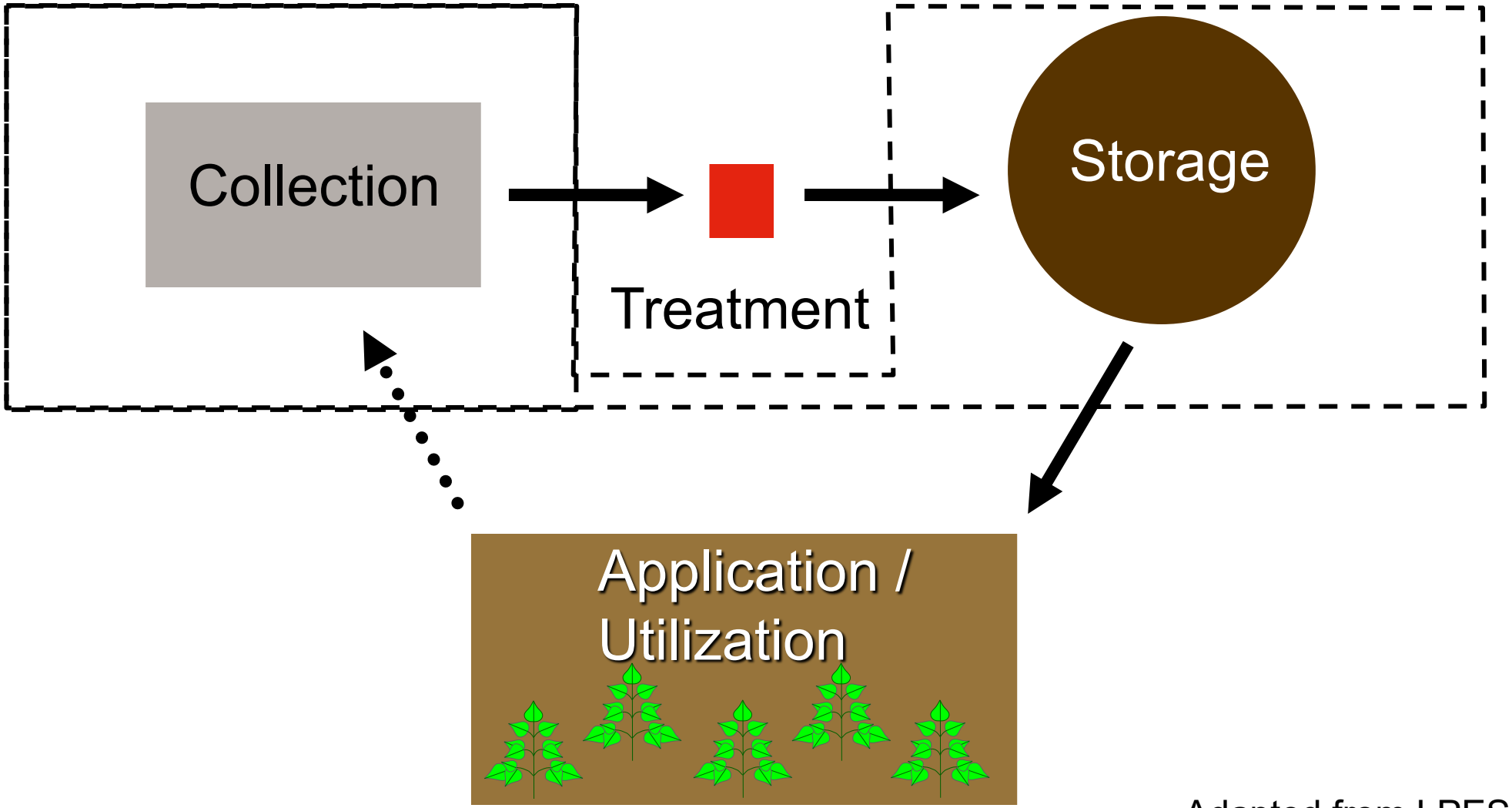
<u>Perimeter Buffer Area</u>

The area that relates to day-to-day care of the animals.

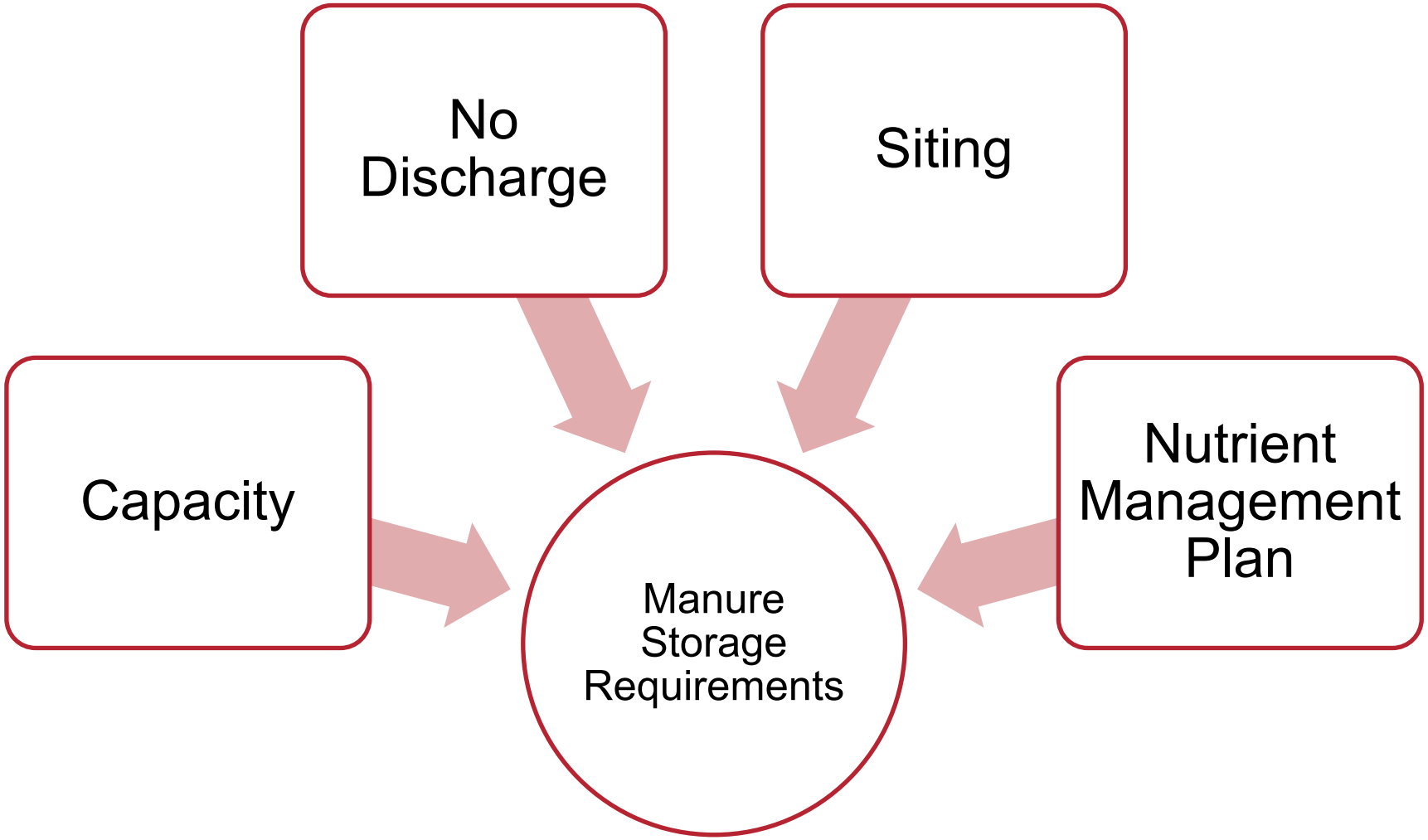
First line of defense against the entry of pathogens.

1. *Increased human and vehicle traffic.*
2. *Manure movement off the farm.*

Animal Manure Management System with an Off-Farm Digester



Adapted from LPES Curriculum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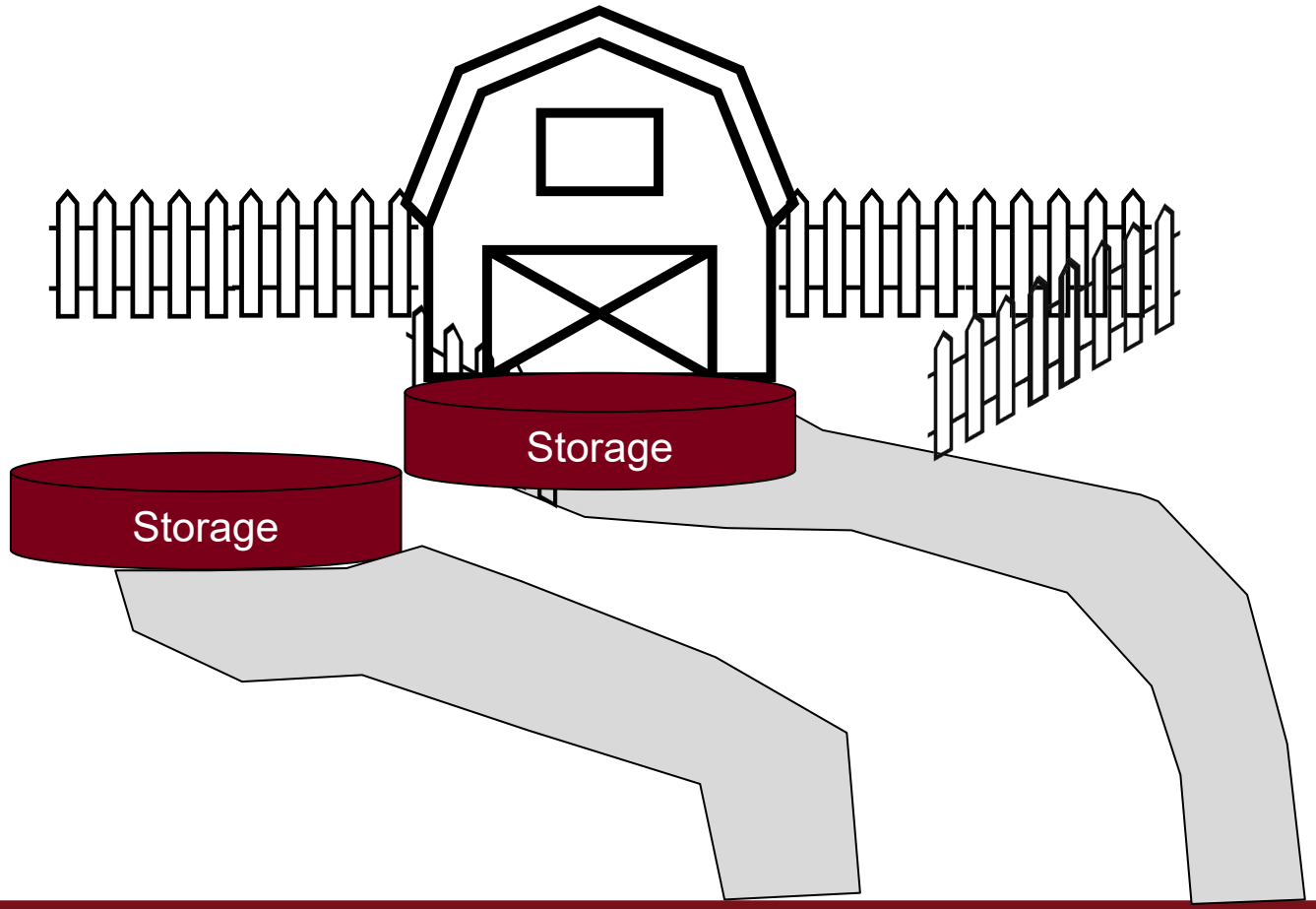
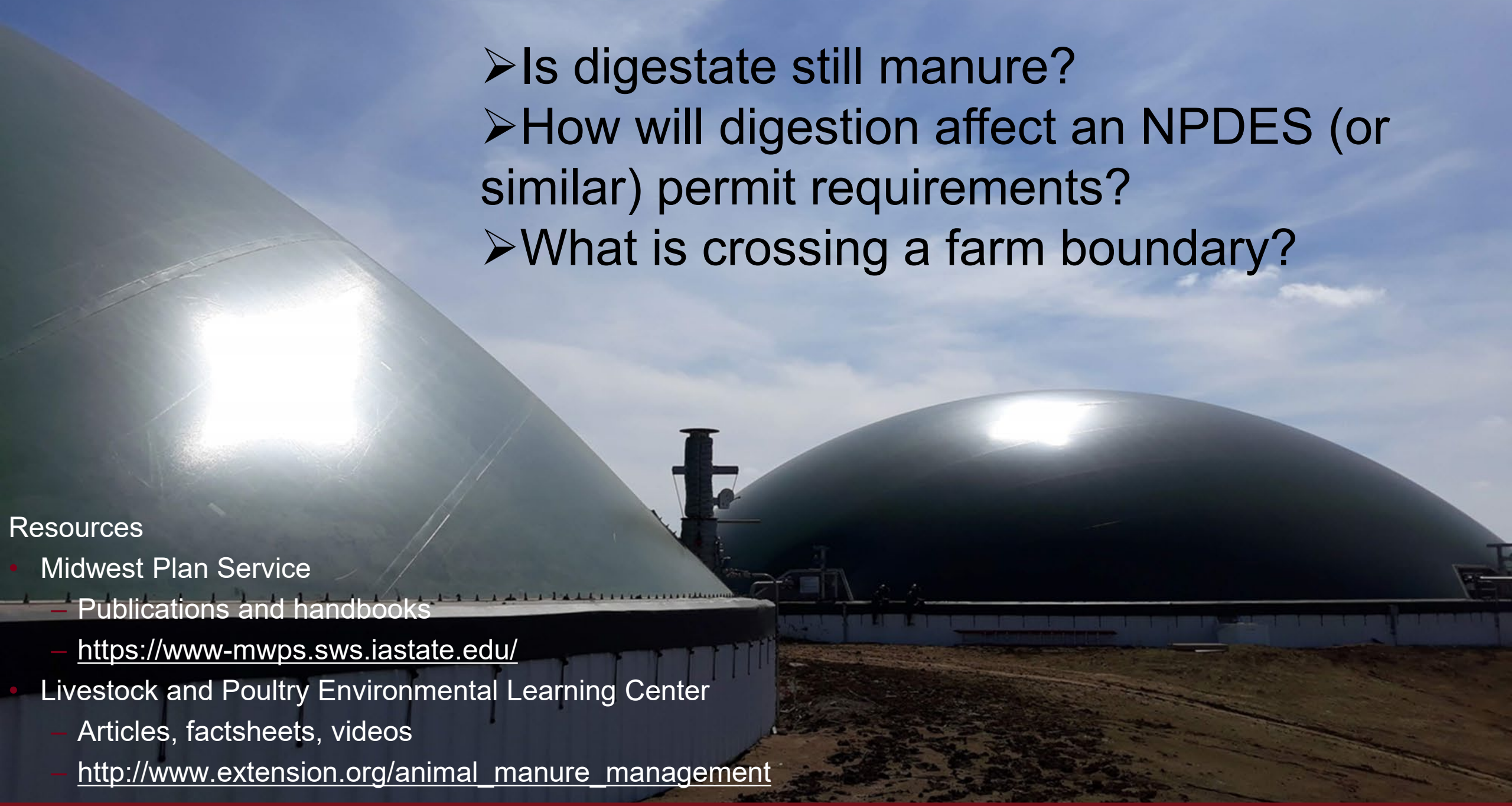


1. *Increased human and vehicle traffic.*
2. *Manure movement off the farm.*
3. *Mixed manure/digestate onto farm.*

Proximity of the manure/digestate to animals?



- Is digestate still manure?
- How will digestion affect an NPDES (or similar) permit requirements?
- What is crossing a farm boundary?

Resources

- Midwest Plan Service
  - Publications and handbooks
  - https://www-mwps.sws.iastate.edu/
- Livestock and Poultry Environmental Learning Center
  - Articles, factsheets, videos
  - http://www.extension.org/animal_manure_management

Questions or Inquiries

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Use of Digestate

Melissa Wilson, Ph.D.
Associate Professor &
Extension Specialist,
University of Minnesota

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Land application of digestate and how it may change manure management

Dr. Melissa Wilson
Associate Professor and Extension Specialist

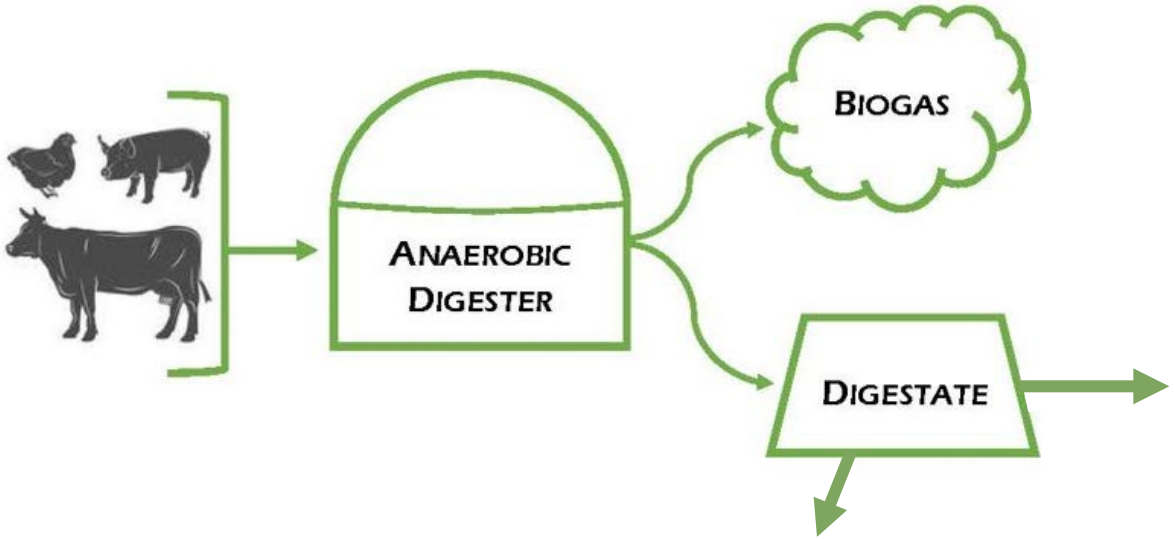
MAKING A DIFFERENCE IN MINNESOTA: ENVIRONMENT + FOOD & AGRICULTURE + COMMUNITIES + FAMILIES + YOUTH

Considerations for land application

1. **Changes in nutrient content**
2. **More or less land may be needed**
3. **Different equipment for application**
4. **Changes in state permits**

Photo credit: U.S. Dairy

From raw manure to digestate



Total N, P, and K remain stable

Digestate has:

- Higher ammonium levels
- Higher pH

- Dry matter content
- Lower C:N ratios
- Reduced viscosity

Diagram credit: Minn. Department of Ag

Effects of liquid-solid separation on digestate

Liquid fraction

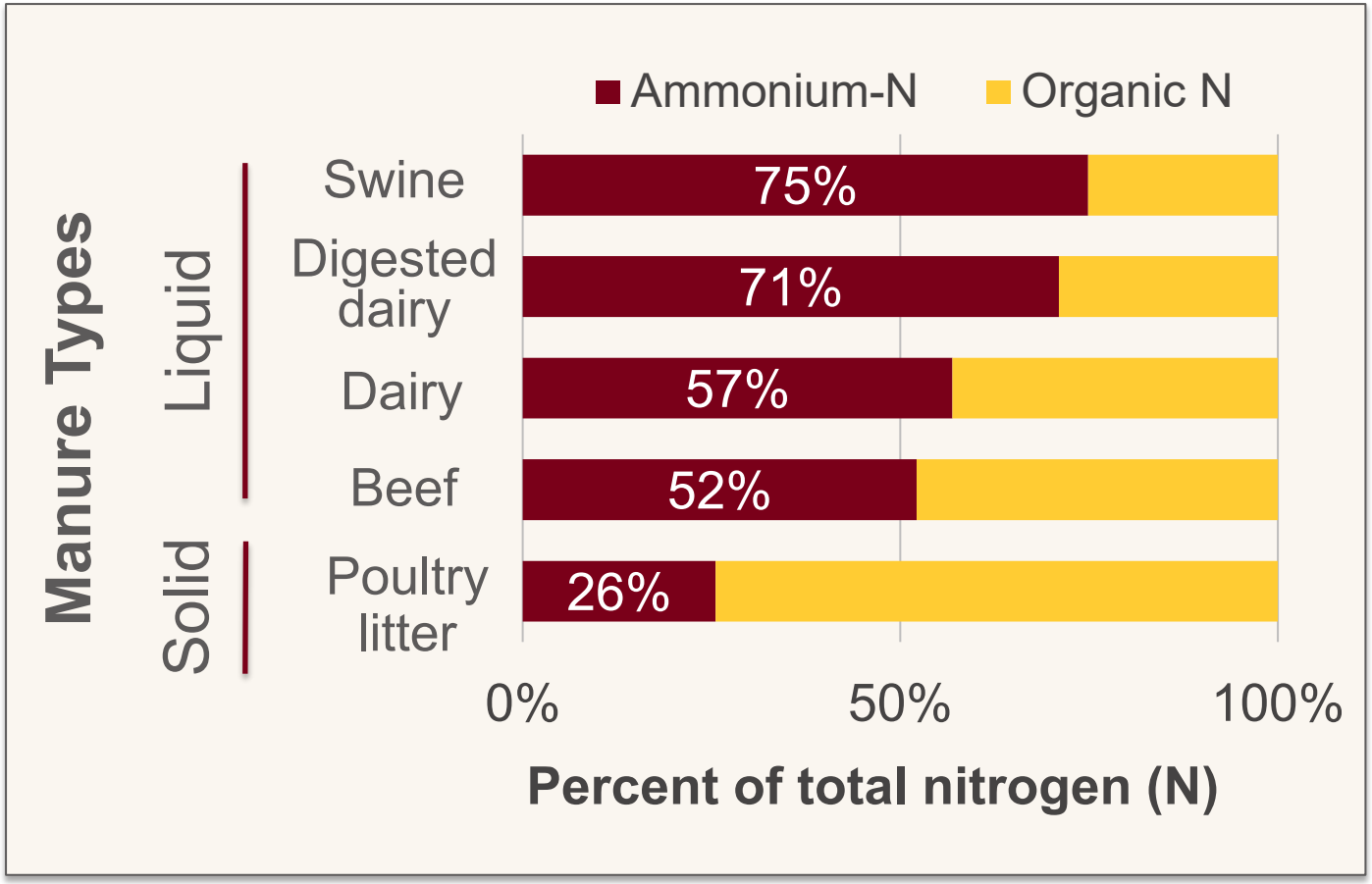
- Low dry matter (4-7% solids)
- Easier to pump with fewer blockages
- Typically high in N (ammonium form) and K

Solid fraction

- Higher dry matter (19-25% solids) and organic matter
- Most P is left in the solids, also contains N and K

Consider application rates and timing

- Digestion makes nitrogen more:
  - Plant-available
    - Application rates will need adjusted
  - Easily lost
    - Apply as close to crop uptake as possible



Adjust nutrient management plans

Sample digestate and send to a lab to help with planning

Lower application rates may mean more land is needed

Liquid-solid separation may reduce volume so less land may be needed if solids are recycled to the barn

Application equipment

Highly recommend that digestate is injected or immediately incorporated

If getting liquid and solid digestate, may need equipment to land apply both types

Don’t forget to check/update your permits!

Always check with your local MPCA office for rules and regulations

- A manure digester is permitted just like any other manure storage area at a feedlot
- The material coming out of the digester is still manure
- Co-digesting a significant amount other materials (i.e., food processing wastes) with manure could complicate the permitting process and require a permit other than a feedlot permit

Questions or Inquiries?

Contact Info:

- mlw@umn.edu
- Follow me on twitter: @ManureProf
- https://z.umn.edu/manureresearch2021

Audience Q & A

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