Environment and Natural Resources Trust Fund
2021 Request for Proposal

General Information

Proposal ID: 2021-258

Proposal Title: Manure Testing for Better Management and Clean Water

Project Manager Information

Name: Melissa Wilson

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

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Project Basic Information

Project Summary: We will start a Manure Testing Program to increase manure testing, create a nutrient analysis database for different livestock types, and improve manure application rates to protect water quality.

Funds Requested: $200,000

Proposed Project Completion: 2023-06-30

LCCMR Funding Category: Small Projects (H)
      Secondary Category: Water Resources (B)

Project Location

What is the best scale for describing where your work will take place?
      Statewide

What is the best scale to describe the area impacted by your work?
      Statewide

When will the work impact occur?
      During the Project and In the Future

Narrative

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Animal manure can be a useful crop nutrient resource when used properly or an environmental hazard when not. We collected preliminary data on manure from three commercial laboratories in Minnesota, and found that: (1) there is a great deal of variability in manure nutrients and (2) there are significant differences compared to published book values of "typical" manure nutrients that are over 20 years old. In the last two decades, genetics, feeds used, manure handling, and housing practices continually evolve. People relying on these book values for nutrient management planning may be either under- or over-applying critical crop nutrients. This could lead to reduced crop production or excess nutrient application and loss from the plant root zone. With an increasing public concern about animal manure issues, better manure nutrient information is needed to better manage and utilize this resource while protecting our waterways. Up-to-date and dynamic manure nutrient information may also enhance opportunities for technologies to extract energy and recycle the nutrients in the manure for crop production.

What is your proposed solution to the problem or opportunity discussed above? i.e. What are you seeking funding to do? You will be asked to expand on this in Activities and Milestones.

Commercial laboratories currently collect limited information about manure before analyzing it, usually only animal species and whether the manure is liquid or solid. We would like more information about types of operations and how manure is stored before being sampled. As an example, nursery hog barns are washed more often than finishing hog barns, so we expect the nursery barn manure to be more dilute. In dairy systems, a bedded pack barn will have different manure than barns that use sand bedding. We intend to work with a commercial laboratory to set up a specialized Minnesota Manure Testing Program. Farmers, or the agricultural professionals they work with, will fill out information specific to their operations via a survey. Upon completion, they will receive a coupon to send their manure sample to the commercial lab. The Manure Testing Program will pay for the sample and receive the manure analysis, which will then be shared with the farmer. By doing this we will be able to correlate animal operation information directly with manure nutrient contents. Once the data is aggregated (all private farmer information will be removed), we will create a website to share the new, up-to-date manure nutrient averages (book values).

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

The MDA surveyed farmers in 2015 about nutrient management practices and found that only 27% of respondents knew the nitrogen content of manure applied on their fields. Since farmers are required by the state to "manage manure to prevent pollution of waters", this would suggest that many people rely on average book values to plan manure application rates. By setting up the Minnesota Manure Testing program, more farmers will have site-specific manure nutrient information and farmers using book values will have more up-to-date information. This will result in better use of manure nutrients and increased protection of water resources.

Activities and Milestones

Activity 1: Minnesota Manure Testing program

Activity Budget: $200,000

Activity Description:

The manure user community will help identify different types of livestock systems and promote the program. This includes Extension Educators, County Feedlot Officers, MPCA staff, and farmers. AGVISE Labs will also promote the program at their events. Farmers will fill out a detailed survey on their type of operation, including animal numbers, manure storage system, type of bedding (if any), etc. Upon completion of the survey, they will be given a container for the manure sample. Manure will be frozen before being shipped and the farmer will pay for shipping. By having a small investment in the process, they are more likely to collect a well-mixed manure sample. AGVISE Labs will receive and analyze the samples for total nitrogen, ammonium-nitrogen, phosphorus, potassium, sulfur, calcium, magnesium, etc. The goal is to analyze 1,240 samples the first year and 1,235 samples the second year for a total 2,475 samples. Results will be sent to the farmer and researchers at the University of Minnesota. All private information will be removed from the data, including farmer name and address. Data will be entered into a database, which can be used to summarize nutrient information for manure from different livestock systems.

Activity Milestones:

Description	Completion Date
Promote program, collect first round of manure samples, evaluate what livestock operation types are missing	2022-06-30
Build database to show average nutrient contents for various livestock systems; build website with information	2023-06-30
Continue to promote program, collect second round of manure samples targeting missing types from database	2023-06-30

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
John Breker	AGVISE Labs	AGVISE labs will be analyzing the manure samples from farmers participating in the Manure Testing Program. They will also promote the program at trade shows and agricultural-related events held in Minnesota to encourage participation.	Yes

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this be funded?

The aggregated data collected from the program will be presented on the University of Minnesota Extension website in the Manure Management Section. Dr. Wilson is the chair for the Manure Extension Team and will ensure the data is updated regularly throughout the life of the project. If the program is successful and stakeholders identify a need to continue it past project completion, we will work with them to identify funding strategies. Stakeholders may include farmers, state agencies, NRCS folks, soil and water conservation districts, and livestock and crop commodity groups.

Project Manager and Organization Qualifications

Project Manager Name: Melissa Wilson

Job Title: Assistant Professor and Extension Specialist

Provide description of the project manager's qualifications to manage the proposed project.

Dr. Wilson is an assistant professor in the Department of Soil, Water, and Climate, and statewide Extension specialist in manure management at the University of Minnesota. Her research and Extension programs focus on manure nutrient management for crops and reducing impacts on water quality in Minnesota.

RESEARCH
•Assessing best management practices for manure application to protect water quality and improve soil health
•Determining nutrient availability from manure to improve land application recommendations
•Evaluating techniques to open the window of land application for manure in cold climates
•Advisor: 2 current, 1 graduated Graduate Students; 1 Undergraduate research award winner
•Research Funded: Over $1.1M as PI and an additional $675K as Co-PI

EXTENSION
•Annual training for Commercial Animal Waste Technicians (200+ attendees annually at 6 locations)
•Bi-annual training for MN County Feedlot Officers regarding manure management (40+ attendees annually at 2 locations)
•Annual training for farmers "Advanced Nitrogen Smart - Manure Management" (50+ attendees at 7 locations)
•Extension articles and presentations: More than 100

SELECT PUBLICATIONS
•Everett LA, Wilson ML, Pepin RJ, Coulter JA. 2019. Winter Rye Cover Crop with Liquid Manure Injection Reduces Spring Soil Nitrate but Not Maize Yield. Agronomy 9(12): 852. doi: 10.3390/agronomy9120852.
•Wilson ML, Allan DL, Baker JM, Pagliari PH. 2019. Comparing Methods for Overseeding Winter Rye into Standing Soybean. Agroecosystems, Geosciences, and Environ. 2(1). doi: 10.2134/age2019.04.0023.
•Wilson ML, Allan DL, Baker JM. 2014. Aerially seeding cover crops in the northern US Corn Belt: Limitations, future

research needs, and alternative practices. J of Soil and Water Conservation 69(3): 67A-72A.

•Wilson ML, Baker JM, Allan DL. 2013. Factors affecting successful establishment of aerially seeded winter rye. Agronomy J 105(6): 1868-1877.

Organization: U of MN - College of Food, Agriculture and Natural Resource Sciences

Organization Description:
The University of Minnesota is one of the country's original land-grant institutions and is dedicated to its mission of promoting access to higher education and collaborating to advance knowledge benefiting communities, the state, and world. The University of Minnesota Extension plays a key role in the University of Minnesota's mission: We bring Minnesotans together to build a better future through University science-based knowledge, expertise and training. University of Minnesota Extension works in rural, suburban, urban and tribal communities and beyond. More than one million people are reached annually by Extension education.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Project Coordinator		The project coordinator will work with Extension Educators, County Feedlot officers, MPCA staff, commercial manure haulers, farmers, and AGVISE to promote the program and identify approximately 2,475 farms that would benefit from this program and that meet our criteria for sampling. They will coordinate data transfer from AGVISE to UMN and collate the data for the online website. FTE 0.35 each year of project and benefits are 31.8%			31.8%	0.7		$50,884
							Sub Total	**$50,884**
Contracts and Services								
AGVISE Labs	Professional or Technical Service Contract	AGVISE Lab is a commercial analytical laboratory that will provide nutrient analyses for manure samples at a discounted rate. Roughly 2,475 samples will be analyzed for nutrient analysis by AGVISE labs. The price per sample is $60.23 (15% discount). Estimated costs were rounded up to the nearest dollar.		X		0		$149,071
							Sub Total	**$149,071**
Equipment, Tools, and Supplies								
							Sub Total	-
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-

Travel In Minnesota								
-							Sub Total	-
Travel Outside Minnesota								
-							Sub Total	-
Printing and Publication								
$45	Printing	Printing surveys - 2,475	Surveys will be printed for farmers or ag consultants to fill out information about the manure sample before sending it to a lab.					$45
-							Sub Total	$45
Other Expenses								
-							Sub Total	-
							Grand Total	**$200,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Contracts and Services - AGVISE Labs	Professional or Technical Service Contract	AGVISE Lab is a commercial analytical laboratory that will provide nutrient analyses for manure samples at a discounted rate. Roughly 2,475 samples will be analyzed for nutrient analysis by AGVISE labs. The price per sample is $60.23 (15% discount). Estimated costs were rounded up to the nearest dollar.	AGVISE Labs has agreed to work with us on this project and provide a 15% discount for all manure analyses. This is a very competitive price with other commercial labs in the area. Since we are building a database, using one lab will help to maintain consistency in the nutrient data that is reported to us. Different labs use different testing procedures and report results in different units sometimes. This will limit not only actual nutrient reporting inconsistencies, but also help reduce issues with data entry when we go to summarize and publish the data. **This is a single source contract.**

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
-			**State Sub Total**	-
Non-State				
In-Kind	Retail price for the analyses we want to conduct through AGVISE Labs is $70.85. The AGVISE lab will provide a 15% discount from retail price for this project and charge us $60.23 per sample. We project running 2,475 samples over the life of the project, so this discount will essentially provide a $26,282 in-kind match.	This is an in-kind match, so the dollars not spent by paying the retail price will allow us to have 371 more samples analyzed within the budget of this project.	Secured	$26,282
			Non State Sub Total	**$26,282**
			Funds Total	**$26,282**

Attachments

Required Attachments
Visual Component
File: 4453dfb1-1b1.pdf

Alternate Text for Visual Component
There is a picture of a manure pile with a sign above it that says "manure happens". Next to the photo is a quote from a MN Department of Agriculture survey that says "In a 2015 survey, only 27% of respondents knew the nutrient content of their manure before applying it." What will the Manure Testing Program in this grant do? The objectives are to provide manure testing for livestock farmers, use the nutrient analysis data to find averages for different livestock systems, and to improve manure application rates and protect water quality.

Optional Attachments
Support Letter or Other

Title	File
MPCA-support-letter	23c81cc8-8fb.pdf
AGVISE-support-letter	bb675d1f-12f.pdf
UMN-certified-audit	5be069bb-80c.pdf
MACFO-support-letter	86a87d40-a9b.pdf
MN-Pork-support-letter	82b491c3-f4e.pdf
MN-Milk-support-letter	8c9c749f-164.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?
> No

Does your project have patent, royalties, or revenue potential?
> No

Does your project include research?
> Yes

Does the organization have a fiscal agent for this project?
> Yes, Sponsored Projects Administration

Manure testing for better management and clean water

In a 2015 survey, only 27% of respondents knew the nutrient content of their manure before applying it.

-Minnesota Department of Agriculture

How can the Manure Testing Program help?

Provide manure testing for Minnesota livestock farmers

Use nutrient analysis data to find averages for different livestock systems

Improve manure application rates and protect water quality

UNIVERSITY OF MINNESOTA
EXTENSION