1.0 PROJECT PROPOSAL SUMMARY SHEET

PROJECT TITLE: Livestock Environmental Nutrient Management Educational Support Program

LEAD PROJECT SPONSOR: North Dakota State University

CONTACT PERSONS:

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STATE: North Dakota WATERSHED: Statewide

HYDROLOGIC UNIT CODE: Statewide HIGH PRIORITY WATERSHED (yes/no): N/A

PROJECT TYPE: Information and Education NPS CATEGORY: Agriculture

WATERBODY TYPES: Lakes/Reservoirs, Rivers, Streams, Groundwater

CONTINUATION PROJECT: Yes. A summary of past accomplishments is provided in Appendix A.

SUMMARIZATION OF MAJOR GOALS:
Support livestock and crop producers by providing them with the information and education needed to implement nutrient management practices to reduce surface and ground water contamination, more efficiently use manure nutrients and successfully operate and maintain livestock manure management systems. Provide educational and informational support to ongoing NPS 319 projects in the state with nutrient management components.

PROJECT DESCRIPTION:
Due to the vastness of need and geographical production variation across ND, one livestock environmental management Extension specialist will be responsible for leadership of the program, providing educational support on livestock manure management, the use of livestock manures in crop production, guidance for custom manure applicators and technical support for producers, NDSU Extension and agency personnel. This specialist will be based out of the NDSU Carrington Research Extension Center.

FY 319 funds requested $390,000 Match: $260,000

Other Federal Funds $ Total project cost: $650,000

319 Funded Full Time Personnel: 1

2.0 STATEMENT OF NEED

This proposed project is a continuation of a multi-year project working in conjunction with NDSU Extension. The program has continued to focus on education of producers and agency personnel (SCD, NRCS, NDDH) dealing with water quality issues arising from livestock enterprises. The Livestock Environmental Nutrient Management Educational Support Program has worked to provide information and education to these groups through presentations, on-site visits, demonstrations, a website, fact sheets and written publications. A summary of past accomplishments from July 2011 to the present is included in Appendix A.

2.1 Consistency with Water Quality Priorities

Livestock production is a major industry in North Dakota with approximately 1,860,000 cattle, 147,000 hogs, and 70,000 sheep being inventoried annually on over 29,900 farms. The manure produced by these livestock is identified as a major source of surface water contamination in many watersheds across the state according to the North Dakota 2016 Integrated Water Quality Assessment Report. Animal feeding and handling operations are one of the impairment source for 4,429 miles of rivers and streams and 13,881 acres of lakes and reservoirs.

Geographically, North Dakota has two distinct livestock production areas. The eastern portion of the state has a more rolling topography and receives higher rainfall giving rise to potholes and more year-round flowing streams with an increased risk of frequent water runoff events in the watersheds. Livestock operations in the eastern part of the state also tend to concentrate stock cows and calves for winter feeding. The western portion of the state has a steeper topography and receives significantly less rainfall but is prone to higher intensity of runoff during the less frequent events. Winter feeding in western ND is somewhat different than eastern ND in that the stock cows are generally fed in more open, unconfined areas on pasture or cropland, while the calves are fed in confined areas. These east-west differences require different management approaches.

In addition to the traditional beef, dairy or swine operations, a new class of livestock owner is becoming more common in ND. These new owners have smaller-scale operations that oftentimes require supplemental income sources. Most of these small-scale operations are also found near urban areas and are at risk for stockpiling excess livestock manure because of minimal land for application and limited space for winter feeding.

As of 2012, 5 counties are home to 25 percent of the total ND equine inventory (Burleigh, Cass, Morton, Stark and Ward). This project will primarily target AFOs (Animal Feeding Operations) but will also gear educational and technical assistance toward folks with lesser manure management experience, including crop producers who do not own livestock and small-scale livestock owners. This strategy falls within Goal 3 of the ND State NPS Management Program document following the desire to focus on the agriculture industry as a whole and will complement the efforts of others working toward increasing water quality in the state.

2.2 Justification for Target Audience

The North Dakota Department of Health has regulations pertaining to animal feeding operations that require nutrient management planning and review and approval of plans for manure storage and runoff containment. For over 15 years, the NDSU Livestock Environmental Nutrient Management Educational Support Program, sponsored by NPS 319 grants, has made a concerted effort to promote sound nutrient management practices and provide educational support to producers and other NPS 319 projects in North Dakota. Previous and ongoing NPS projects focus primarily on facility design and best management practices (BMPs) for manure handling/storage with limited emphasis on nutrient management educational support, development of nutrient management benchmarks, or investigation of alternative livestock manure management strategies.

The NDSU Livestock Environmental Nutrient Management Educational Support Program, under the direction of the current Livestock Environmental Management Specialist, has evolved since its inception over 15 years ago. The focus has shifted from regulatory compliance issues to alternative livestock feeding options; proper handling of livestock manure once it is contained; and calibrated manure application. While nutrient management plan implementation remains a number one objective, the proposed program also looks to the future of nutrient management with objectives focusing on integrated crop and livestock systems as well as a special focus on small-scale livestock manure management. Along with numerous invited talks, the team (current Extension specialist along with nutrient management researchers on NDSU's campus) coordinates annual events such as the Nutrient Management Day and Compost Demo Day. These events target not only producers, but also watershed coordinators, NRCS and NDSU Extension personnel. Extension publications written or updated recently include Resource Guide for Livestock Management, North Dakota Manure Fertilizer Use Recommendations, 5 Easy Steps for Composting Dead Livestock and Environmental Implications of Excess Fertilizer and Manure on Water Quality. The website is continually updated at www.ag.ndsu.edu/lem to keep up-to-date information available to constituents.

Crop and livestock producers are aware of the need to properly use all on-farm sources of nutrients. Because of the economic volatility being experienced both in the crop and livestock industries, producers feel the need to more intensely manage nutrients used to enhance crop fertility, specifically in this case, livestock manure. Containing runoff from livestock facilities, applying livestock manure consistently, uniformly or in a way that diminishes environmental risk to surface water and increasing crop yield are all factors that producers must take into consideration when dealing with livestock manure. Because of the sectored nature of modern-day agriculture, it is likely that crop producers have little knowledge of the uses of livestock manure as a fertilizer. Likewise, livestock producers don't necessarily understand the need for a consistent manure fertilizer product. Once producers learn how to economically use livestock manure as a fertilizer and about the negative impacts of nutrient runoff, they will implement nutrient management plans that emphasize environmental protection and proper use of livestock manures. North Dakota State University, primarily through NDSU Extension, works closely to support livestock and crop producers and NPS projects around the state with applied research, educational materials and technical support relating to using livestock manure. Given the number of livestock facilities and NPS projects needing support, the vastness of the state, the need to make progress with nutrient

management plan updates and the different cultures of livestock production and runoff management (east vs. west/ urban vs. rural/ small-scale vs. traditional) it is imperative that this project continues under the leadership of a livestock environmental management Extension specialist.

3.0 PROJECT DESCRIPTION

3.1 Goal

The goal of this project is to educate and assist crop and livestock producers in adopting nutrient management practices specific to manure to reduce adverse impacts on water quality. This project will deliver programs to provide education and information support to crop and livestock producers, 319 project coordinators, agency personnel and NDSU Extension agents/specialists. These educational programs will focus on livestock facility management and livestock manure handling and use. The majority of livestock operations in ND are small- to medium-sized. Therefore, this program will primarily focus on livestock systems defined as small or medium animal feeding operations. However, large operations will be offered assistance when needed.

The North Dakota NPS Pollution Management Program has funded a Livestock Waste Management/ Engineering Extension Specialist since March 1998. Through effective collaboration with NDSU faculty, Extension agents, NRCS, and other agencies and groups, this individual developed a livestock waste facility design educational program that was well received by ND producers. The program continued to grow to support one and then two nutrient management Extension specialists as the need for educational assistance grew within the state. The current proposed program builds on this earlier work and involves the development and delivery of educational resources, individualized work on nutrient management plans with livestock producers, and expanding the scope of current work with custom manure applicators. The scope of the current program will also expand into new focus areas including cooperative demonstration projects highlighting crop and livestock integration and innovative options for manure management for small-scale livestock owners appropriate for ND soils and climate. The program involves conducting workshops with producers, one-on-one consultations and cooperation with researchers. Close working relationships have been and will be maintained with 319 project coordinators, the North Dakota Department of Health, Division of Water Quality, NRCS, local soil conservation districts and other technical service providers. Emphasis will be given to coordination with all entities working with producers to assure the same criteria and recommendations are being used. Special emphasis will be given to program development in the areas of 1) understanding and use of existing nutrient management plans; 2) appropriate handling and use of livestock manure nutrients in soil fertility programs; 3) general knowledge and awareness by ND custom manure applicators of the available nutrients and uses of manure; and 4) the benefits to soil and water quality through the integration of crops and livestock, and improved manure management on small scale operations. On-farm demonstrations will be developed to showcase the best practices to preserve manure nutrients and future nutrient crediting when manure is land applied.

This proposed information and education project will work with a statewide audience of producers and will offer advice and alternatives for livestock manure handling, management and use. This project will also work with existing NPS 319 projects that have an identified

livestock manure component. Impact of the program will be measured through ongoing evaluation of participants to determine their adoption of nutrient management practices.

3.2 Objectives

Objective 1: Provide education and advice to individual livestock producers, specifically those with permitted operations, on nutrient management plans (NMP). This education and advice will include information on how to update an NMP, how to calculate a phosphorus index for proper manure nutrient placement and how to manage the plan. Additionally, this objective will provide educational support on livestock manure nutrient utilization to ND crop and/or livestock producers with or without livestock facilities.

Task 1:

- Work individually with 10 livestock enterprises per year who have an active animal feeding operation permit to update their nutrient management plan.
- Consultations will focus on updating interpretation of soil analysis, manure analysis, calculating the phosphorus index on NMP specified fields and helping find alternative manure application sites to reduce nutrient concentration and increase crop fertility.
- A tablet will be used to provide convenient, on-site assistance. Manure results, soil tests, resources, nutrient calculators and so on can be easily accessed at any producers' home or field. Nutrient management plans can be readily created and fields accurately mapped.

Approximately 15% of the project will be devoted to this task.

Products: One-on-one producer education leading to a better understanding of how to apply a nutrient management plan on their operation and reduce unnecessary nutrient concentration.

Task 2:

- Work individually with 5 crop and/or livestock producers per year with or without livestock facilities to create nutrient management plans.
- These individuals may be crop producers who do not own livestock but will be using manure in their fertility program.
- These individuals may also be producers who do not own livestock but plan on integrating them into their operation for residue or cover crop grazing.

Approximately 5% of the project will be devoted to this task.

Products: One-on-one nutrient management education of non-livestock owners leading to a reduction in misuse of manure nutrients.

The estimated costs for this objective include the value of 20% of personnel time plus the costs for travel, supplies, communication and contractual services.

Estimated cost $78,000 – 319 grant, $52,000 – Match

Objective 2: Develop educational opportunities and materials for custom manure applicators in North Dakota. These opportunities will include assistance with manure application rates, calibrating equipment, education on nutrient management plans, environmental awareness, and ND rules and regulations.

Task 3:

- Proper manure application rates will be taught in a classroom setting using indoor calibration kits during two field days per year. These rates will be determined by manure type, soil type and crop rotation.
- The basics and the importance of nutrient management plans will be shown in a classroom setting and through one-on-one consultations in the field.
- Calibrations will be demonstrated one-on-one or in groups during two field days per year organized by 319 watershed coordinators, NRCS or NDSU Extension personnel. This training will take place with field-scale equipment apart from Task 4 when permissible.

Approximately 5% of the project will be devoted to this task.

Product: Twenty-five ND custom manure applicators' will have increased confidence in calibration techniques and grow their knowledge of the importance of NMPs. Two simple guides pertaining to how to read a manure sample and how to read a soil sample will be created in year one. A simple fact sheet explaining what a manure hauler needs to know about an NMP and how to use one will be created in year two.

Task 4:

- Environmental awareness, ND rules and regulations regarding manure management, vehicle and road rules and restrictions, and business management will be taught in a group effort along with NDSU Extension agents, manure industry representatives, soil scientists, ND State Highway Patrol, farm business management specialists, and others when appropriate in various educational settings. (1 meeting/year in a general location or 2-3 meetings/year in localized areas depending on applicator response and program acceptance).

Approximately 10% of the project will be devoted to this task.

Product: Develop a network specific to the ND custom manure applicators via classroom setting, social media and/or email where questions can be asked and information shared regarding manure application and nutrient management.

The estimated costs for this objective include the value of 15% of personnel time plus the costs for travel, supplies, communication and contractual services.

Estimated cost $58,500 – 319 grant, $39,000 – Match

Objective 3: Develop educational materials and create learning opportunities for traditionally smaller-scale livestock (e.g., equine, cattle, sheep, chickens, etc.) owners who need manure management assistance. When able, live demonstrations using appropriately sized equipment will be conducted to show spreading, calibration, evenness of spread and rate differences.

Task 5:

- Four workshops per year pertaining to small-scale livestock manure management will be offered in an effort to increase knowledge between nutrient management and water quality. Whenever possible, these workshops will be held outdoors in an on-farm setting where lot management, paddock rotation, feedstuffs management, animal health and manure management can be demonstrated.
- Collaboration with NDSU Extension specialists and agents as well as agency personnel and experienced producers will make this task achievable.

Approximately 10% of the project will be devoted to this task.

Product: Workshops, demonstrations, and a fact sheet pertaining to managing small-scale livestock manure.

Task 6:

- Eight educational workshops per year (4 in the fall and 4 in the spring) will be offered among the 5 counties containing 25% of the total ND equine inventory (Burleigh, Cass, Morton, Stark and Ward). These workshops will include hands-on collaboration from NDSU Extension range, soil and environmental specialists along with local SCD, NRCS and 319 personnel.
- The workshops will be coordinated in conjunction with the local NDSU Extension agent. Whenever possible, workshops will be held in an on-farm environment where working examples of manure management can be shared.

Approximately 15% of the project will be devoted to this task.

Product: A network of ND equine owners who have the knowledge and skills to effectively manage manure nutrients while not negatively impacting their land or water resources.

The estimated costs for this objective include the value of 25% of personnel time plus the costs for travel, supplies, communication and contractual services.

Estimated cost $97,500 – 319 grant, $65,000 – Match

Objective 4: Develop educational materials based on literature reviews or current, active research regarding crop and livestock integration with an emphasis on using livestock manure with cover crops.

Task 7:

- Conduct a literature review to see what information is available about using manure on cover crops in year one. Follow that up with demonstrations of suggested manure use protocols in years two and three at RECs or in producer fields to see what does and does not work with the ND climate.

Approximately 10% of the project will be devoted to this task.

Product: A comprehensive literature review, which can be shared with producers via PowerPoint or a fact sheet, of the current protocols concerning the use of manure (spread by machine or animal) on cover crops and 3 to 5 field demonstrations to show those protocols.

The estimated costs for this objective include the value of 10% of personnel time plus the costs for travel, supplies, communication and contractual services.

Estimated cost $39,000 – 319 grant, $26,000 – Match

Objective 5: Provide educational and technical support pertaining to general manure management issues to NDSU Extension, NRCS and other agency personnel as well as crop and livestock producers and urban and youth audiences.

Task 8:

- Provide individuals with printed information (i.e. presentation handouts and Extension publications) as well as individual, science-based management recommendations. Educational materials and programming, focusing on the use of livestock manure, by giving credit for the fertilizer value in manure for crop production.
- Educational materials include press releases for the public (i.e. spreader calibration and composting), website material, newsletters (3/year), and Extension bulletins. Mass media, websites, and Extension Impact Reports will be used to inform producers and the public about successful efforts to reduce impacts on water quality.
- Participation via presentation of technical information in meetings, workshops, demonstrations, and tours that are held to educate crop and livestock producers and those who advise and work with crop and livestock producers around the subjects of manure sampling, manure nutrient content, spreader calibration, manure composting, mortality composting and the agronomic use of manure and commercial fertilizers. At least 5 demonstrations and/or workshops will be participated in each year. The demonstrations/workshops will be spread throughout North Dakota and will be organized by NDSU Extension agents, NRCS, Soil Conservation Districts, 319 Coordinators, or producer organizations.
- Focus will be placed on BMPs that result in cost effective changes to minimize water quality impacts from manure nutrients while complying with current environmental regulations.

Approximately 30% of the project will be devoted to this task.

Product: Workshops (3 per year) (i.e. CAFO Operator School, Animal Carcass Management, Feedlot School) and demonstrations (4 per year) (i.e. Nutrient Management Day, cover crop/compost demonstration, manure spreader calibration demonstration, manure compost demonstration, mortality compost demonstration) as well as producer meetings (10 per year) (e.g., Kidder County Cow Day, McIntosh County Crop Forum, McHenry County Cattle Feeders Update, Walsh County Livestock Day, Stutsman County Livestock Meeting) organized during the winter months by NDSU Extension agents/specialists or agency personnel in counties all around ND.

The estimated costs for this objective include the value of 30% of personnel time plus the costs for travel, supplies, communication and contractual services.

Estimated cost $117,000 – 319 grant, $78,000 – Match

3.3 Milestone Table

See Appendix B: Milestone Table

3.4 Lead Project Sponsor

The lead project sponsor is NDSU Extension. With offices in every county in the state along with seven Research Extension Centers and presence on campus, NDSU Extension provides a statewide educational system. The educational system draws upon the research base of North Dakota State University and network of other universities across the nation in the development of educational and informational materials and programs. NDSU Extension also draws upon the knowledge base of other agencies and organizations including the Natural Resources Conservation Service, the North Dakota Department of Health, Division of Water Quality, and the North Dakota Department of Agriculture. Educational programs are delivered through local county Extension offices as well as through on and off campus specialists. NDSU Extension has a long history of working with these partners in the development and delivery of educational programming and has the ability to focus research and Extension specialist knowledge from the departments of Animal Sciences, Plant Sciences, Agricultural and Biosystems Engineering, Natural Resource Sciences, and Research Extension Centers.

3.5 Operation and Maintenance of 319 Funded BMPs

This section is not applicable to this particular grant proposal.

4.0 COORDINATION PLAN

4.1 Cooperating Organizations

This program will be coordinated with other state agencies and organizations involved in water quality and livestock manure management. NDSU Extension is the lead organization. The North Dakota Agricultural Experiment Station will collaborate with this program through applied research and demonstration projects. The Natural Resource Conservation Service will cooperate with technical resources and guidelines. The ND Department of Health, Division of Water Quality will help provide contacts with ongoing and proposed 319 water quality projects which have a livestock manure management component. The ND Department of Health, Division of Water Quality will provide guidelines, rules and regulations for livestock enterprises. Livestock producer organizations provide another conduit to the producers and represent the producers' viewpoint. NDSU Extension agents and SCD personnel will provide contacts with producers in counties not represented by a 319 watershed project.

A Nutrient Management Advisory committee will be used to provide overall program direction. Membership will include NDSU Extension Ag Program Leader, Carrington Research Extension Center Director, ND Stockmen's Association's Environmental Services program leader, a representative of the ND dairy producers or ND Dairy Coalition, a representative of the ND pork producers, NDSU Soil Science Extension/researcher(s), NDSU Ag and Biosystems Engineering researcher, 319 Program Coordinator, ND Department of Ag, ND Department of Health AFO team, representatives from NRCS (i.e. state engineer staff and state agronomist), other state agricultural commodity groups, a custom manure applicator, NDSU Extension agent(s) and NDSU Extension district director (s). The advisory committee will meet annually to give overall direction to the program. The NDSU Extension Ag Program leader and the Director of the Carrington Research Extension Center will make

up a two-member steering committee charged with on-going supervision of the project and insure coordination with other livestock manure management efforts.

4.2 Local Support

North Dakota NRCS, North Dakota Department of Health, Division of Water Quality, Soil Conservation District personnel and county Extension agents have all indicated a need for this type of informational and educational program. Individuals working with local 319 funded water quality projects have also indicated a need.

Support letters have been solicited from one ND crop and livestock producer; the Foster County 319 and NRCS team; and K2S Engineering. Copies of these letters can be found in Appendix C and will be kept on file at the CREC.

4.3 Coordination

This project will be coordinated with ongoing funded 319 projects and support them with technical information and educational assistance. There will also be coordination with the NDDH regarding follow-up on nutrient management plans for ND permitted livestock facilities. The follow-up on nutrient management plans will include one-on-one visits to active permitted livestock operations who have recently been or will be inspected. The purpose of the follow-up will be to assist with the educational component of nutrient management planning. These one-on-one visits will allow the operation manager to ask questions about how to update manure spreading records, the proper manure sampling technique, best practices for keeping weekly facility monitoring and weather records, how to understand and decide when it is time to add more fields to the spreading rotation and how to read and use manure and soil analysis results. Coordination with other NDSU Extension and Research Extension Center personnel will also occur.

4.4 Duplication of Efforts

This program is not duplicated by other organizations or agencies. The agencies represented at the most recent Nutrient Management Advisory meeting identified this project and NDSU Extension as the lead on educational and research efforts pertaining to nutrient/manure management and water quality in North Dakota. Other agencies such as NRCS provide site-specific technical assistance on manure management projects but their limited resources require them to focus primarily on sites where cost share assistance is available. This project is not faced with such limitations and provides exceptional assistance in coordination of resources.

5.0 EVALUATION AND MONITORING PLAN

5.1 Plan for Evaluation

Individual workshop and meeting evaluations will be developed and used through the duration of this project to determine the knowledge and needs of producers (Appendix D). These evaluations will measure the increase in knowledge of participants as well as their increased likelihood of adopting enhanced manure management practices. However, the impact of the project will be determined by follow-up of individuals who have sought assistance from NDSU Extension or other agencies working in livestock manure management. Adoption of manure handling and nutrient management practices will be the focus of the program evaluations. Program evaluations will be based on Kirkpatrick's four

levels of evaluation. Level 1 is what was thought about the training. Level 2 identifies the amount of knowledge gained during training and anticipated behavior change. Level 3 measures the changes in behavior. Level 4 tracks the long-term results from the education received. This is the evaluation system that is supported by NDSU Extension.

5.2 Monitoring for Demonstration Projects

This section is not applicable to this particular grant proposal.

5.3 Collected Data

This section is not applicable to this particular grant proposal.

5.4 Monitoring Strategy

This section is not applicable to this particular grant proposal.

5.5 Data Storage, Management and Use

This section is not applicable to this particular grant proposal.

5.6 Models

This section is not applicable to this particular grant proposal.

5.7 O&M of Restoration Activities

This section is not applicable to this particular grant proposal.

6.0 BUDGET

The budget is detailed in the two budget tables (Appendix D and E). Appendix D details funding sources by year. Appendix E is a detailed budget of the section 319/non-federal budget. The following narrative will explain Appendix E. The salary and fringe lines include 319 and non-federal NDSU cash match monies (i.e. a salaried faculty member spending a portion of his/her time, for which s/he is paid, on a project). The 319 funds will be utilized to continue employment of one extension specialist, one full-time position at the Carrington Research Extension Center. The salary is annualized per year plus fringes, increased by 3% per year. The NDSU non-federal match in this line is the time devoted to the project by other NDSU faculty and staff who will be supporting the program (Appendix F).

This includes project support that will be tracked as match from the following:

1) NDSU Extension Service Specialists who provide program development and delivery in livestock production, soils and fertility, watershed and soil conservation, and ag and biosystems engineering.

2) North Dakota Agricultural Experiment Station Scientists who work with animal and agronomy outreach programs at the Carrington Research Extension Center. Education and outreach utilizing nutrient management benchmarks and demonstration projects will be the main focus of this collaboration.

3) County Extension Agents who will organize local educational efforts and help provide educational program delivery that is focused on the specific needs of producers in their region. Specific contributions to the project will include organizing and facilitating regional educational events such as workshops, tours and demonstration projects. These Extension agents will also receive additional training on alternative winter feeding options, manure utilization and mortality management and incorporate this information into their livestock/crops educational programs along with providing leadership to this program effort within their multicounty program unit.

The remainder of the budget is supported from 319 funds. This includes travel and operating support for the specialist. Regular travel includes travel to producer, regional, and national meetings as well as travel costs to bring expert speakers to programs. Printing costs are for production of educational materials including development of extension bulletins and circulars, the purchase of national educational curriculum and the development of field records and other printed material to be used by producers. Supplies include computers and printing (including $1,000 for a tablet computer in year one of the project to be used at the on-farm locations and $1,200 for a desktop computer in year two of the project), a Millcreek 37 manure spreader in year one estimated at $4,500, sampling supplies, calibration kits, meals for educational meetings (meals at educational events are calculated at $12/person for 13 people per event at two events; The educational events are typically day-long events outside an urban area), and instructional supplies to support the program. Communications costs are for long-distance telephone, internet access and mobile service costs for the specialist. Fees are included for manure analyses, facility rental for workshops, speaker fees for experts to deliver programming, and soil sample analyses. Administrative costs are calculated at 10%.

List of Appendices:

- Appendix A: Past Accomplishments
- Appendix B: Milestone Table
- Appendix C: Letters of Support
- Appendix D: Examples of Evaluation Forms and Surveys
- Appendix E: Budget Table Part 1
- Appendix F: Budget Table Part 2
- Appendix G: Value of Time and Services Provided by Extension Personnel as non-Federal Match

Appendix A: Past Accomplishments (January 2011-September 2018)

Meetings	Location	Date
The Effects of Manure on Salinity	Lamoure County NRCS Winter Meeting	Jan. 12, 2011
Sound Nutrient Management Practices	Feedlot School CREC Carrington, ND	Jan. 28, 2011
Carcass Composting Management	McHenry County Carcass Management Clinic	Feb. 15, 2011
Manure Spreader Calibration & Manure Sampling for Nutrient Management	Morton County Manure Workshop	Feb. 22, 2011
NDSU Nutrient Management Plan Training	NDSU Campus Fargo, ND	Feb. 24, 2011
Containment Pond Management	ND Winter Show	Mar. 1, 2011
Manure Nutrient Sampling Program	319 Watershed Coordinator's Annual Meeting	Mar. 16, 2011
Manure Nutrient Sampling Program	CREC Field Day	July 2011
Manure Nutrient Sampling Program	Livestock In-service Washburn, ND	Sept. 7, 2011
Solid Formation and Management	Ft. Ransom Eco Ed Day	Sept. 15, 2011
Manure Management and Manure Nutrient Sampling Program	Livestock Q&A Granville	Sept. 29, 2011
Manure Management and Manure Nutrient Sampling Program	Mercer County Workshop	Nov. 29, 2011
Sound Nutrient Management Practices	Feedlot School CREC Carrington, ND	Jan. 28, 2012
Super Pooper School	DREC	Feb. 29, 2012
Super Pooper School	Edgeley	Mar. 1, 2012
Super Pooper School	Rugby	Mar. 2, 2012
Manure Management & Soil Salinity Management	Granville	Mar. 14, 2012
Non – AFO Winter Feeding Systems	319 Watershed Coordinator's Meeting	Mar. 22, 2012
Cover Crop Summit		Mar. 28, 2012
Manure Compost Management and Its Benefits	CCSP	July 12, 2012
Nutrient Management Record Keeping	Morton County 319 Workshop	Nov. 29, 2012
Horse Manure Management	Equine Producer Meeting Bismarck, ND	Dec. 19, 2012
Feedlot Nutrient Management	NDSU Feedlot School Carrington, ND	Jan. 23, 2013
Nutrient Sampling and Manure Spreader Calibration	Walsh County Livestock Meeting Park River, ND	Jan. 24, 2013
Compliance Considerations – Do I Need a Permit	Hettinger County Livestock Meeting Regent, ND	Feb. 5, 2013

Manure Management and Nutrient Sampling Program	McKenzie County SCD Board Watford City, ND	Feb. 20, 2013
Utilizing Livestock Manure	McIntosh County Crop and Livestock Meeting Wishek, ND	Feb. 21, 2013
Manure Management Issues and Concerns	McHenry County Cattle Feeders Update Granville, ND	Mar. 13, 2013
Livestock Environmental Management	Foster County Farm Bureau Lunch and Learn CREC	Mar. 14, 2013
Manure Management and Nutrient Sampling Program	SCD/319 Watershed Coordinators Meeting Bismarck, ND	Mar. 20-21, 2013
Managing and Utilizing Livestock Manure	NDSU Animal Science Beef Production Class Fargo, ND	Mar. 25, 2013
Value of Swine Manure in ND	Swine Meeting CREC	Apr. 12, 2013
Mortality Management	CGREC Field Day	July 8, 2013
Value of Manure as Fertilizer	HREC Field Day	July 9, 2013
Composting Basic/Value of Manure as Fertilizer	CCSP Farm Forman, ND	July 18, 2013
Offal composting	Bowdon Meat Processing	July 29, 2013
Mortality Management	ND Lamb and Wool Expo Jamestown, ND	Aug. 2, 2013
What is Compost?	Lake Region Homeschool Group Carrington REC	Sept. 17, 2013
North Dakota Discovery Farms Overview	NACAA Ag Committee Phone Conference	Oct. 15, 2013
ND Manure Sampling Program	CNMP Multi-State Conference Fargo, ND	Nov. 18-20, 2013
Ag and YOUth	Stutsman County Ag Expo Jamestown, ND	Jan. 15, 2014
Feedlot Manure Management	NDSU Feedlot School Carrington REC	Jan. 22, 2014
Manure/Nutrient Management	Sheridan Co. Lvst. Forum McClusky, ND	Jan. 30, 2014
Farm Safety Day	Foster/Eddy Counties	May 7, 2014
Manure Corn Calculator	CREC Field Day Carrington REC	July 15, 2014
Guest Lecture, Composting Manure	NDSU Campus Fargo, ND	Sept. 19, 2014
County Mortality Composting Projects	Extension Fall Conference Fargo, ND	Sept. 29-Oct. 3, 2014
Guest Lecture, Dairy Nutrient Management	NDSU Campus Fargo, ND	Oct. 7, 2014
LEM Program Overview	International Group	Oct. 17, 2014

	Carrington REC	
Manure Spreading – Confinement vs. Grazing	SARE Tour Richardton, ND	Nov. 5, 2014
Guest Lecture, Feedlot Management	NDSU Campus Fargo, ND	Nov. 6, 2014
Alternative Winter Feeding Strategies	Winter Meeting Series Ellendale, ND	Nov. 12, 2014
Alternative Winter Feeding Strategies	Winter Meetings Series Medina, ND	Nov. 12, 2014
Alternative Winter Feeding Strategies	Winter Meeting Series Wing, ND	Nov. 13, 2014
Alternative Winter Feeding Strategies	Winter Meeting Series Carson, ND	Nov. 13, 2014
Advisory Board Meeting	Bismarck, ND	Nov. 18, 2014
Ag and YOUth	Jamestown, ND	Jan. 14, 2015
Feedlot Pen Management	Feedlot School Carrington REC	Jan. 20-21, 2015
Alternative Winter Feeding Strategies	Stutsman County 319 Tour Rural Stutsman County	Feb. 12, 2015
Mortality Composting	Kidder County Crops & Cattle Day Pettibone, ND	Feb. 20, 2015
Nutrients in Manure, Spreader Calibration, & Hauler Association	Custom Manure Haulers Mandan, ND	Feb. 25, 2015
Manure and the Mystery Bucket	Cass Co. Ag in the Classroom West Fargo, ND	Mar. 3-5, 2015
Mortality Compost Training	CGREC	Mar. 16, 2015
Guest Lecture, Feedlot Tour	Casselton, ND	Mar. 23, 2015
Equine Nutrient Management	Equine Encounter Fargo, ND	Apr. 21, 2015
Equine Nutrient Management	Equine Encounter Mandan, ND	Apr. 22, 2015
Equine Nutrient Management	Equine Encounter Minot, ND	Apr. 23, 2015
Compost and Kids	After School Program Jamestown, ND	Apr. 27-28, 2015
Compost and Kids	After School Program Jamestown, ND	May 4-5, 2015
Compost and Kids	After School Program Jamestown, ND	May 7, 2015
Progressive Ag. Safety Day	Foster/Eddy County Schools	May 8, 2015
Compost and Kids	Emmons County Day Camp Linton, ND	Jun. 3, 2015
Compost and Kids	Summer School Program Jamestown, ND	Jun. 18, 2015
Composting Fish	Lakes of the Woods County	Jul. 21, 2015

	Phone Conference Presentation	
Let's Talk Manure	Extension Fall Conference Bismarck, ND	Oct. 12-15, 2015
Is Their Grass Greener	Extension Fall Conference Bismarck, ND	Oct. 12-15, 2015
When You Have Livestock, You'll Have Deadstock	Extension Fall Conference Bismarck, ND	Oct. 12-15, 2015
Advisory Board Meeting	Jamestown, ND	Nov. 10, 2015
Guest Lecture – Dairy Nutrient Management	NDSU Campus Fargo, ND	Nov. 24, 2015
Guest Lecture – Feedlot Management	NDSU Campus Fargo, ND	Dec. 3, 2015
Grazing Nutrient Management	Mercer County Beulah, ND	Dec. 8, 2015
Ag and YOUth	Jamestown Ag Expo Jamestown, ND	Jan. 13, 2016
Grazing into the Winter Workshop	Barnes Co. 319 Valley City, ND	Jan. 14, 2016
Feedlot Nutrient Management	NDSU Feedlot School Carrington REC	Jan. 20-21, 2016
Kids, Compost, Crops & Consumption	Elementary Classroom Fargo, ND	Jan. 25, 2016
Guest Lecture – Manure/Nutrient Management	BSC Career Academy	Feb. 3, 2016
Guest Lecture – Manure/Nutrient Management	BSC Career Academy	Feb. 5, 2016
Winter Tour	Stutsman County 319 Stutsman County	Feb. 10, 2016
Winter Tour – Bale Grazing Manure Management	Burleigh Co. SCD Morton County	Feb. 16, 2016
Mortality Composting	US APHIS Wildlife Services Dickinson & Valley City, ND	Feb. 17-18, 2016
ND Custom Manure Haulers Meeting	USDA ARS Mandan, ND	Feb. 24, 2016
Mortality Composting During Calving Season	Ward County Extension North Central REC	Feb. 29, 2016
Program Outline	NPS 319 Conference Bismarck, ND	Mar. 29, 2016
Composting	ND Garden Expo Bismarck, ND	Apr. 16, 2016
CNMP Meeting	NRCS Watford City, ND	May 17, 2016
Kids, Compost, Crops & Consumption Final Meeting	Elementary School Fargo, ND	May 23, 2016
Horse Manure Management	Equine Encounter Ward County	May 25, 2016

Horse Manure Management	Equine Encounter Cass County	June 6, 2016
Horse Manure Management	Equine Encounter Stark County	June 7, 2016
Horse Manure Management	Equine Encounter Stark County	June 8, 2016
Junior Master Gardner – Compost	NDSU Extension Stutsman County	June 9, 2016
Emergency Spill Response	Land Use Conference Bismarck, ND	June 28, 2016
Guest Lecture - Composting	Rugby High School FFA Rugby, ND	Oct. 11, 2016
Checkmark to a Relationship	NDSU Fall Conference Fargo, ND	Oct. 18, 2016
Decision Matrix	Lean 101 – Webinar Wed. Skype for Business	Oct. 26, 2 016
Guest Lecture – Feedlot Nutrient Management	NDSU Campus Fargo, ND	Nov. 8, 2016
Manure as a Resource, What's It Good For?	Kiwanis Carrington, ND	Nov. 9, 2016
Advisory Board Meeting	Stutsman County Extension Jamestown, ND	Dec. 13, 2016
Café Talk	NDSU Extension Milnor, ND	Jan. 5, 2017
Feedlot Manure Management	NDSU Feedlot School Carrington REC	Jan. 18-19, 2017
Fall Grazing Nutrient Management	NDSU Extension Central Grasslands REC	Jan. 20, 2017
Intro to Anaerobic Digestion	ND Dairy Convention Bismarck, ND	Jan. 23, 2017
Manure Management	Stutsman County Beef Day Medina, ND	Feb. 7, 2017
Bale Grazing Nutrient Management	McLean Co. Ag Show Garrison, ND	Feb. 8. 2017
Café Talk	NDSU Extension Jamestown, ND	Feb. 10, 2017
Mortality Composting	Beef Day – Circle of Life Ellendale, ND	Feb. 14, 2017
ND Custom Manure Haulers Meeting	USDA ARS Mandan, ND	Feb. 22, 2017
Bale Grazing Overview	Legislative/Commissioner Luncheon Burleigh County	Feb. 28, 2017
Pesticide Residuals in Manure	Pesticide Training Sioux County	Mar. 8, 2017
Pesticide Residuals in Manure	Pesticide Training Grant County	Mar. 9, 2017

Project Successes and Challenges	319 Watershed Coordinators Meeting Bismarck, ND	Mar. 28-29, 2017
Guest Lecture – Manure Management	Lake Region State College Devils Lake, ND	Apr. 27, 2017
Equipment Safety	Ag Safety Day Carrington, ND	May 5, 2017
REAL Colors	NDSU Extension Stutsman County	May 18, 2017
Composting, Large and Small	Coffee Club via Skype Golden Valley, ND	May 25, 2017
Equine Manure Management	Completing the Pattern ND 4-H Camp	June 12-15
From A Checkmark to a Relationship	NACAA Salt Lake City, UT	July 11, 2017
Youth Composting	Wells County Famer's Union Camp	Aug. 7, 2017
Extended Season Grazing Options – Producer Panel	NDSU Extension Lvst. In-Service ND 4-H Camp	Sept. 6-7, 2017
Decision Matrix and Bale Grazing	NDSU Fall Conference Fargo, ND	Oct. 24-27, 2017
Guest Lecture - Feedlot Manure Management	Beef Cattle Research Complex; Fargo, ND	Nov. 7, 2017
Livestock Manure Management	Stutsman Co. Lvst. Day Woodworth, ND	Nov. 29, 2017
Nutrient Management Advisory Board	Bismarck, ND	Dec. 5, 2017
Café Talk	NDSU Extension Lisbon, ND	Jan. 9, 2018
Grazing Manure Management	Grazing, Manure & Soil Health, Rutland, ND	Jan. 21-22, 2018
Feedlot Design & Manure Mngt.	NDSU Feedlot School	Jan. 23-24, 2018
ND Custom Manure Haulers Meeting	USDA ARS Mandan, ND	Feb. 21, 2018
Feeding Cows on Fields vs. Drylot	Winter Meeting McIntosh County	Feb. 23, 2018
NDSU Extension Update	Washington, D.C.	Apr. 11, 2018
North American Manure Expo	Brookings, SD	Aug. 12-17, 2018
Farm Visits	**Location**	**Date**
Manure Sampling	Lamoure County	May 16, 2011
Manure Sampling	Medina, ND	May 24, 2011
Manure Sampling	Towner, ND	July 8, 2011
Manure Sampling	Lamoure County	July 18, 2011
Manure Sampling	Norwich, ND	July 26, 2011
Manure Sampling	Drake, ND	Sept. 20, 2011
Manure Sampling	Rolette, ND	Sept. 22, 2011
Discovery Farm	Underwood, ND	Aug. 30, 2012
Producer Visit	Carrington, ND	Aug. 31, 2012

Manure Sampling	Geneseo, ND	Sept. 27, 2012
Manure Sampling	Foster County	Oct. 8, 2012
Manure Sampling	Carrington REC	Oct. 9, 2012
Manure Sampling	Medina, ND	Oct. 10, 2012
Manure Sampling	Foster County	Oct. 11, 2012
Manure Sampling	Streeter, ND	Oct. 15, 2012
Manure Sampling	Center, ND	Oct. 16, 2012
Manure Sampling	Wells County	Oct. 16, 2012
Manure Sampling	Ward County	Oct. 17, 2012
Manure Sampling	Mountrail County	Oct. 18, 2012
Manure Sampling	Beach, ND	Oct. 23, 2012
Manure Sampling	Bowman, ND	Oct. 23, 2012
Manure Sampling	Hettinger, ND	Oct. 24, 2012
Manure Sampling	Beulah, ND	Oct. 25, 2012
Manure Sampling	Logan County	Oct. 31, 2012
Emmons County Extension Office	Emmons County	Dec. 20, 2012
McHenry County Ext. Office	Towner, ND	Dec. 21, 2012
Bottineau County Ext. Office	Bottineau, ND	Dec. 21, 2012
Collaboration Visit	CGREC	Feb. 25, 2013
Bale Grazing Visit	Tuttle, ND	Feb. 25, 2013
Manure Sample	Towner, ND	Apr. 12, 2013
Manure Sample	Spiritwood, ND	Apr. 22, 2013
Mortality Management Set Up	Bathgate, ND	May 13, 2013
Manure Sampling	Park River, ND	May 15, 2013
Manure Sampling	Carpio, ND	May 22, 2013
Farm Visit	Wyndmere, ND	July 19, 2013
Manure Composting Visit	Leeds, ND	July 23, 2013
Manure Sampling	Kensal, ND	July 30, 2013
Manure Sampling	Ellendale, ND	July 30, 2013
Manure Sampling	Oakes, ND	July 30, 2013
Manure Sampling	Foster County	Aug. 1, 2013
Manure Sampling	Granville, ND	Aug. 14, 2013
Farm Visit/Producer Trip	Richland County	Aug. 30, 2013
Compost Consultation	Leeds, ND	Jan. 20, 2014
Compost Consultation – Business plan	Leeds, ND	Mar. 26, 2014
Mortality Compost	Mountrail County	May 20, 2014
Mortality Compost – set up site	Mountrail County	June 24, 2014
Manure Sampling	Foster County	Oct. 8, 2014
Producer Visit	Bathgate, ND	Oct. 22, 2014
Producer Visit	Hatton, ND	Oct. 22, 2014
Producer Visit – manure questions	Tuttle, ND	Oct. 31, 2014
Manure Sampling	Foster County	Mar. 18, 2015
Producer Visit	Bismarck, ND	Mar. 24, 2015
Compost Consultation	Leeds, ND	Apr. 16, 2015
Producer Visit	Burlington, ND	Jun. 9, 2015
Producer Visit	McLean County	Aug. 14, 2015
Producer Visit – Dairy Manure Mgt.	Foster County	Feb. 2, 2016
Producer Visit-Mortality Composting	Ward County	Feb. 29, 2016

Farm Visit – CCSP Farm	Forman, ND	Apr. 6, 2016
Extension Agent Visit	Morton County	Apr. 18, 2016
Producer Visit	McHenry County	Sept. 1, 2016
Producer Visit	McHenry County	Sept. 9, 2016
Producer Visit – Digester Economics	Towner, ND	Apr. 12, 2017
Farm Visit	Wimbledon, ND	Aug. 15, 2017
Producer Visit	Emmons County	Sept. 12, 2017
Producer Visit	Oliver County	Oct. 5, 2017
Producer Visit	Wells County	Mar. 4, 2018
Extension Agent Visit	Pierce County	June 5, 2018
Producer Visit	Renville County	June 29, 2018
Producer Visit	Renville County	July 30, 2018
Demonstrations	**Location**	**Date**
Hoopbarn Tour	Southeast ND	Mar. 7, 2011
Manure Spreader Calibration Demo	Morton County Nutrient Management Workshop	Apr. 26, 2011
Discovery Farms Tour	North Dakota	July 13-14, 2011
Nutrient Management	SDSU Tour	July 19-20, 2011
Salinity	Stutsman Co. Salinity Tour	Aug. 11, 2011
Compost Demo Day	DREC	Aug. 17, 2011
Discover Farms EPA Tour	Dazey, ND	Oct. 7, 2011
Compost Demo Day	Carrington REC	Aug. 23, 2012
Manure Spreader Calibration Demo	Stanley, ND	Sept. 25, 2012
Compost Mortality Demo	CGREC	May 1, 2013
Mortality Composting	CGREC Field Day	July 8, 2013
Composting Basics/Value of Manure as Fertilizer	Carrington REC Field Day	July 16, 2013
Compost Day	Carrington REC	Aug. 13, 2013
NDSU Intern/Short Mortality Demo	Carrington REC	Aug. 16, 2013
Mortality Demo Work	CGREC	Aug. 27, 2013
Mortality Composting Demonstration	Mountrail County Field Day Stanley, ND	Oct. 15, 2014
Slaughter Waste Compost Demo	Carrington REC	Jun. 23, 2015
Fish Entrails Compost Demo	Carrington REC	July 8, 2015
Nutrient Management Day	Carrington REC	Aug. 18, 2015
Manure Spreader Demonstration	Equipment Day CGREC	Oct. 6, 2015
Manure Spreader Demonstration	Equipment Day HREC	Oct. 9, 2015
Composting and Spreader Calibration	Land Use Conference Bismarck, ND	June 29, 2016
Composting and Spreader Calibration	Nutrient Management Day Carrington REC	Aug. 23, 2016
Composting Demonstration	Nutrient Management Day Carrington REC	Aug. 29, 2017
University of Guelph Student Tour	Carrington REC	Apr. 23, 2018
Equine Nutrient Management	Completing the Pattern ND 4-H Camp	June 24-27, 2018

Composting Manure	CREC Field Day Carrington REC	July 17, 2018
Composting Manure	Nutrient Management Day Carrington REC	Aug. 22, 2018
On-farm Demo	Compost Demo Day Renville County	Aug. 24, 2018
Publications	**Location**	**Date**
Biosecure Nutrient Management Practices	Chris Augustin, Charles Stoltenow, Ron Wiederholt	Apr. 2011
North Dakota Manure Fertilizer use Recommendations	Ron Wiederholt, Mary Berg, Emily Kline	Dec. 2012
Containment Pond Management	Chris Augustin	Feb. 2013
Beef Feeding Operation Siting & Design Basics (Revised)	Mary Berg and Emily Kline	May 2013
Livestock Resource Management Guide (Revised)	Mary Berg	Jan. 2014
Alternative Winter Feeding Strategies for Beef Cattle Management	Chris Augustin, John Dhuyvetter, Karl Rockeman, Mary Berg	July 2014
Manure Spreader Calibration – Revision	Paulo Flores, Mary Berg, Chris Augustin, Ron Wiederholt	Oct. 2015
5 Easy Steps for Composting Dead Livestock	Mary Berg, Paige Brummund, Alicia E. Harstad and Penny L. Nester	Dec. 2015
ND CAFO Operators Record Book (Reviewed)	Mary Berg	Aug. 2016
Animal Carcass Disposal Options (Revised)	Shafiqur Rahman and Mary Berg	Sept. 2017
Environmental Implications of Excess Fertilizer and Manure on Water Quality (Revised)	Mary Berg, Miranda Meehan, Thomas Scherer	Oct. 2017
Nitrogen Behavior in the Environment (Revised)	Mary Berg, Miranda Meehan, Thomas Scherer	Oct. 2017
North Dakota Manure Fertilizer use Recommendations (Reviewed)	Mary Berg	Mar. 2018
Phosphorus Behavior in the Environment (Revised)	Mary Berg, Miranda Meehan, David Franzen, Thomas Scherer	June 2018
LEM News (Newsletter)		
2011		
	January	
	March	
	June	
	October	
2012		
	January	
	April	
	November	

2013		
	March	
	June	
	September	
2014		
	January	
	April	
	October	
	December	
2015		
	January	
2016		
	January	
	May	
	October	
	December	
2017		
	March	
	June	
	September	
	December	
2018		
	May	
	October	
Displays	**Location**	**Date**
LEM Booth	Conservation Fair Valley City, ND	Jan. 16, 2013
LEM Booth	Mountrail County Winter Classic Livestock Meeting Stanley, ND	Feb. 4, 2013
CREC Booth	Foster County Fair Carrington, ND	June 25, 2013
LEM Booth	ND Lamb & Wool Expo Jamestown, ND	Aug. 2-3, 2013
Cornvention Booth	North Dakota Corn Council Fargo, ND	Feb. 19, 2014
CREC/LEM Booth	ND Stockmen's Convention Dickinson, ND	Sept. 25-27, 2014
CREC Booth	Agri-International Bismarck, ND	Feb. 10-11, 2015
CREC Booth	Cornvention Fargo, ND	Feb. 18, 2015
CREC Booth	Foster County Fair Carrington, ND	June 23, 2015
CREC/LEM Booth	ND Stockmen's Convention Bismarck, ND	Sept. 24-25, 2015
CREC Booth	Agri-International	Feb. 9, 2016

	Bismarck, ND	
CREC Booth	Agri-International Bismarck, ND	Feb. 15, 2017
CREC Booth	Agri-International Bismarck, ND	Feb. 6, 2018
Interviews	**Location**	**Date**
Manure Management	Mick Kjar KQLX 890	Apr. 25, 2013
Flooding and Manure Management	Mick Kjar KQLX 890	Apr. 29, 2013
Talking Dirt Radio Segment	KDAK 1600	May 1, 2013
Manure Management	Ken Morgan K-FYR 550	May 2, 2013
Field Day Manure Corn Calculator	Ken Morgan K-FYR 550	July 15, 2014
Alternative Winter Feeding Strategies	Sarah Gustin KXMB TV	Nov. 12, 2014
Alternative Winter Feeding Strategies	Sarah Gustin KXMB TV	Feb. 12, 2015
Manure Management Update	Mick Kjar KQLX 890	Feb. 18, 2015
Equine Encounter	Mick Kjar KQLX 890	Apr. 16, 2015
Manure as a Fertilizer	Jonathan Knutson Ag Week	Jul. 22, 2015
Nutrient Management Day	Mick Kjar KQLX 890	Aug. 11, 2015
Nutrient Management Day	Sarah Heinrich KFGO 790	Aug. 18, 2015
Equipment Demonstration Day	Mick Kjar KQLX 890	Sept. 29, 2015
Equipment Demonstration Day	Sarah Heinrich KFGO 790	Oct. 6, 2015
Fall Manure Management	Greg Grenz KDAK 1600	Oct. 5, 2016
Nutrient Management Day	Greg Grenz KDAK 1600	Aug. 2, 2017
Fall Manure Management	Mick Kjar KQLX 890	Sept. 28, 2017
Fall Manure Management	Megan Ternquist Red River Farm Network	Oct. 2, 2017
Manure Management	Megan Ternquist Red River Farm Network	Feb. 13, 2018
North American Manure Expo	Megan Ternquist Red River Farm Network	May 23, 2018
North American Manure Expo	Mick Kjar KQLX 890	May 29, 2018
CREC Field Day	Greg Grenz KDAK 1600	July 17, 2018
North American Manure Expo	Sarah Heinrich	July 17, 2018

	KFGO 790	
ND Day and Manure Expo	Greg Grenz KDAK 1600	Aug. 1, 2018
North American Manure Expo	Mick Kjar KQLX 890	Aug. 13, 2018
North American Manure Expo	Sarah McNaughton KFGO 790	Aug. 15, 2018
Nutrient Management Day	Mick Kjar KQLX 890	Aug. 17, 2018

On average, 25 people are in attendance at all meetings where program personnel present. From January 2011 thru September 2018, approximately 3,025 people were reached via formal presentations. Farm visits are done one-on-one with producers and many of them were accomplished first in part by the manure sampling program and later based on program recognition by producers themselves. From May 2011 thru September 2018, approximately 150 ND crop and livestock producers were reached with on-farm visits. On average, 35 people will attend demonstrations or tours led by program personnel. From March 2011 thru September 2018, approximately 1,050 ND crop and livestock producers were reached via demonstrations/tours. The newsletter is electronically disseminated to 300 people, including producers and agency personnel.

Participation in meetings may involve organizing the meeting, speaking on specific topics, and conducting demonstrations appropriate for the meeting topic. Participation may also involve logistics and behind-the-scenes coordination to ensure relevant speakers and a successful event. Producer and train-the-trainer education is accomplished through this event.

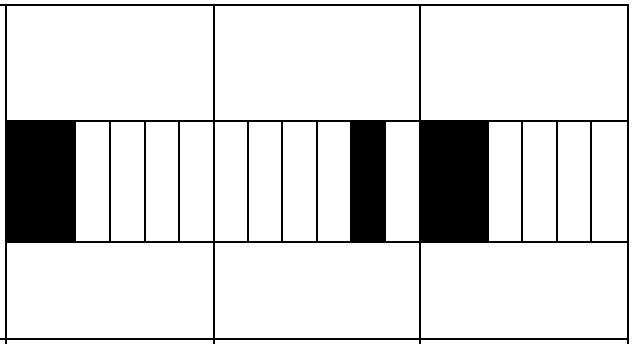
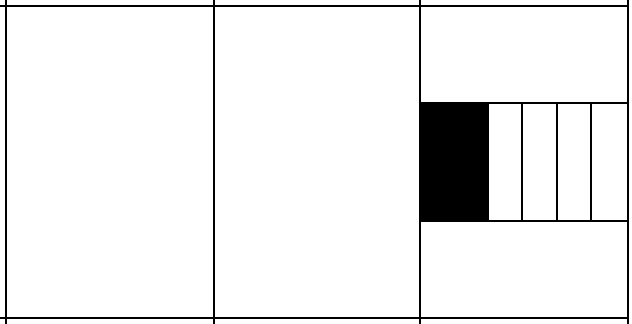
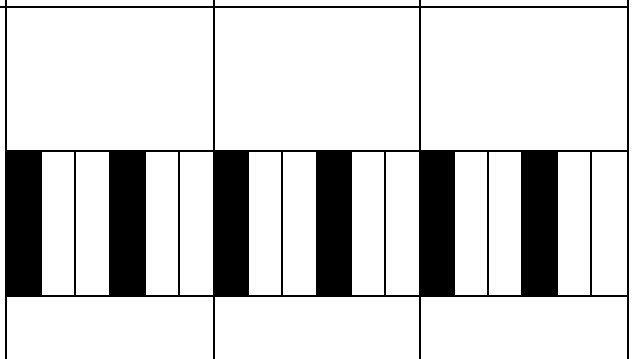
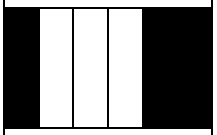
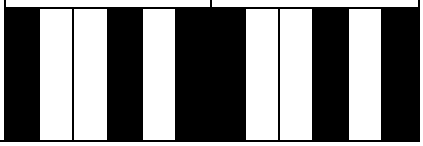
Participation in farm visits allows for one-on-one interaction between the specialist and the producer. This type of education allows for questions to be answered in a non-threatening environment while offering and teaching a technical service such as proper sampling technique or proper spreading rate.

Publications allow for dissemination of research and step-by-step instructions for accomplishing tasks such as manure spreader calibration or composting animal manures. Demonstrations are an extension of the publication and encourage learning by participation either in large groups or one-on-one.

Interviews may occur because of press releases or upcoming events and connect the reader/listener to a person. They also provide a means of information dissemination.

Appendix B: Milestone Table

Task/Responsible Organizations	Output	Qty.	Year 1	Year 2	Year 3
Objective 1			**Oct. 19 Sept. 20**	**Oct. 20 Sept. 21**	**Oct. 21 Sept. 22**
Task 1 – Individually assist livestock producers with updating NMPs. (10/yr.; Group 1 & 2)	One-on-one producer education.	30			
Task 2 – Individually assist non-livestock producers who plan to integrate livestock with NMPs. (5/yr.; Group 1)	One-on-one producer education.	15			
Objective 2			**Oct. 19 Sept. 20**	**Oct. 20 Sept. 21**	**Oct. 21 Sept. 22**
Task 3 – Demonstrate manure spreader calibration in a classroom setting and in the field and teach the basics and importance of NMPs to ND custom manure applicators. (2/yr.; Group 1, 3 & 4)	One-on-one or group applicator education.	6			
	2 simple guides in year 1 (reading manure analyses and soil analyses) and 1 fact sheet (Need to Know - NMP) in year 2.	3			
Task 4 – Aspects of the ND custom manure applicator industry, including environmental awareness, ND rule and regulations, vehicle and road rules and business management, will be taught in a classroom setting. (1/yr.; Group 1, 2 & 5)	A network of 25 or more ND custom manure applicators who can ask questions and received information pertaining to manure application and nutrient management.	3			
Objective 3			**Oct. 19 Sept. 20**	**Oct. 20 Sept. 21**	**Oct. 21 Sept. 22**

Task 5 – Hands-on workshops for small-scale livestock owners where lot management, paddock rotation, feed management, animal health and manure management will be discussed and demonstrated. (4/yr.; Group 1, 2, 3, 4 & 5	Workshops and demonstrations pertaining to small-scale livestock management.	12			
	Fact sheet regarding small-scale livestock manure management.	1			
Task 6 – Hands-on workshops pertaining to soil, range, grazing and manure management will be held among counties containing the highest equine inventory. (8/yr.; Group 1, 3 & 4)	Equine owners with the knowledge and skills of how and why to management manure nutrients.	24			
Objective 4			**Oct. 19 Sept. 20**	**Oct. 20 Sept. 21**	**Oct. 21 Sept. 22**
Task 7 – Conduct a literature review to glean current information available regarding crop and livestock integration (1/grant period; Group 1) and apply that information in the form of field demonstrations. (3-5 in yr. 2-3; Group 1, 3, 4 & 5)	Literature review.	1			
	In-field demonstrations based on information found in literature review	3-5			

	pertaining to crop and livestock integration.				
Objective 5			**Oct. 19 Sept. 20**	**Oct. 20 Sept. 21**	**Oct. 21 Sept. 22**
Task 8 – Provide educational and technical support pertaining to general manure management issues to producers, NDSU Extension and agency personnel. (Group 1, 3, 4 & 5)	Provide Groups 2, 3, 4 & 5 with science/based manure management recommendations (5/mo)	180			
	Workshops (3/yr.) and demonstrations (4/yr.)	21			
	Educational Producer Meetings (10/yr.)	30			
	LEM News (3/yr.)	9			
	Website	1			

- Group 1 – NDSU LEM Extension Specialist
- Group 2 – NDDH
- Group 3 – NDSU Extension agents/specialists
- Group 4 – 319, NRCS
- Group 5 – Other (manure industry reps, out-of-state speakers, producers, farm business management specialist, etc.)

Appendix C: Letters of Support

Bloms Land & Cattle, LLC
7470 42nd Ave. NW
Carpio, ND 58725

September 28, 2018

Greg Sandness
ND NPS Management Program Task Force
918 E. Divide Ave., 4th floor, Gold Seal Center
Bismarck, ND 58501

Greg and Task Force,

I am writing this letter in support of the funding for the Livestock Environmental Nutrient Management Educational Support Program position. I own and operate a large permitted animal feeding operation in ND.

I have worked with Mary a couple times over the past six years, most recently this summer. Mary and I worked on a manure composting project where I learned the ins and outs of composting and hosted a field day event for other crop and livestock producers and Extension agents. Twenty-five people attended the event to ask questions about composting and using manure on fields.

As I work on continually updating my nutrient management plan, I know I can call NDSU Extension with questions related to manure management and its use as a fertilizer on the crops I use in my feedyard. I not only rely on local Extension support, but also the specialized support of positions like Mary's, as she can focus in on one area and can offer ideas of what other producers are doing not only statewide but also regionally.

Please consider funding this program that is important to me, a North Dakota producer.

Sincerely,

Monte Bloms
Bloms Land & Cattle, LLC

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
6720 HWY 200,
Carrington, ND 58421-8701

September 28th 2018

Greg Sandness
ND NPS Management Program Task Force
918 E Divide Ave 4th floor, Gold Seal Center
Bismarck ND 58501

I am writing this letter of support for the continuation of funding for the Livestock Environmental Nutrient Management Educational Support Program position. This position is very beneficial to our area farmers and ranchers who annually apply nutrients to their fields. Understanding the risks associated with doing that is a great value to the water quality issues we face in North Dakota.

Together with this position and efforts made from our office, best management practices to treat risks of runoff and erosion will continue to be our targets in mitigating these risks. Locally, our National Water Quality Initiative is a feature that NRCS shares in the goal of targeted efforts for improved water quality.

Education and outreach to ag producers is critically important and this position is a vital component to that happening. Please consider this position for funding to be of utmost importance to us at NRCS and Foster County Soil Conservation District.

Paul DuBourt
District Conservationist
Natural Resources Conservation Service
Carrington NRCS Field Office

Dionn Schaaf
Foster Co SCD

K2S Engineering Inc.
4209 94th Ave Se
Ypsilanti, North Dakota 58497
Phone: (701) 489-3322
Cell: (701) 320-6493
Email: k2s@daktel.com
February 9, 2006

Greg Sandness
ND NPS Management Program Task Force
918 E Divide Avenue 4th Floor Gold Seal Center
Bismarck, ND 58501-1947

Re: Nutrient Management Educational Support Program, Carrington Research Extension Center

Greg,

K2S Engineering Inc. is a company that provides agricultural engineering and manure management/planning services to area producers. Our focus is designing facilities for animal feeding operations of all sizes, including large CAFOs. We feel it is important for our clients to understand the importance of a well-managed facility, which includes the utilization of the manure produced at their facility. The first step to producers understanding the benefit of this nutrient resource is education. Carrington Extension Research Center is essential to this process by providing this information and educating those in the agricultural industry. That is why we feel it is extremely important to fund this program to provide the concrete data/facts that support the recommendations and plans that this industry will utilize to more successful.

Thank-you,

Shane Kjellberg, PE

Appendix D:

Examples of Levels 1, 2 & 3 evaluations & accompanying NDSU Extension Impact Reports

Nutrient Management Day **Evaluation of Learning** **Date: August 18, 2015**

Directions: Please rate your learning in this workshop. Your honest responses are valued. Your responses will be used to assist the Nutrient Management team to make improvements in the design of this workshop.

Place an X in the box to indicate your response. (1=nothing, 3=some, 5=a lot)

	1 ←		3 →		5
1. Overall, how much did you learn from attending this meeting?	☐	☐	☐	☐	☐
Please rate each of the following:	1 ←		3 →		5
2. My Understanding of mortality composting: **(1=low, 3=moderate, 5=high)**					
Before Participation	☐	☐	☐	☐	☐
Now, After Participation	☐	☐	☐	☐	☐
3. My Knowledge of composting manure:					
Before Participation	☐	☐	☐	☐	☐
Now, After Participation	☐	☐	☐	☐	☐
4. My Understanding of calibrating a manure spreader:					
Before Participation	☐	☐	☐	☐	☐
Now, After Participation	☐	☐	☐	☐	☐
5. My Understanding of the ND Corn Manure Calculator:					
Before Participation	☐	☐	☐	☐	☐
Now, After Participation	☐	☐	☐	☐	☐
6. My Awareness of ongoing manure and compost research at the CREC:					
Before Participation	☐	☐	☐	☐	☐
Now, After Participation	☐	☐	☐	☐	☐

7. List one action you intend to take as a result of this workshop:

8. List one behavior you intend to change (within the next 3 months, 6 months, 12 months) as a result of information learned in this session:

9. Please list the topics or issues you would like more information about.

_____
_____
_____

Making a difference

NDSU EXTENSION SERVICE

NORTH DAKOTA STATE UNIVERSITY

Nutrient Management Day at the NDSU Carrington REC

The Situation

Manure as a fertilizer is highly underused in North Dakota when compared to neighboring states. Manure is a nutrient-rich product that not only contains necessary nutrients for growing crops, but also has benefits for the soil, such as advantageous micro-organisms, increased carbon, and increased water-holding capacity. Composting manure can reduce the volume that needs to be hauled to the field by 50%, reducing the total hauling expense for the farmer. While research has been conducted showing that composted manure can be used as a fertilizer, many farmers either don't know the composting process or have never viewed growing crops that have been fertilized by composted manure.

Extension Response

Composting site selection is very important as North Dakota's surface water quality could be compromised by an influx in nutrients due to incorrect site placement. Proper construction of a manure compost pile/row as well as maintenance of the product will dictate quality at the end of the process. Seeing how manure compost turners work and the differences between types can help a producer determine what is best for their operation. Finally, on-site viewing of crop rotations and growing crops that have been fertilized by composted livestock manure aid in producer decision making. All of these topics and more were covered by speakers during a daylong, hands-on workshop created by the Livestock Environmental Management program. This workshop was specifically designed around manure nutrients, the process of composting manure and using compost as a fertilizer. Speakers included government, state, producer and university personnel.

Impacts

Twenty-three participants completed the field day survey. Sixty-four percent of the participants had a medium-high to high understanding of compost site selection. Eighty-nine percent for the participants had a medium-high to high understanding of the differences between manure and compost. Eighty-five percent of the participants had a medium-high to high understanding of the manure composting process.

Feedback

- "It was nice to see manure application on different crops."
- "Great learning session!"

As a result of NM Day I plan to:

- "Change my rotation."
- "Continue to follow research on the use of composted manure as a fertilizer."

Contact

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Workshop Name: Equine Encounter **Evaluation of Learning** **Date: April 2015**

Directions: Please rate your learning in this workshop. Your honest responses are valued. Your responses will be used to assist the Equine Encounters team to make improvements in the design of this workshop.

Place an X in the box to indicate your response. (1=nothing, 3=some, 5=a lot)

	1 ←		3	→	5
1. Overall, how much did you learn from attending this meeting?	☐	☐	☐	☐	☐

Please rate each of the following:	1 ←		3	→	5
2. My Understanding of equine biosecurity: **(1=low, 3=moderate, 5=high)**					
Before Participation	☐	☐	☐	☐	☐
Now, After Participation	☐	☐	☐	☐	☐
3. My Knowledge of equine manure management:					
Before Participation	☐	☐	☐	☐	☐
Now, After Participation	☐	☐	☐	☐	☐
4. My Knowledge of equine pasture management and weed control:					
Before Participation	☐	☐	☐	☐	☐
Now, After Participation	☐	☐	☐	☐	☐
5. My Awareness of spring equine vaccinations and deworming:					
Before Participation	☐	☐	☐	☐	☐
Now, After Participation	☐	☐	☐	☐	☐

10. List one action you intend to take as a result of this workshop:

11. List one behavior you intend to change (within the next 3 months, 6 months, 12 months) as a result of information learned in this session:

12. The most important things I learned in this session were:

13. Please list the topics or issues you would like more information about.

Equine Encounter **6 Month Follow-up Evaluation** **October 2015**

1. After participating in the Equine Encounter workshop, did you share information you learned from the program with others?
    - Yes
        - Please provide specific examples of what you shared and with whom.
    - No

2. Are you using the information learned in the Equine Encounter workshop?
    - I have not had time or opportunity to use it
    - I don't need to use this information – it was not useful
    - I am using it and it was useful
        - Please provide a specific example of how you used it.

3. Since attending the Equine Encounter workshop, have you made any changes to your operation/situation based upon the information you obtained at the workshop?
    - Yes
        - Please share specific examples of changes you made and how this has helped your operation/situation.
    - No

4. Since attending the Equine Encounter workshop, have you made any changes to your operation or practices based upon information obtained from the topics presented during the workshop?

	Yes - I made changes	No - I did not make changes	N/A
Manure Management			
Pasture Management and Weed Control			
Spring Equine Vaccinations and Deworming			
Equine Biosecurity – Ward County			
Hay Selection – Cass & Morton Counties			

5. Please describe in more detail how you used information to make positive changes.

6. As a result of attending the Equine Encounter workshop, did you find any financial savings for your operation/situation?
    - Yes
        - Please describe the savings achieved.
    - No

7. After attending the Equine Encounter workshop, what specifically did you change?
    - How did you change your vaccination protocol?
    - How did you change your deworming protocol?
    - How did you change your pasture management?
    - How did you change your manure management?

8. How did the information you learned help you to improve your goals of equine management or being a better horse owner?

Equine Encounters…Reaching a Smaller Sector of the North Dakota Livestock Industry

The Situation

Although equine may be considered a specialty livestock, the animals still make up a significant part of North Dakota's animal agriculture industry. There were a total of 5,379 horses and ponies in North Dakota in 2012 according to the National Agricultural Statistics Service with 5,048 farms owning between 1 and 24.

Extension Response

In April 2015, the Extension agents in Cass, Morton and Ward counties were host sites and presenters for the Equine Encounter workshops along with an area and state Extension specialist. Agents presented information on hay selection for horses in Cass and Morton counties and equine biosecurity in Ward County. The state specialist discussed strategies for pasture management and weed control, and the area specialist discussed manure management at all three locations. A non-Extension equine veterinarian presented on spring vaccinations and deworming.

Impacts

Participants filled out a learning evaluation following the workshop presentations.

- 39 of 46 respondents reported learning above average or a lot from attending an Equine Encounter workshop.

Respondents were asked to evaluate their knowledge levels of the topics prior to and after the presentations. There was an increase in knowledge in all areas:

- 65% increase in understanding of proper hay selection for different classes of horses
- 57% increase in knowledge of proper manure management techniques
- 60% increase in knowledge of summer pasture management and weed control
- 65% increase in awareness of spring equine vaccinations and deworming protocols
- 64% increase in understanding of biosecurity issues when traveling to events with animals

A six month follow-up evaluation was distributed. Nine participants responded to the questions.

- 2 of 4 made changes to the way they were composting manure
- 5 of 5 made changes to their pasture weed control
- 4 of 5 made changes to the way they managed their pasture grazing
- 5 of 7 made changes to their current deworming protocol
- 2 of 4 made changes to their biosecurity protocols at equine events

Ninety-eight percent of 46 respondents said they would attend another meeting if offered the following year. It is clear that this constituency group is asking for and using the information we have to share.

Feedback

"It was very informative and enjoyable. Would recommend these workshops to others." attendee

Comments from the follow-up survey:

- "Started composting"
- "I did more spot spraying [in pasture(s)]."
- "We worked with the county weed board and correctly identified the weeds in the pasture to ascertain which herbicide would be most efficient."
- "I'm more aware of the growth cycle of different grasses. Tried to graze during optimal times."
- "I feed age groups by quality [of hay]."
- "Didn't allow novel horses to share water buckets."

Contact

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Team Members

Paige Brummund, Jackie Buckley, Kelcey Hoffmann, Dr. Kevin Sedivec

Kids • Compost • Crops & CONSUMPTION

PRESURVEY

County: _____

Date: _____

1. How old are you?
    a) 8 years old
    b) 9 years old
    c) 10 years old
    d) 11 years old
    e) Other _____

2. Are you:
    a) Male
    b) Female

3. What is your ethnic origin? (circle all that apply)
    a) White
    b) American Indian/Native American
    c) Asian or Pacific Islander
    d) Hispanic
    e) African American
    f) Other_____

4. Which of the following do livestock eat?
    a) Grass
    b) Corn
    c) Hay
    d) All of the above

5. Livestock use plants as:
    a) Food
    b) Clothes
    c) Shelter
    d) None of the above

6. If you were to eat a hamburger at supper, what animal would it be from?
    a) Cow
    b) Sheep
    c) Pig
    d) None of the above

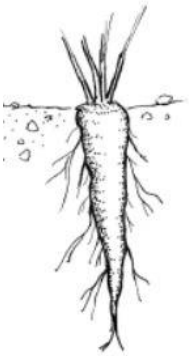
7. Manure can be used as compost?
    a) Yes
    b) No

8. What materials can be composted?
    a) Pop cans
    b) Leftover meat
    c) Paper

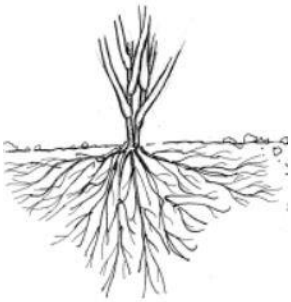
9. Composting will reduce the volume (amount) of the product at the end by:
    a) 10%
    b) 50%
    c) 80%

10. Which root is a tap root?

    a)



    a)



11. This life cycle uses energy from sunlight and carbon dioxide to make sugar and oxygen:
    a) The sunrise
    b) Photosynthesis
    c) The water cycle

12. Nitrogen, phosphorus and potassium (N-P-K) also are known as:
    a) Nutrients
    b) Photosynthesis
    c) Grass

13. What soil particle is the largest in size?
    a) Sand
    b) Silt
    c) Clay

14. How does compost help the soil?
    a) Increases organic matter
    b) Adds nutrients
    c) Increases water movement
    d) All of the above

15. What do soil particles affect?
    a) Water movement in the soil
    b) Nutrient holding capacity
    c) A and B

16. How willing are you to try new fruits and vegetables?
    a) Not willing
    b) Somewhat willing
    c) Very willing

17. How many servings of vegetables do you eat each day?

    1 2 3 4 5

18. Fruits and vegetables contain _____ and _____ that help our brain, eyes, heart, skin and teeth:
    b) Vitamins and minerals
    c) Sugar and salt
    d) Sticks and stones

19. How many days of the week are you physically active for 60 minutes? (circle one)

    0 1 2 3 4 5 6 7

Thank you!

NDSU | EXTENSION

EXTENDING KNOWLEDGE ›› CHANGING LIVES

Kids • Compost • Crops & CONSUMPTION

POST-SURVEY

County: _____

Date: _____

1. How old are you?
   a) 8 years old
   b) 9 years old
   c) 10 years old
   d) 11 years old
   e) Other _____

2. Are you:
   a) Male
   b) Female

3. What is your ethnic origin? (circle all that apply)
   a) White
   b) American Indian/Native American
   c) Asian or Pacific Islander
   d) Hispanic
   e) African American
   f) Other_____

4. Which of the following do livestock eat?
   a) Grass
   b) Corn
   c) Hay
   d) All of the above

5. Livestock use plants as:
   a) Food
   b) Clothes
   c) Shelter
   d) None of the above

6. If you were to eat a hamburger at supper, what animal would it be from?
   a) Cow
   b) Sheep
   c) Pig
   d) None of the above

7. Manure can be used as compost?
   a) Yes
   b) No

8. What materials can be composted?
   a) Pop cans
   b) Leftover meat
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9. Composting will reduce the volume (amount) of the product at the end by:
   a) 10%
   b) 50%
   c) 80%

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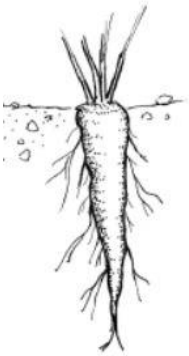
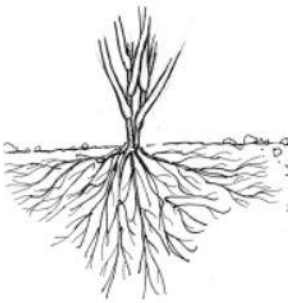


    a)



11. This life cycle uses energy from sunlight and carbon dioxide to make sugar and oxygen:
    a) The sunrise
    b) Photosynthesis
    c) The water cycle

12. Nitrogen, phosphorus and potassium (N-P-K) also are known as:
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    b) Photosynthesis
    c) Grass

13. What soil particle is the largest in size?
    a) Sand
    b) Silt
    c) Clay

14. How does compost help the soil?
    a) Increases organic matter
    b) Adds nutrients
    c) Increases water movement
    d) All of the above

15. What do soil particles affect?
    a) Water movement in the soil
    b) Nutrient holding capacity
    c) A and B

16. Are you more willing to try new fruits and vegetables since this class started?
    a) Not willing
    b) Somewhat willing
    c) Very willing

17. How many servings of vegetables do you eat each day?

    1 2 3 4 5

18. Fruits and vegetables contain _____ and _____ that help our brain, eyes, heart, skin and teeth:
    b) Vitamins and minerals
    c) Sugar and salt
    d) Sticks and stones

19. How many days of the week are you physically active for 60 minutes? (circle one)

    0 1 2 3 4 5 6 7

20. List one thing you learned:

21. List one thing you will do this summer that you learned in the nutrition/garden project.

22. What did you like about the nutrition/garden project?

23. Did you take the family newsletter home?
    a) Yes
    b) No

24. Did anyone in the family read the newsletter?
    a) Yes
    b) No

Thank you!

NDSU | EXTENSION

EXTENDING KNOWLEDGE ›› CHANGING LIVES

Kids • Compost • Crops & CONSUMPTION

FOLLOW-UP SURVEY

County: _____

Date: _____

1. Did you plant the garden box we provided for you?
    a) Yes
    b) No. Please explain what stopped you from planting your garden box.

    _____

    _____

    _____

    _____

2. Did you harvest and eat the spinach from the garden you planted?
    a) Yes. What did you prepare with the spinach?

    _____

    _____

    b) No
    c) I did not plant the garden.

3. Who else participated in the garden activity?
    a) No one
    b) Parent/guardian
    c) Sibling
    d) Other _____
    e) I did not plant the garden

4. Did you grow a garden besides the one we provided you?
    a) Yes
    b) No

5. Did you start a compost pile this summer?
    a) Yes. What did you compost?

    _____

    _____

    b) No

6. How many days of the week were you physically active for 60 minutes this summer? (circle one)

   0 1 2 3 4 5 6 7

7. How many servings of vegetables did you eat this summer?

   0 1 2 3 4 5

8. Do you have anything else you would like us to know?

_____

_____

_____

_____

_____

We enjoyed bringing Kids, Compost, Crops and Consumption to your classroom!

NDSU | EXTENSION

Thank you!

EXTENDING KNOWLEDGE » CHANGING LIVES

NDSU EXTENSION SERVICE
NORTH DAKOTA STATE UNIVERSITY

MAKING A DIFFERENCE

Kids, Compost, Crops and Consumption

The Situation

According to the Centers for Disease Control and Prevention, 92 percent of children in North Dakota do not eat enough vegetables. Also, the average American consumer is three to four generations removed from agriculture.

Extension Response

Youth participating in the Kids, Compost, Crops and Consumption program learned about nutrition, agricultural production and where their food comes from. This program was piloted to 80 third- and fourth-graders at a low-income school in the Fargo School District.

The program consisted of six lessons taught once a month throughout the school year. Each lesson focused on a different part of the food cycle:

- Livestock production (Kelcey Hoffmann)
- How compost recycles plant and livestock manure into a valuable resource for crop production (Mary Berg)
- How soil supports livestock and crop production (Alicia Harstad)
- Root development, required nutrients for plant growth and photosynthesis (Todd Weinmann)
- Health benefits of vegetables and how to incorporate vegetables into their diet (Nikki Johnson)

The final lesson was a review of the previous lessons. Each student was provided with a square foot garden and all of the necessary supplies and information to grow spinach during the summer. Students also received two recipes for using spinach and tasted those recipes before the lesson ended. Every lesson also promoted daily physical activity.

Impacts

Success of this program was measured with pre and post evaluations as well as a follow-up evaluation three months following the final lesson.

Students improved their knowledge of nutrition, compositing and agriculture by participating in this program. For example:

- 97 percent know livestock use plants as food.
- 78 percent know paper can be composted, compared with 41 percent before the program.
- 68 percent correctly defined photosynthesis as the life cycle that uses sunlight energy and carbon dioxide to make sugar and oxygen.
- 75 percent correctly answered that sand is the largest soil particle, compared with 20 before the program.
- 85 percent indicated they are more willing to try new fruits and vegetables.
- 91 percent know fruits and vegetables contain vitamins and minerals that help our brain, eyes, heart, skin and teeth.

Follow-up evaluations were completed by 63 students three months after the last lesson and indicated students applied the knowledge they gained:

- 73 percent planted the square-foot garden that was provided by the program.
- 37 percent harvested the plant and the majority ate it as a salad.
- 57 percent planted another garden besides the one the program provided.
- 62 percent had a parent participate in the garden activity.
- 29 percent consumed 2 serving of vegetables per day during the summer break months.

Feedback from Teachers

- “We appreciate all of your work and patience with our students. You made it hands-on, interesting and something they will remember. Thank you for all of your work and effort!”
- “The most valuable part of the program was exposing the students to agriculture in ways they have not experienced. Very hands-on and having something to take home to try was excellent. As one student said, ‘Showing us real life.’”

NDSU EXTENSION SERVICE
NORTH DAKOTA STATE UNIVERSITY

MAKING A DIFFERENCE

Public Value Statement

Educating students about food production and the nutritional requirements of a balanced diet may empower them to make healthy choices and begin to provide food security.

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Collaborators

Linda Schuster
Stacy Wang

Non-Extension Collaborators

Northern Cass FFA

Resource Links

I3-Corps Blog part 1

- https://extension.org/2016/06/17/i-three-issue-corps-kids-compost-crops-consumption/

I3-Corps Blog part 2

- https://extension.org/2016/08/10/i-three-issue-corps-kids-compost-crops-and-consumption-part-ii/

Appendix E

Budget Table for Livestock Environmental Nutrient Management Educational Support Program

Part 1: Funding Sources	2020	2021	2022	TOTAL
FY19 Section 319 Funding	130,917	127,474	131,608	390,000
NDSU Non-federal Match**	87,396	84,875	87,729	260,000
Total	218,313	212,349	219,337	650,000

** The sources and value of cash match provided by NDSU staff is provided in more detail in Appendix F.

Appendix F

Livestock Environmental Nutrient Management Educational Support Program

Part 2 Section 319/Non-Federal Budget

Fiscal Year	2020	2021	2022		Total 319 Funds	NDSU Non-federal Match FY20-23	Total
Personnel/Support							
1) Salary (1.0 FTEs)	57,482	59,206	60,982		177,670	173,333	351,003
2) Fringe	27,591	28,419	29,271		85,282	60,667	145,948
3) Travel	10,900	9,400	10,900		31,200		31,200
4) Printing	1,820	1,820	2,570		6,210		6,210
6) Supplies	7,700	3,550	2,392		13,642		13,642
8) Communication	2,380	2,380	2,380		7,140		7,140
9) Fees							
manure and soil sample analysis	5,152	5,152	5,152		15,456		15,456
speakers	3,000	3,000	3,000		9,000		9,000
site rental	1,800	1,800	1,800		5,400		5,400
Subtotals	117,825	114,727	118,447		351,000	234,000	585,000
Administrative	13,092	12,747	13,161	0	39,000	26,000	65,000
Total 319/Non-Federal Budget	130,917	127,474	131,608	0	390,000	260,000	650,000

Appendix G

Livestock Environmental Nutrient Management Educational Support Program

Value of Time and Services Provided by Extension Personnel as non-Federal match

Fiscal Year	FTE	2020	2021	2022	Total
Personnel/Support					
State and Regional Specialists	0.07	4,102	3,909	4,124	12,135
Research Scientists (1 staff)	0.02	1,135	1,105	1,141	3,381
Extension Agents (9 staff)	0.90	53,027	51,569	53,221	157,817
Fringe Benefits		20,392	19,804	20,470	60,667
Administrative		8,740	8,487	8,773	26,000
Total Non-Federal Match Budget* **		87,396	84,875	87,729	260,000

*** Matching funds are estimated at the beginning of the four-year period. Amounts are subject to change with changing staff and changing salaries. Total match will always meet agency requirements.