

# Shared experiences in environmental sustainability assessment

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Associate Professor & Extension Engineer

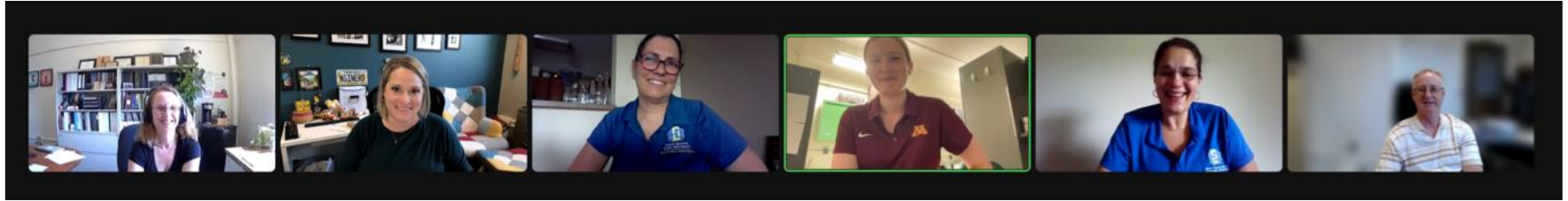
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Postdoctoral Associate



UNIVERSITY  
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# Project Team



Erin Cortus

Amy Schmidt

Patricia  
Villamediana

MaryGrace  
Erickson

Maristela  
Rovai

Rick Stowell

Not pictured: Mitch Schulte, Midwest Dairy



# Background





## Show of Hands

You recently **had** or **heard** a conversation about dairy environmental stewardship



# U.S. Dairy Net Zero Initiative

**By 2050, U.S. dairy collectively commits to:**



**Achieve greenhouse  
gas neutrality**



**Optimize water use while  
maximizing recycling**



**Improve water quality**

<https://www.usdairy.com/sustainability/environmental-sustainability/net-zero-initiative>



# U.S. Dairy Net Zero Journey

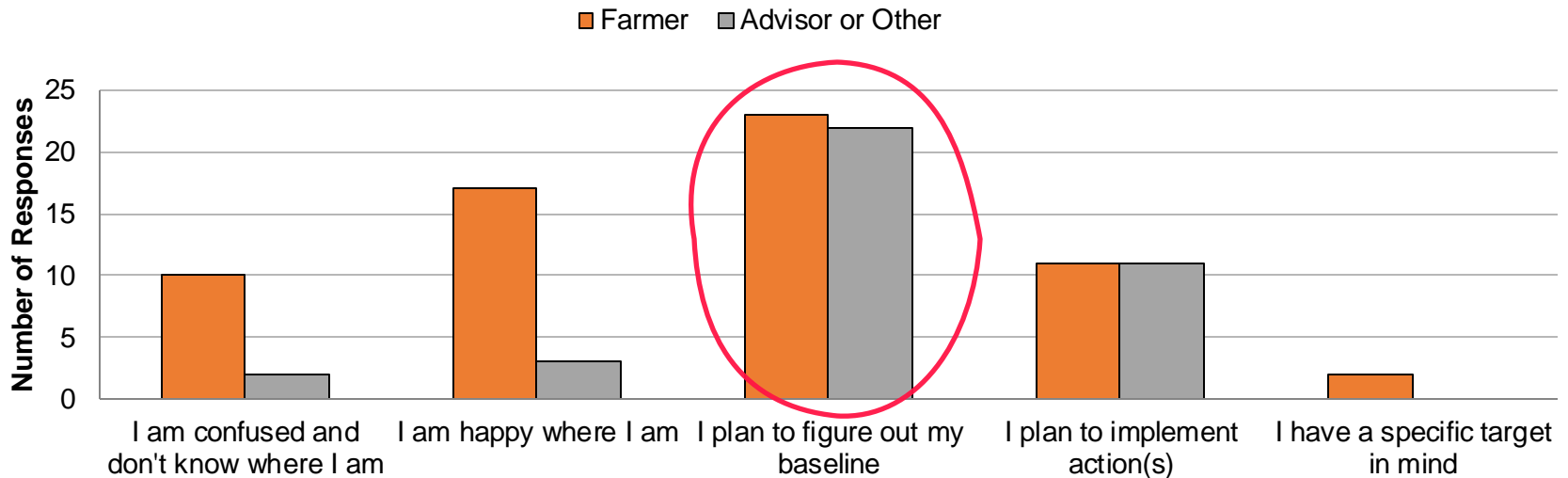
***Where are we now?***

***How do we get there?***



# Pilot survey in 2022: Midwest farmer and advisor responses to “What is your next step in your sustainability journey?”

n = 81, response rate = 36%



# U.S. Dairy Net Zero Journey

*Where are we now?*

*How do we get there?*

Implementation:  
**FARM ES Assessments**

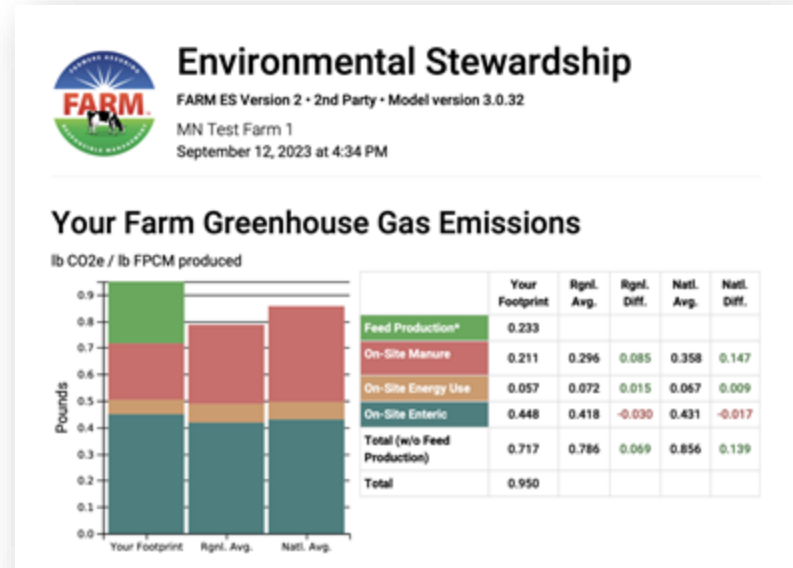




# FARM Environmental Stewardship (ES)<sup>1</sup>

Selected portion of a FARM ES report in 2023

- Evaluator-mediated process
- Estimates greenhouse gas and energy impacts for farms using a life cycle assessment model<sup>2</sup>



1. <https://nationaldairyfarm.com/>; 2. Asselin-Balençon et al., 2013



# FARM ES Version 2



What do farmers and advisors think about this?

What might evaluators experience?



# Project Objectives

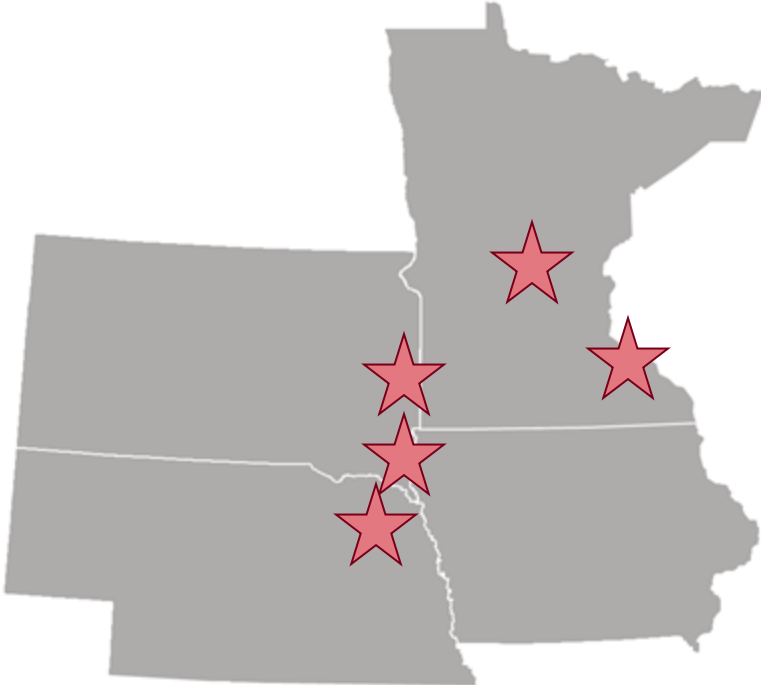
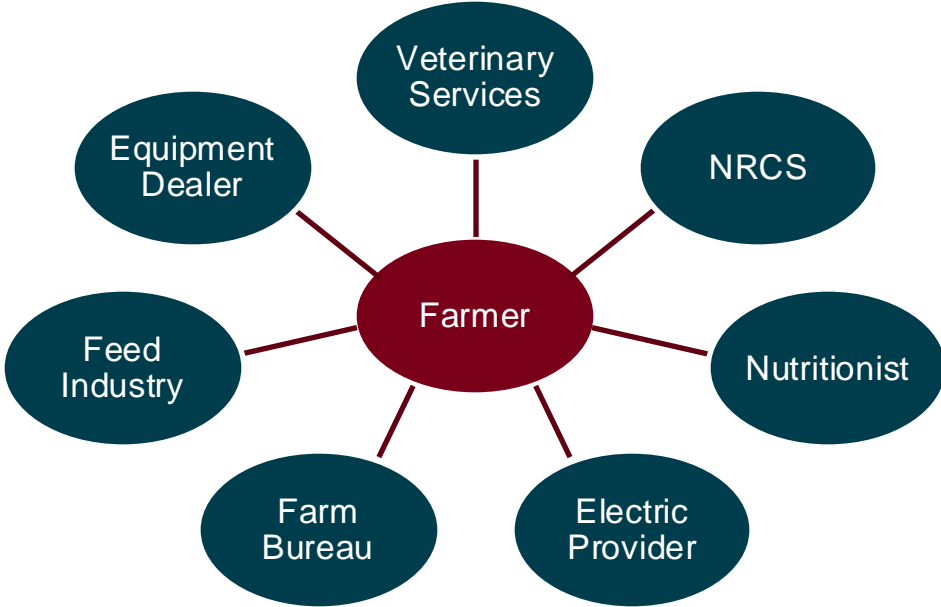
Through focus groups in the Upper Midwest,  
explore farmer and advisor perceptions of  
#1) the value (+/-) of FARM ES Version 2 assessments,  
#2) feasible on-farm improvement strategies, and  
#3) shared responsibilities in making progress.



# Methods

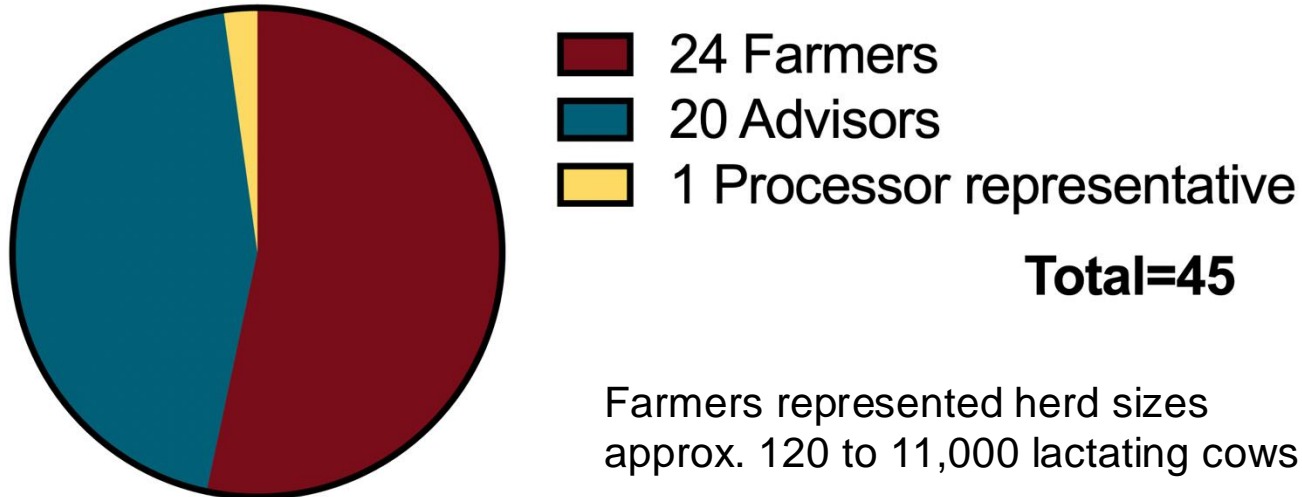


# Recruitment



★ = in-person focus group numbered by state, e.g., SD1

# Focus group participants



# Focus group methods

- For each region: sequence of 2-3 meetings (n = 14 total)
- Facilitated by project team members



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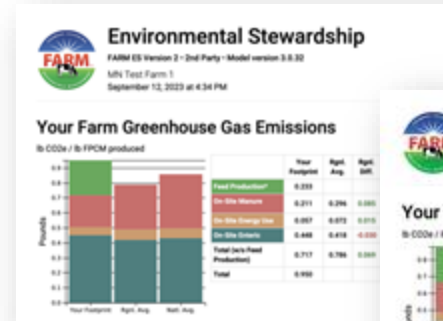


# Starting point: fictional FARM ES reports

- Semi-structured prompts:
  - Value in seeing one or multiple reports
  - Missing context and improvements

Region-specific,  
fictional scenarios

MN Small



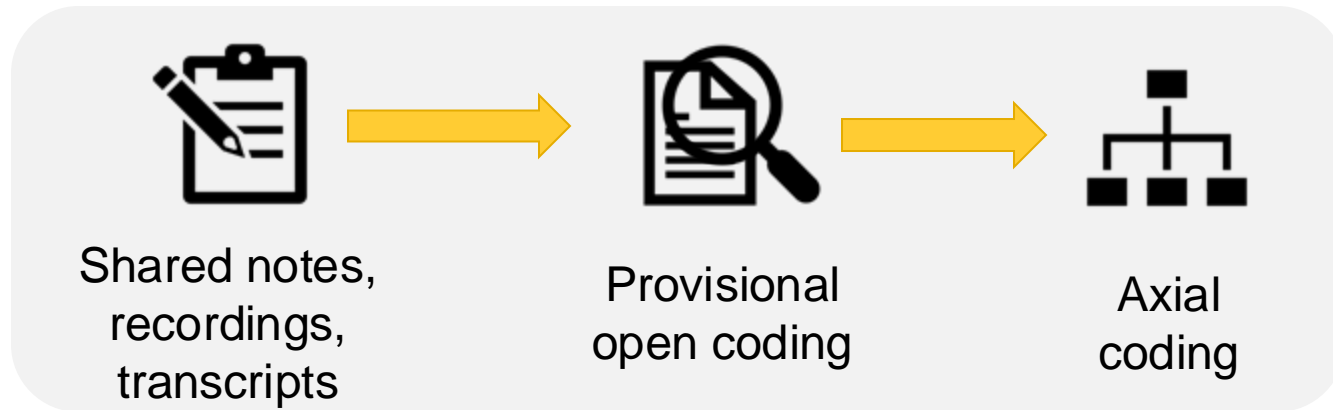
MN Large



# Topic 1: Qualitative Analysis



Weekly debriefings with project team:



Creswell, 2005



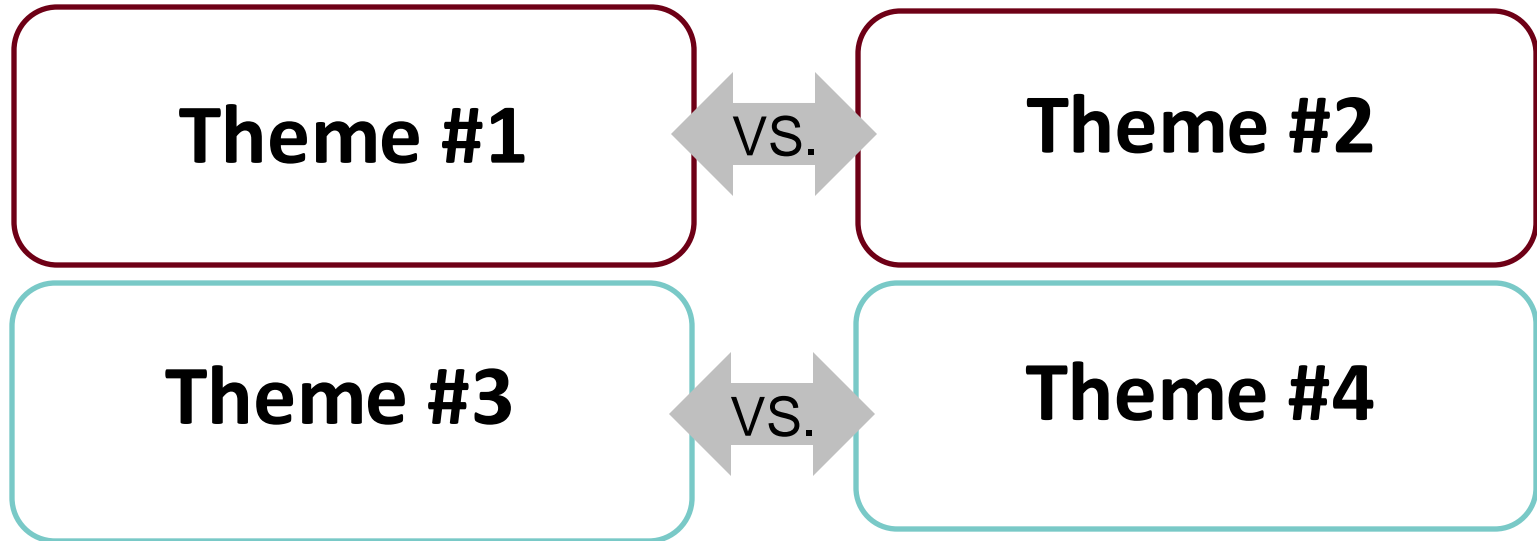


## Show of hands

The farms I work with  
typically have similar opinions about  
**FARM assessments**  
(e.g., ES or Animal Care)



# Two major categories of themes, each representing a tradeoff



# Two major categories of themes, each representing a tradeoff

**Simple, easy to complete**

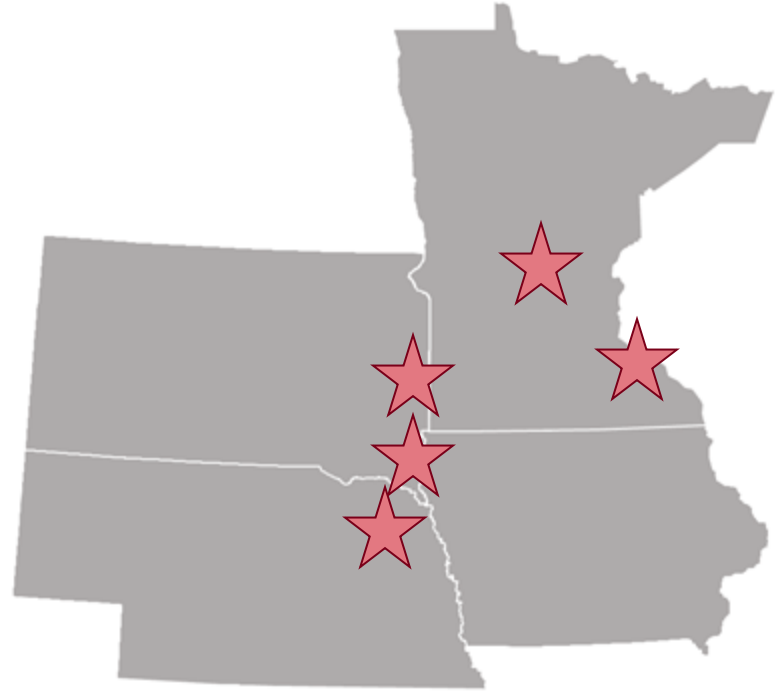
**VS.**

**Some skeptical of accuracy  
and fairness**

**VS.**



Exemplary quote  
[Region]





Model design and assistance from evaluators makes data input...



Photo credit: Morning Ag Clips



# Easy to provide self-report inputs

- Milk and component production
- Herd demographics
- Lactating cow diet
- Dry matter intake
- Energy usage
- Manure management system(s)



*...you gather all that information for taxes for the most part... [MN1]*

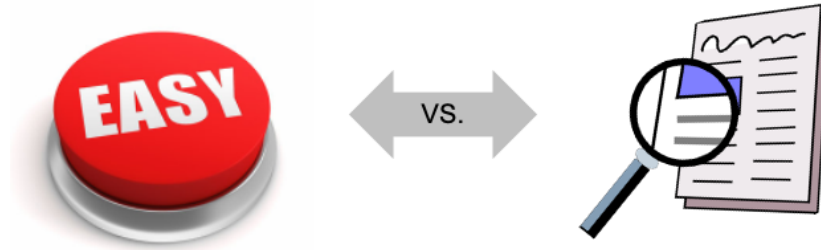
*Simplicity.  
This is easy to fill out.  
This isn't awful. [SD2]*





# Simplicity has a trade-off with accuracy and detail

*It's a balance ...  
between **what makes it simple to gather the data** and  
then also **what's going to produce accurate estimates**. [SD2]*



# Lack of detail and specificity

- Crop management
- Herd management



*... A third of their footprint is the growing of the feed but you don't even know anything about any of the practices here. [MN2]*

*Every animal has a footprint to it [SD2]*





Assessments are standardized

Every farm is unique

Photo credit: Craig Debnam



# Accuracy for my farm

- Need to check model outputs against measured outputs and impacts



*...Is there a verifiability, something like that? **How do you know a number is real and accurate** is what we're getting at? [NE1]*

***How do they measure?** Do they measure air? Do they measure dirt? ... How do we know that number is right? [SD1]*

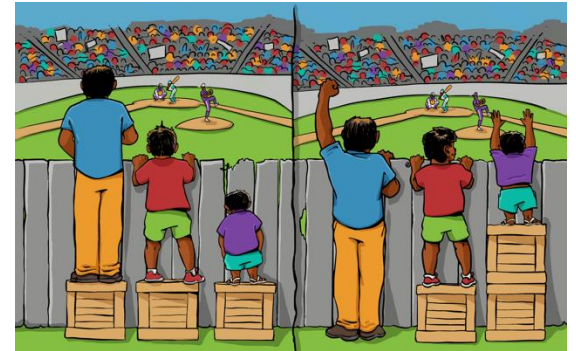


# Fairness to various producers

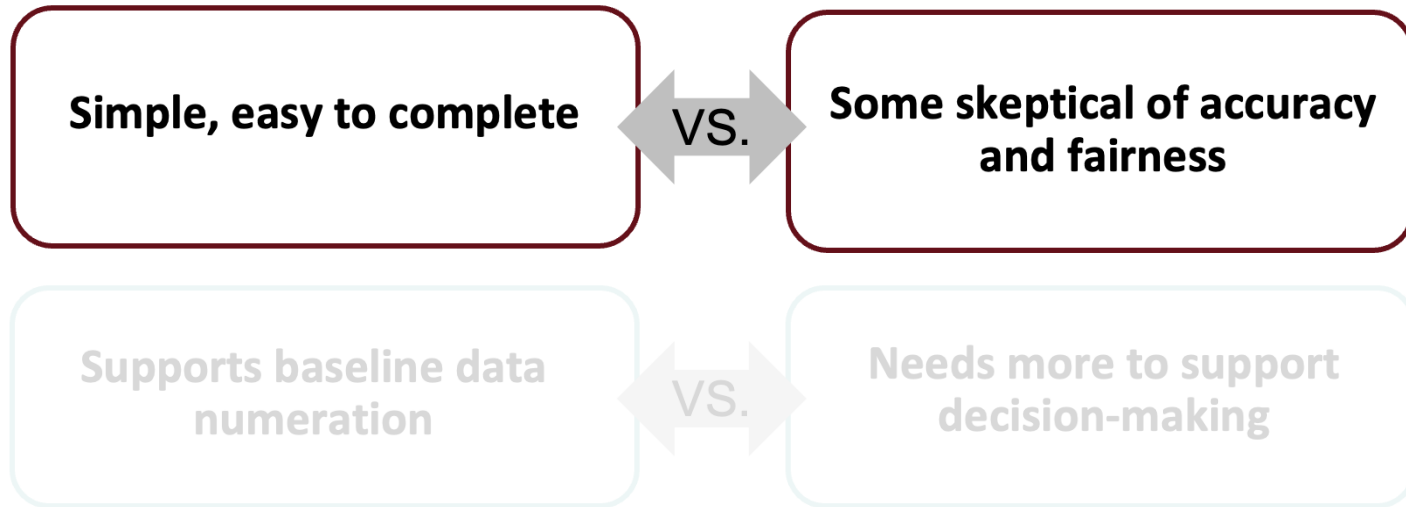
- Potential to game the system or alienate certain producers

*...are these number that are old, are they wrong? Have they been tweaked on by somebody, **maybe for self-interest**, maybe not? [NE1]*

*But who's keeping score and **are we keeping score in a fair way to everybody...** [SD1]*



# Recommendations for Processors



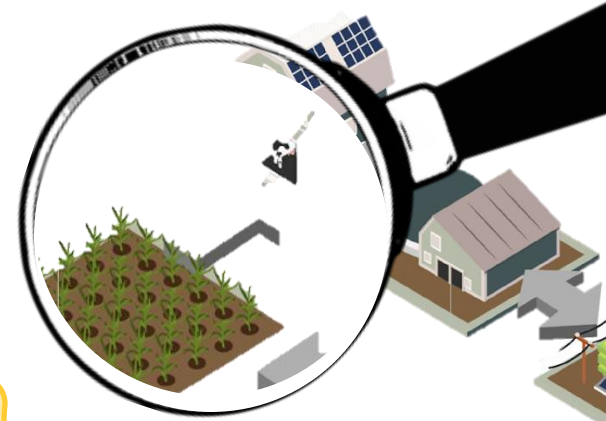
# Recommendations for Processors

Avoid implying that the results of a single assessment are final or binding

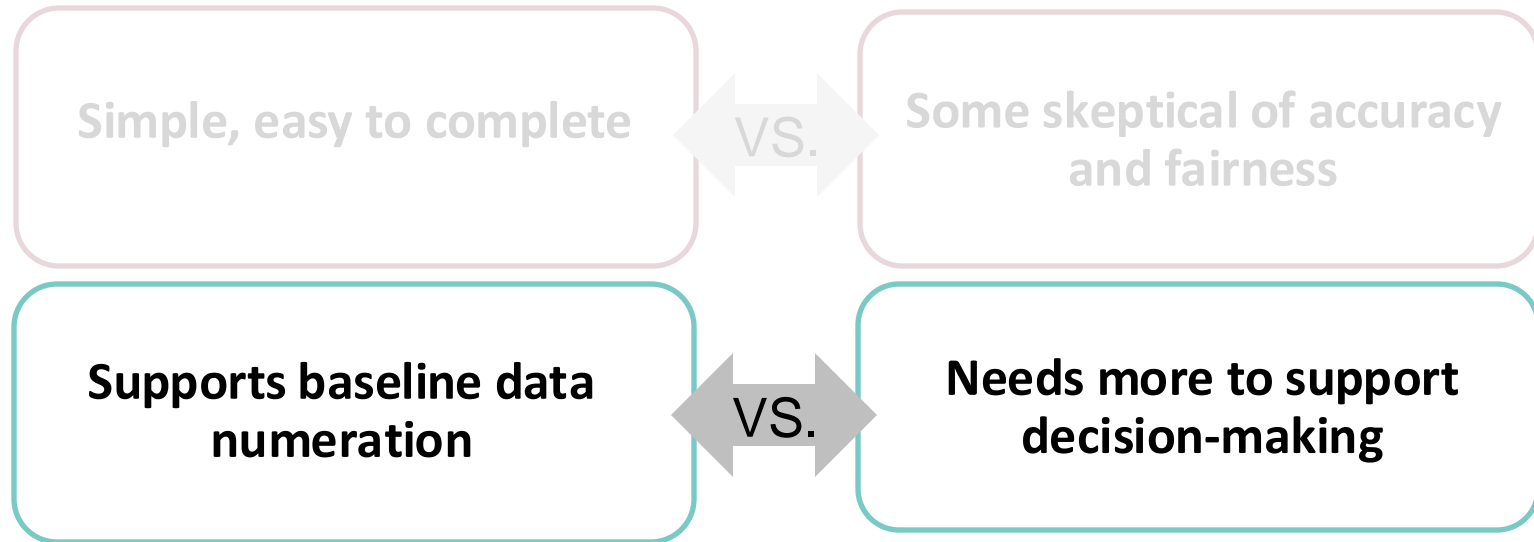
Explain data protection processes

Be transparent about how your company uses individual farm assessments relative to other farms

Show how aggregated data is used to market milk



# Two major categories of themes, each representing a tradeoff





# Supports first steps into ES assessments

*...I think it might be a very good beginner step just for the farm to **get them ruminating on things** [MN2]*

*...the data here will give you the opportunity at least to **see how things are progressing or regressing** [SD2]*

*...at least you're able to **compare to your peers in the area**, so you get that on the printout [MN1]*



# Need for comparisons among practices

- Comparing farm practices (**inputs**), not just environmental impacts (**outputs**)



*We're all dairy farmers, and we can say, "Well, yours is different than mine. **Why do you think that is? What practices are you doing that makes them different?"** [MN1]*



# Need connection to farm management

- Leverage points
- Uncertainties

*...what are the things that we know do help you, and to what degree [SD2]*

*...can you even move the bar? If your standard deviation is this big, there's not a lot you're going to do about that. [MN1]*



# Need an impetus for action

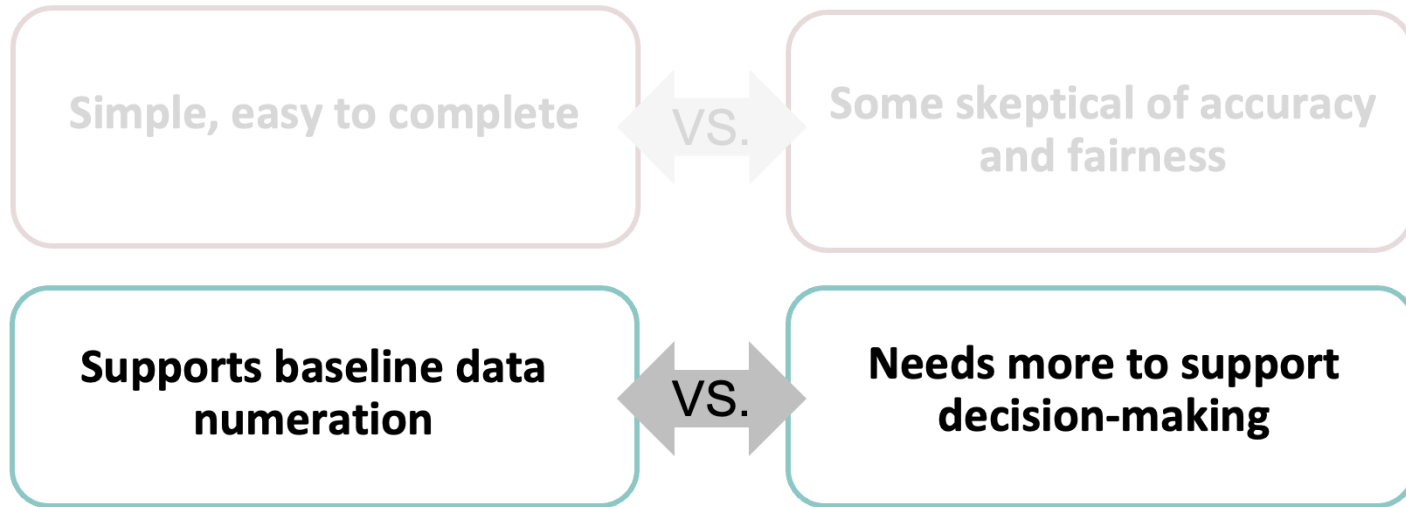
- Follow-up discussions with peers
- Social and technical support



*You have to encourage farmers to talk to each other about it in a positive way. They can ask the experts all they want, ... they're going to check in with each other and that's who they trust. [MN2]*

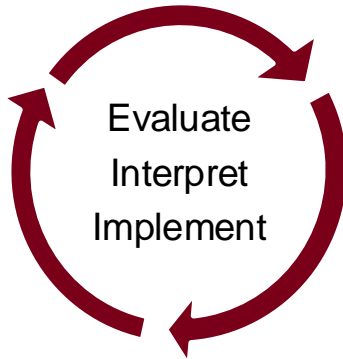


# Recommendations for Processors



# Recommendations for Processors

Consider continuing support across iterative assessment processes



Contribute to farms taking 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> steps in an environmental stewardship journey



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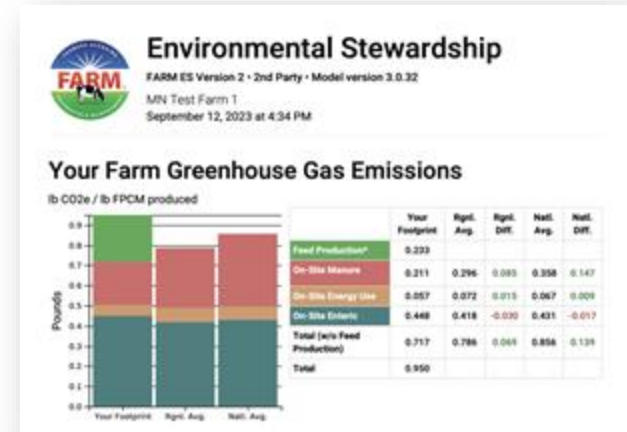


# Taking action on a report

Which changes could we make on-farm?



Selected portion of a FARM ES report in 2023





Estimated GHG contribution of each “print” to the total\*:

Feed (26%)    Enteric (35%)    Manure (33%)    – Energy (6%)

**FEED 26%**

- No/low-till farming
- Cover crops
- Nutrient management
- Precision agriculture
- Water use efficiency

**ENTERIC METHANE 35%**

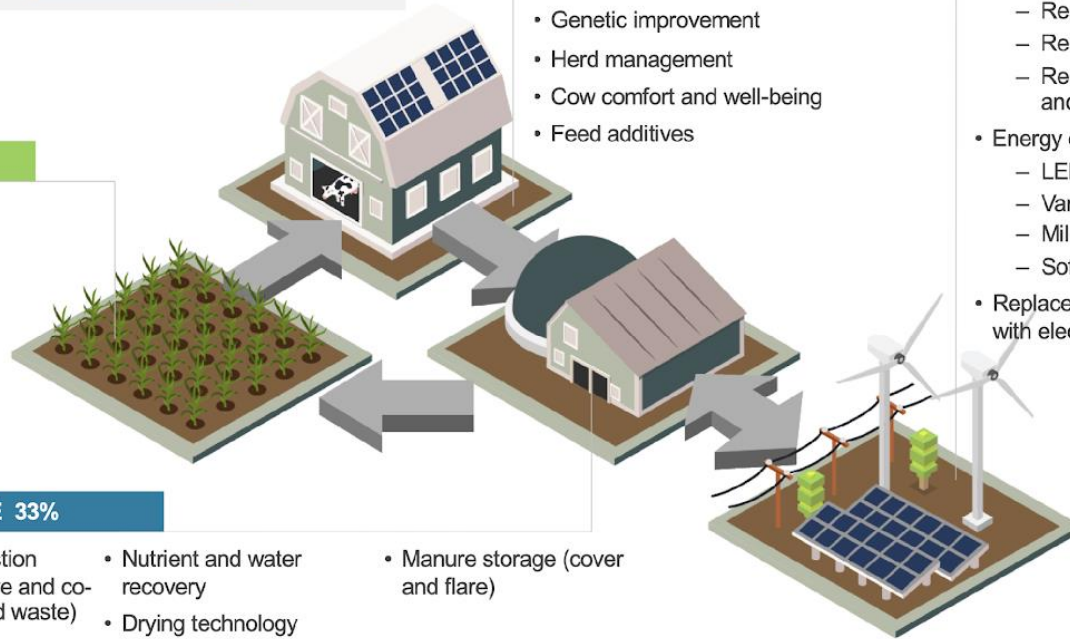
- Diet management
- Genetic improvement
- Herd management
- Cow comfort and well-being
- Feed additives

**ENERGY 6%**

- Renewable energy:
  - Renewable electricity
  - Renewable natural gas
  - Renewable energy from wind and solar sources
- Energy efficiency:
  - LED lighting
  - Variable speed pumps
  - Milk pre-cooling technology
  - Soft start motors
- Replacement of fossil-fueled engines with electric motors

**MANURE 33%**

- Anaerobic digestion (includes manure and co-digestion of food waste)
- Nutrient and water recovery
- Drying technology (elimination of lagoons)
- Manure storage (cover and flare)
- Renewable fertilizers

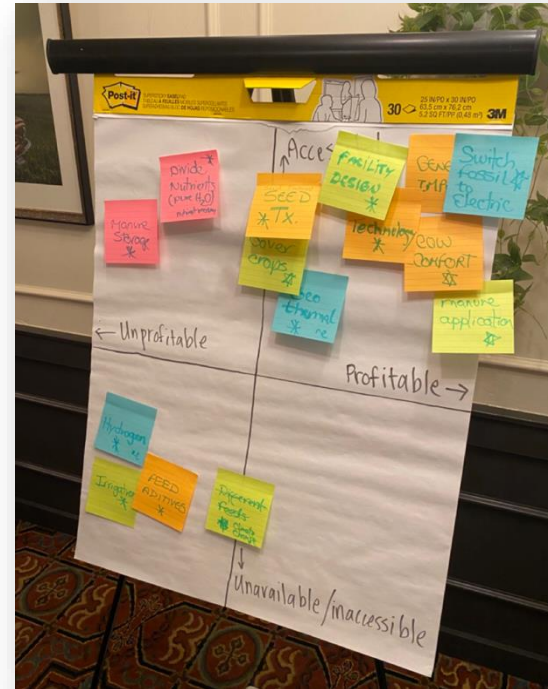
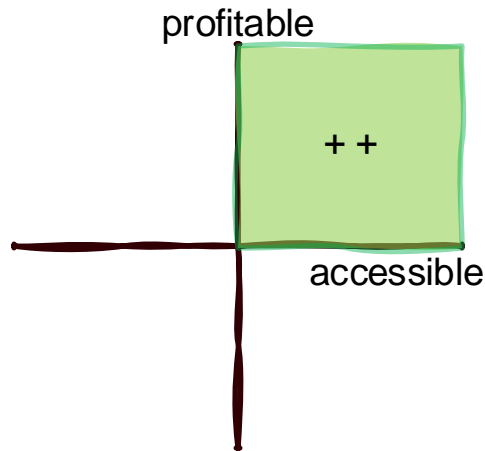


Source: USDairy



# Topic 3: Activities and Qualitative Analysis

1. Revise list of potential actions
2. Rate actions as **accessible**, **profitable** using a quadrant diagram



Creswell, 2005



# Action opportunities identified by focus groups as **accessible, profitable** (or at least no loss)

# of Groups Identifying Action	Feed Production	Animal Production	Manure Management	Energy
3+	Cover cropping	Genetic improvement		
2	No-/Minimum-tillage Precision nutrient management	Herd/facility management technologies Monensin		Fossil fuel to electric motors
1	Nutrient management Seed treatments Microbial products Precision ag in crop production Direct injection of manure	Cow comfort & well-being Altering feeding behavior Extended lactation Diet/herd management Feed additives	Anaerobic digesters Composting manure Manure aeration	Solar energy Facility design Geothermal energy Ventilation technologies Robotics Precision ag in milk

**Would this list look different for your region?**

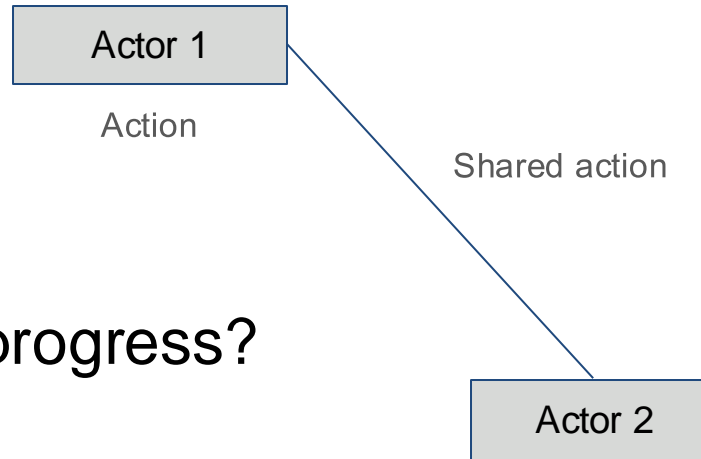


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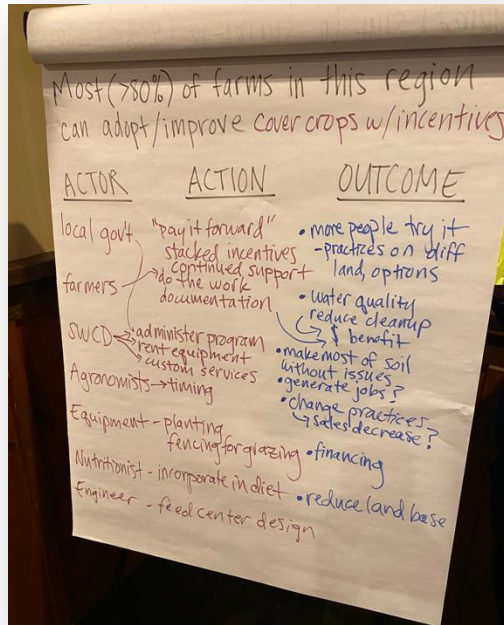
# Actor-Network Diagrams



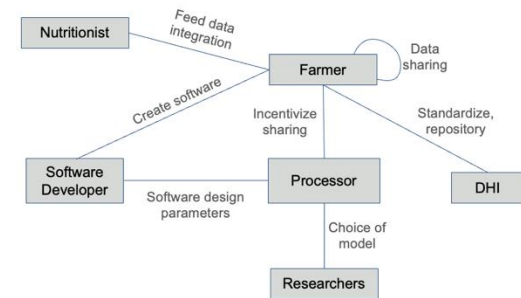
- Who/what is involved in progress?
- How can we share responsibility?



# Topic 3: Qualitative Analysis

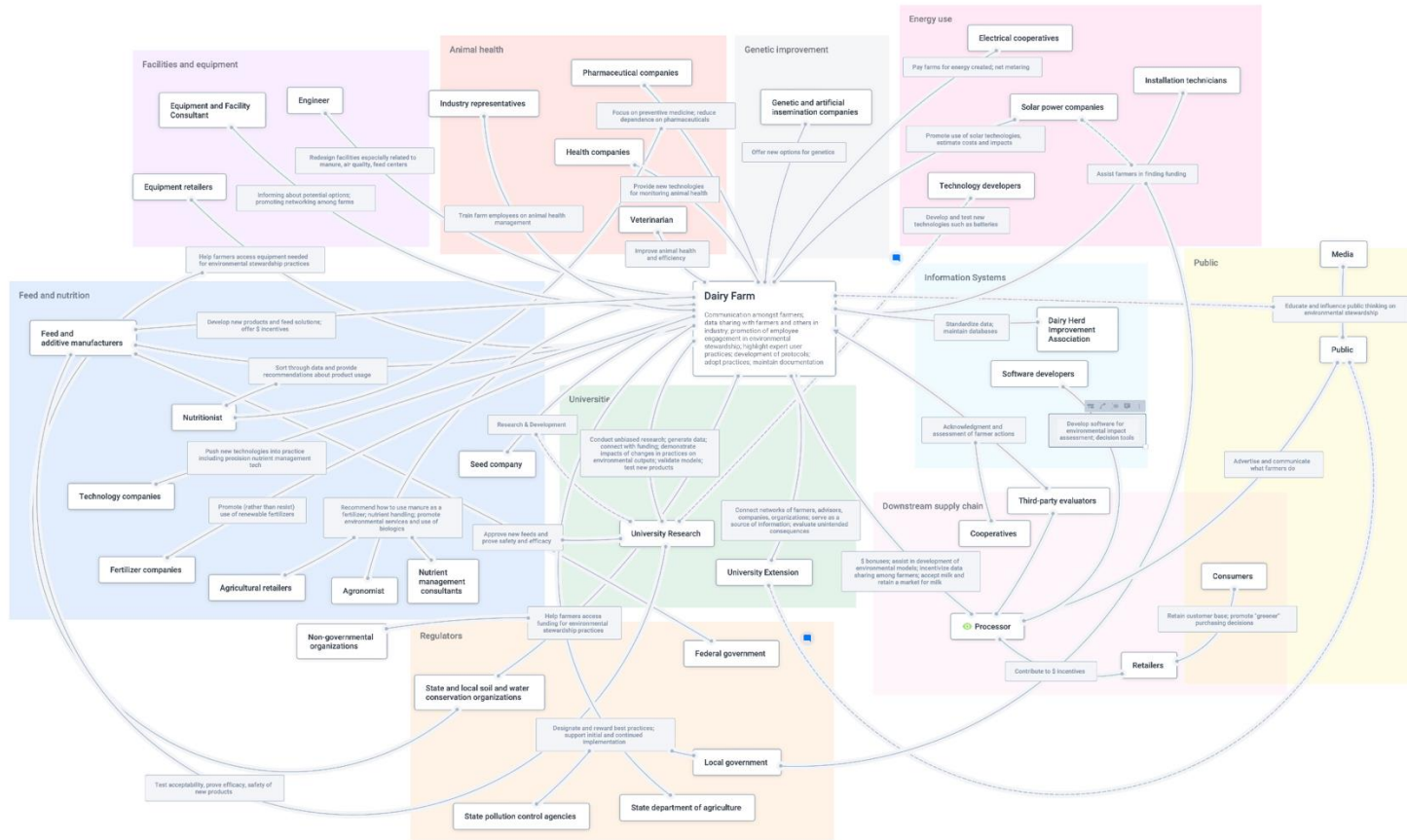


## Actor-network diagrams



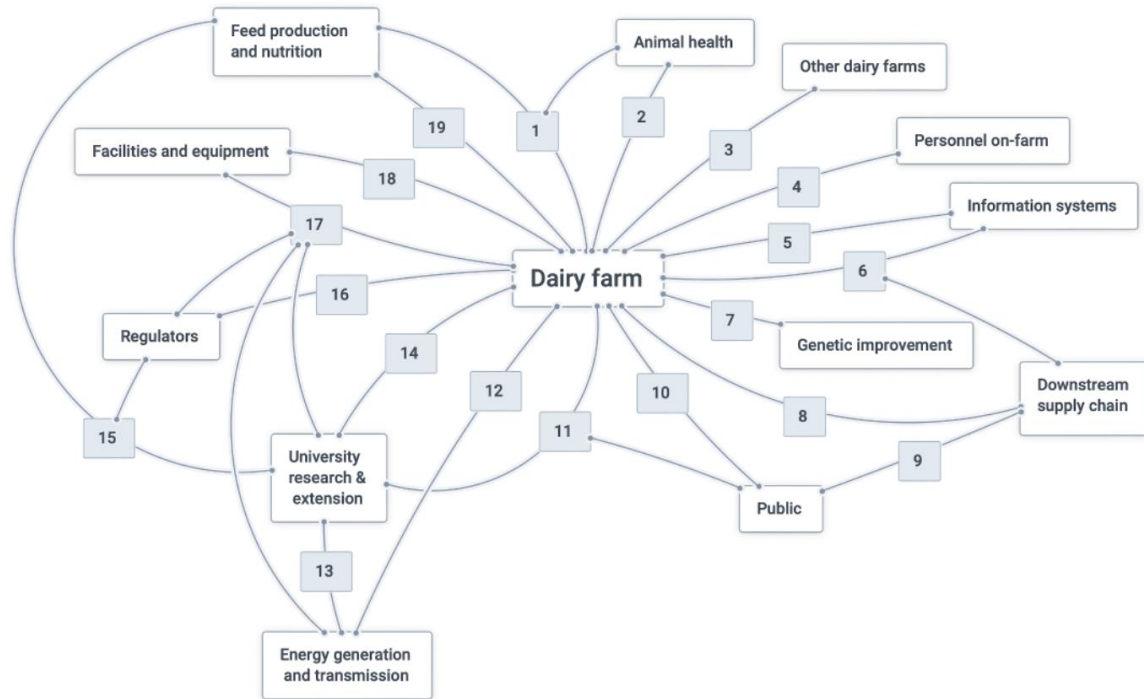


No farm is an island





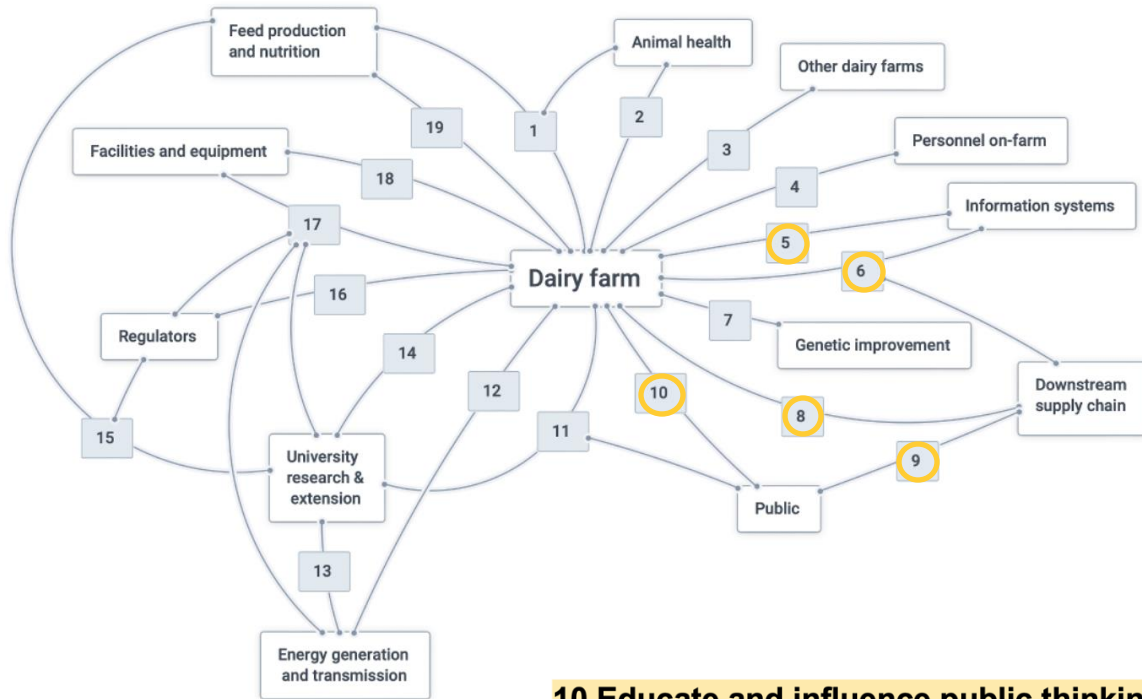
# Actor network map



- 1 Focus on preventive medicine; reduce dependence on pharmaceuticals
- 2 Train farm employees; provide new technologies for monitoring and improving animal health and efficiency
- 3 Communicate and share data amongst farmers and others in industry
- 4 Engage employees in environmental stewardship; develop protocols; adopt practices; maintain documentation
- 5 Standardize data; maintain databases
- 6 Acknowledge and assess farmer actions; Develop software; decision tools
- 7 Offer new options for genetics
- 8 \$ bonuses; develop environmental models; incentivize data sharing among farmers; accept milk and retain a market for milk
- 9 Retain customer base; promote "greener" purchasing decisions; advertise and communicate what farmers do
- 10 Educate and influence public thinking on environmental stewardship
- 11 Inform; connect farmers, advisors, companies, organizations; evaluate unintended consequences
- 12 Pay farms for energy created; Promote use of technologies, estimate costs and impacts
- 13 Develop and test new technologies such as batteries
- 14 Conduct unbiased research; demonstrate impacts of changes in practices; validate models
- 15 Test acceptability, prove efficacy, safety of new products
- 16 Designate and reward best practices; support initial and continued implementation
- 17 Facilitate access to specialized equipment
- 18 Redesign facilities; Inform about potential options; connect farms
- 19 Develop new products and technologies; Provide technical support; offer \$ incentives



# Importance of Evaluation Processes



Focus on preventive medicine; reduce dependence on pharmaceuticals  
 Train farm employees; provide new technologies for monitoring and improving animal health and efficiency  
 Communicate and share data amongst farmers and others in industry  
 Engage employees in environmental stewardship; develop protocols; adopt practices; maintain documentation  
 Standardize data; maintain databases  
 Acknowledge and assess farmer actions; Develop software;

**5 Standardize data; maintain databases**  
**6 Acknowledge and assess farmer actions; Develop software; decision tools**

advertise and communicate what farmers do  
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**8 \$ bonuses; develop environmental models; incentivize data sharing among farmers; accept milk and retain a market for milk**  
**9 Retain customer base; promote "greener" purchasing decisions; advertise and communicate what farmers do**

Redesign facilities; Inform about potential options; connect farms  
 Develop new products and technologies; Provide technical support; offer \$ incentives

**10 Educate and influence public thinking on environmental stewardship**

# Recommendations

Consider ways you can make **connections**, start **conversations**, & promote **collaboration**





Each of us has  
“windows” to make  
connections!

Photo credit: Ioannis Mavromichalis

# Summary

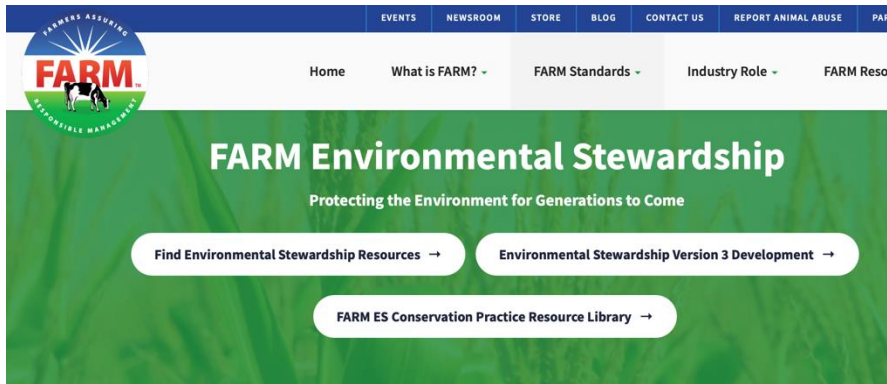
Our findings suggest a need for:

- **Communicating the value** of ES assessments
- **Supporting farmers** in finding pathways forward
  - **Promoting continued engagement** in ES,  
across the industry





# Supporting Progress



The screenshot shows the top navigation bar of the FARM website with links for EVENTS, NEWSROOM, STORE, BLOG, CONTACT US, REPORT ANIMAL ABUSE, and PART. Below the navigation is the FARM logo (Farmers Assuring Responsible Management) and a menu with Home, What is FARM?, FARM Standards, Industry Role, and FARM Resou. The main content area features the heading "FARM Environmental Stewardship" with the tagline "Protecting the Environment for Generations to Come". Three buttons are visible: "Find Environmental Stewardship Resources", "Environmental Stewardship Version 3 Development", and "FARM ES Conservation Practice Resource Library".

## Building value in FARM ES assessments

Ideas and actions for processor representatives



Prepared by Erin Cortus and MaryGrace Erickson

A cooperative effort between:



# Thank You; Questions, Comments?

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## Submitted Manuscript

*Building value for dairy  
farmers and advisors in the  
Farmers Assuring  
Responsible Management  
Environmental Stewardship  
Program*



UNIVERSITY  
OF MINNESOTA

09/26/2024



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