

Managing Mud, Manure, and Runoff: Kentucky Livestock BMP Demonstration and Training Project

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- Kentucky Beef Network
- Kentucky Cattlemen’s Association
- Morgan County Extension Agent and Staff

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EXECUTIVE SUMMARY

The Kentucky Agriculture Water Quality Act (KAWQA) encourages producers to implement site-specific best management practices (BMPs) and develop a management plan for their farm to minimize nonpoint source pollution. Choosing the appropriate BMPs and developing an effective management plan requires an understanding of the connection between agricultural activities and nonpoint source pollution. A recent (2012) statewide survey distributed to horse owners determined that many producers may not be equipped with the analytical skills or educational materials to draw the necessary connections between poor management practices, water quality, decreased fertility, livestock health, and environmental hazards (UK, 2012).

Even after 20 years of the KAWQA, many obstacles still remain that prevent producers from fully implementing BMPs. Categories of constraints to adoption behavior cited by previous researchers include landholder perspective, management practice characteristics, socio-economic structure of producer's community, knowledge and training of agricultural professionals, and institutional restraints (Pannell et al., 2006). Additionally, livestock managers may be hesitant to adopt new management strategies because many of these practices are rarely associated with a rapid increase in profitability or productivity.

A variety of agriculture water quality BMPs were implemented as a part of this project, and the project sites served as BMP demonstration hubs. This project took place at five Kentucky locations, including: the University of Kentucky (UK) C. Oran Little Research Center, the UK Coldstream Dairy Research Farm, the UK North Farm, Eden Shale Farm, and the Kentucky Horse Park. BMPs that were implemented and demonstrated include: a mobile feed and water trailer, water harvesting systems, alternative water sources, stormwater management, winter feeding structures, heavy use areas, shade structures, enhanced riparian areas, grade stabilizing structures, stream crossings, dry lots, nutrient management plans, rotational and flash grazing techniques, and windbreaks. Environmental benefits, production concerns, and economic factors associated with implemented BMPs were presented and discussed during field days and educational events at each of the project sites.

The project had both regional and statewide appeal as evidenced through routine utilization by producer education programs that included: Master Cattleman, Pasture to Plate, Master Stocker, and Master Grazer programs, Sheep Profit Field Days, and Ewe Profit Schools. UK animal science and sustainable agriculture courses, as well as local high school agriculture and environmental science classes, regularly visited BMP demonstration sites as part of their curriculum. It is anticipated that implemented BMPs will be used for continued tours and field days that may include K-12 students, college classes, special interest groups, advisory groups, state agency personnel and committees (e.g. Division of Conservation, Division of Water, Soil and Water Commissioners, Agriculture Water Quality Authority, Governor's Office of Agricultural Policy, etc.), as well as farmer and livestock producer field days. The legacy and knowledge gained from this project can be leveraged for future water quality BMP demonstration projects statewide.

INTRODUCTION AND BACKGROUND

The Environmental Protection Agency states that agriculture has a greater impact on stream and river contamination than any other nonpoint source (USEPA, 2009). In Kentucky, it is estimated that 25 percent of the impaired stream miles assessed are caused by pollution from livestock operations (USEPA, 2010). The Kentucky General Assembly passed the Kentucky Agriculture Water Quality Act (KAWQA) in 1994 with the aim of protecting surface and ground water resources from pollution caused by agricultural and silvicultural activities.

The KAWQA encourages producers to implement site-specific Best Management Practices (BMPs) and develop a management plan for their farm to minimize nonpoint source pollution. Choosing the appropriate BMPs and developing an effective management plan requires an understanding of the connection between agricultural activities and nonpoint source pollution. A recent (2012) statewide survey distributed to horse owners determined that many producers may not be equipped with the analytical skills or educational materials to draw the necessary connections between poor management practices, water quality, decreased fertility, livestock health, and environmental hazards (UK, 2012).

Even after 20 years of the KAWQA, many obstacles still remain that prevent producers from fully implementing BMPs. Categories of constraints to adoption behavior cited by previous researchers include landholder perspective, management practice characteristics, socio-economic structure of producer's community, knowledge and training of agricultural professionals, and institutional restraints (Pannell et al., 2006). Additionally, livestock managers may be hesitant to adopt new management strategies because many of these practices are rarely associated with a rapid increase in profitability or productivity.

Other research suggests that increased implementation of conservation strategies is more reliant on the capacity of the incentive to compensate producers for anticipated losses and the extent to which information is shared than other factors (Baerenklau, 2005). However, many voluntary conservation initiatives quickly become incentive-dependent when producers are expected to take profitable pastureland out of production.

The Project Team recognized that there is a need for educational campaigns targeted toward producers and agricultural professionals that can begin to bridge the gap between environmental stewardship, water quality, and on-farm productivity. Bridging this gap would require BMP incentives to go beyond environmental objectives and provide economic returns. For example, winter-feeding of beef cattle represents one of the single largest expenses of that industry. The installation of winter feeding areas needs to be incorporated not only as a BMP that aids in reducing pollutant transport from frozen soils, but also a cost effective measure to preserve food quality and herd health.

Existing educational initiatives for livestock producers in Kentucky are usually species-specific and function on a county by county or conservation district level. Research has shown that Extension outreach campaigns that provide learning opportunities where participants are given a chance to experience educational inputs consistently result in higher learning gains and retention values (Richardson, 1994). To create such an educational setting, a variety of BMPs were implemented at the

University of Kentucky C. Oran Little Research Center, the UK North Farm, UK Coldstream Dairy Research Farm, Eden Shale Farm, and the Kentucky Horse Park.

The goal of this project was to promote and facilitate the implementation of agriculture water quality plans and best management practices that reduce water pollution from livestock operations and enhance profitability. The objectives and associating activities of this project are as follows:

Objective 1: Develop best management practice demonstration sites at the C. Oran Little Research Center, the UK North Farm, and UK Coldstream Dairy Research Farm. An amendment to the grant included the Kentucky Horse Park as a BMP demonstration site.

- Develop a KDOW-approved BMP implementation plan for an integrated and comprehensive suite of BMPs for cattle, small ruminant, and dairy producers.
- Install BMPs that could include, but are not limited to, rotational grazing feed and water trailer for small ruminant production, winter feeding structures, heavy traffic pads, alternative water sources, rotational grazing system for livestock, modified settling basin that controls feedlot runoff, shade structures, enhanced riparian areas, stream crossings, vegetative buffer strips, dry lots, nutrient management plans, windbreaks, and stormwater BMPs.

Objective 2: Educate agriculture producers, agriculture and natural resources professionals, and students about the benefits of BMPs required by the KAWQA and the practices needed to competitively produce livestock.

- Develop comprehensive manuals that detail environmental considerations for beef cattle, dairy, and small ruminant producers.
- Develop presentations highlighting BMPs installed as part of this project as well as other BMPs required by the KAWQA or other practices needed to competitively produce livestock in an environmentally sound manner.
- Create displays that demonstrate project BMPs and other topics related to KAWQA compliance and nutrient management planning.
- Develop KDOW-approved advertising material to promote field days, workshops, and public demonstration events.
- Deliver presentations and educational materials from this project in the Master Cattleman, Master Stocker, Pasture to Plate, and Master Grazer programs, Sheep Profit Field Days Ewe Profit Schools, and college courses.
- Organize and lead training events for Conservation District, Cooperative Extension, Natural Resource Conservation Service (NRCS) staff, and other agricultural professionals throughout the state. Content of these training events will include BMPs installed as part of this project as well as other BMPs required by the KAWQA or

other practices needed to competitively produce livestock in an environmentally sound manner.

- Create and install advertisements promoting responsible practices and environmental compliance in industry magazines, newspapers, and on billboards.

Objective 3: Assess producer attitudes toward environmental stewardship in the context of this project.

- Develop an evaluation tool to assess producer opinions regarding installed BMPs, presentations, subject matter, and willingness to adopt practices on their properties.
- Conduct post-event evaluations of event attendees.
- Summarize assessment results immediately following event.
- Utilize assessment results to adjust delivery methods, style, and content for future events to achieve a maximum connection with the participants in effort to increase BMP adoption.

MATERIALS AND METHODS

Project Areas

- University of Kentucky C. Oran Little Research Center
- University of Kentucky Coldstream Dairy Research Farm
- University of Kentucky North Farm
- Eden Shale Farm
- Kentucky Horse Park

BMP Development and Implementation

BMP Implementation Plan

A Kentucky Division of Water (KDOW) approved BMP Implementation Plan was used to guide decision-making and determine feasibility (Appendix B).

Program Advisory Committee

A Program Advisory Committee (PAC) was used to provide input on the design, development, and implementation of all components of the project by means of technical, professional, or judiciary assistance. The PAC met with project personnel soon after funds were awarded to provide guidance regarding on-farm demonstration sites and associated BMPs, presentation development, and fact sheets. Additional meetings were held as necessary to discuss workshop development, field day presentations, and program evaluation. All project materials developed as a result of this project were reviewed and approved by KDOW prior to release.

PAC Members

Agency Name: University of Kentucky
Role/Contribution to Project: Cooperation and cost share Contact
Person(s): Steve Workman

Agency Name: Kentucky Cattlemen's Association, Kentucky Beef Network
Role/Contribution to Project: Cooperation, input, and advertising for Master Cattleman, Pasture to Plate, Master Stocker, and Master Grazer programming and workshops
Contact Person(s): Becky Thompson

Agency Name: Division of Conservation Role/Contribution to
Project: Cooperation and cost share Contact Person(s): Steve
Coleman and Kim Richardson

Agency Name: Natural Resources Conservation Service (NRCS) Role/Contribution to
Project: Technical support for BMP implementation
Contact Person(s): Tibor Horvath, Mark Ferguson, Randy Smallwood

Agency Name: Kentucky Agriculture Water Quality Authority Role/Contribution to Project: Aid in development and distribution of education and outreach information to federal, state, and local agriculture agencies as well as commodity groups and other agricultural stakeholders.

Contact Person(s): Steve Coleman

Agency Name: University of Kentucky, Robinson Center for Appalachian Resource Sustainability Role/Contribution to Project: Cooperation in conjunction with Small Ruminant Grazing Conference

Contact Person(s): David Ditsch

Agency Name: University of Kentucky Research C. Oran Little Research Center Role/Contribution to Project: Consultants and land users

Contact Person(s): Jeff Lehmkuhler

Agency Name: UK Coldstream Dairy Research Farm

Center Role/Contribution to Project: Consultant and land user

Contact Person(s): Jeffrey Bewley

Agency Name: Kentucky Horse Park

Center Role/Contribution to Project: Consultant and land user

Contact Person(s): Mackenzie Jeffs, Ryan Hix, and Darren Ripley

On-Farm Demonstration Sites

Best management practices were implemented under the guidance of the NRCS. Private contractors as well as UKCOLRC, UKCDRF, ESF, and KHP staff performed installation. These demonstration sites were used during educational tours as well as for formal tours given to entities such as the Kentucky Division of Water and the Natural Resources Conservation Service.

Education and Outreach

Fact Sheets

Fact sheets, also known as Extension publications, were developed on topics that were found to be of importance as a result of this project. These publications were produced using the University of Kentucky Agricultural Communications Services. Publications are available online (<http://www2.ca.uky.edu/agcomm/pubs.asp>) or can be found at Conservation District or Extension offices. Publications were also made available at demonstration sites, field days, and presentations.

Species-Specific BMP Manuals

For small ruminant, dairy, and beef cattle operations, a BMP manual or environmental chapter in a larger publication was created to highlight BMPs relevant to the type of operation, discuss agriculture's impact on water quality, and discuss how to achieve environmental compliance. Relevant BMPs were chosen based on multiple farm visits and one-on-one conversations with producers. The delivery of each manual was tailored to the challenges and goals on each type of operation. For example, small ruminants are prone to parasitic infections, so BMPs that prevent exposure were highlighted. Milkhouse wastewater management is major challenge for dairy operations, so management techniques were emphasized. For beef operations, a chapter that included BMPs relevant to beef operations and environmental compliance concerns was featured in The Kentucky Beef Book, a popular resource among Kentucky beef producers.

Displays and Signage

Poster displays were created for public events, field days, and the Visitor Information Center (VIC) at the KHP to demonstrate project BMPs and inform the public about the project. An electronic slide as part of an informative slide show in the VIC encouraged visitor's to find the water quality improvement projects throughout the park.

Educational signs for BMPs implemented at the KHP were created to inform visitors about the BMP and why it was installed. A QR code on the sign directs to additional information and resources for BMP implementation on the KHP's webpage. The content for this webpage was developed by the project team.

Presentations

PowerPoint was the primary media for County Extension, college lecture, program, workshop, and conference presentations. Presentations typically covered topics such as BMP design considerations, BMP implementation and installation methods, economic and production benefits of BMPs, and environmental enhancements of BMPs. The duration of these presentations varied from 30-90 minutes. Presentations were also given to middle school and high school students on watersheds, water quality, sources and types of pollution, BMPs, soil, and geology. A comprehensive list of presentations, educational events, tours, and training days can be found in Appendix A.

Trainings

Project personnel provided environmental stewardship training as part of the Master Cattleman, Master Grazer, Pasture to Plate, and Master Stocker Programs. Training participants received educational materials and were evaluated to gauge presentation success. Environmental stewardship training was also provided for a variety of turf, equine, and small ruminant programs within the University, such as the Turf and Landscape Management Short Course and the Small Ruminant Grazing Conference.

Project personnel also provided field and indoor trainings for the Conservation Districts, Cooperative Extension, and Natural Resources Conservation Service staff. Indoor trainings covered topics such as developing Agriculture Water Quality Plans and Nutrient Management Plans and appropriate BMPs for various operations or typical farm issues. Program participants received a folder of resources and additional information. Outdoor trainings consisted of tours of the project sites for Kentucky Division of Water inspectors and Natural Resources Conservation Service Technical Service Providers and staff. Tours and training were also provided to multiple producer groups and other resource professionals. These tours provided training on what to look for during an inspection and appropriate BMPs for mitigating pollution concerns. A comprehensive list of presentations, educational events, tours, and training days can be found in Appendix A.

Educational Tours

Educational tours at the project sites were given to various producer, agency, and student groups. During the winter, a bus tour visited select BMPs, and a walking tour or hayride were used during the spring, summer, and fall. Participants were given handouts that contained pictures of what the BMP site looked like before implementation. A comprehensive list of presentations, educational events, tours, and training days can be found in Appendix A.

Advertisements

Billboards promoting Agriculture Water Quality Plans and Nutrient Management Plans were installed throughout the state. Designs were chosen based on the success of a similar campaign used during the Hinkston Creek Watershed Protection Project. Billboard locations were chosen based on the number of livestock in the county and the number of BMPs implemented through the NRCS.

Articles promoting BMPs, AWQPs, NMPs, and more were produced for various industry newspapers and magazines: Cow Country News, Farm Press, Farmer's Pride, Kentucky Farm Bureau magazine, HoofPrint, UK's mAGazine, UK's Off the Hoof, and UK's Dairy Notes.

Miscellaneous Materials

Other educational materials developed for the project included brochures (3 copies of each brochure are submitted accompanying this report), videos, a website (<https://www.uky.edu/bae/awqp>), and a virtual tour (<https://leemoser.maps.arcgis.com/apps/MapTour/index.html?appid=0b7f4bef2efd46689549c8e8db19969d>).

Program Evaluations

This project incorporated a continuous feedback loop—assessment, analysis, refinement, and reassessment. Input from the project advisory committee, program participants, and individual producers were used to improve project deliverables. The number of program participants and changes in attitudes of program participants were two metrics of success. Additional measures included fact sheet publications and follow-up surveys (questions following) after Master Stocker, Master Cattlemen, and Pasture to Plate programs to ascertain if any changes in behavior patterns had been achieved. All direct and indirect contacts numbers are available upon request through the Kentucky Extension Reporting System. Survey results for select presentations are also available upon request.

RESULTS AND DISCUSSION

BMP Development and Implementation

University of Kentucky C. Oran Little Research Center

- Winter feeding areas
- Octagonal waterer
- Feed wagon
- Shade sleds
- No-mow zones
- Riparian area protection
- Nutrient management planning
- Limited access to streams
- Excess pesticide disposal

University of Kentucky Coldstream Dairy Research Farm

- Dry cow barn
- All-weather surface
- Rotational grazing
- Alternative water sources
- Feeding bunk renovations
- Shade sleds
- No-mow zones
- Riparian area protection
- Nutrient management planning
- Limited access to streams
- Excess pesticide disposal

University of Kentucky North Farm

- Floating barley straw baskets
- Four run-in sheds for horses
- Three pervious horse stalls
- Floating treatment wetlands
- No-mow zones
- Riparian area protection
- Nutrient management planning
- Waste oil storage

- Spring development
- Grade stabilization structures
- Limited access to streams
- Excess pesticide disposal
- Stream crossing protection

Eden Shale Farm

- Fence line feeders
- Alternative water sources (integrated in rotational grazing system as a hub)
- Stormwater diversion
- Removed dump (wire)
- Water harvesting systems
- Solar powered pumping systems for livestock water
- Heavy use areas
- Improved winter feeding areas and structures
- Shade sleds
- Vegetative treatment strips established
- Nutrient management planning

Kentucky Horse Park

- Floating treatment wetlands
- Vegetative treatment strips
- Pervious horse wash stalls
- Denitrifying bioreactor (mulch trench)
- Alternative water sources
- Riparian area protection
- Run-in shed and dry lot
- Dry lot for minis
- No-mow zones
- All-weather surfaces
- Rotational grazing
- Water harvesting
- Limited access to streams

Education and Outreach

Fact Sheets

- Feedlot Design and Environmental Management for Backgrounding and Stocker Operations (ID-202). <http://www2.ca.uky.edu/agcomm/pubs/ID/ID202/ID202.pdf>
- All-Weather Surfaces for Livestock (AEN-115). <http://www2.ca.uky.edu/agcomm/pubs/AEN/AEN115/AEN115.pdf>
- Environmental Compliance for Dairy Operations (ID-200). <http://www2.ca.uky.edu/agcomm/pubs/ID/ID200/ID200.pdf>
- On-Farm Composting of Animal Mortalities (ID-166). <http://www2.ca.uky.edu/agcomm/pubs/id/id166/id166.pdf>
- On-Farm Disposal of Animal Mortalities (ID-167). <http://www2.ca.uky.edu/agcomm/pubs/id/id167/id167.pdf>
- Increasing Dry Cow and Bred Heifer Performance with Environmental Management (AEN-121). <http://www2.ca.uky.edu/agcomm/pubs/AEN/AEN121/AEN121.pdf>
- Lowering Somatic Cell Counts with Best Management Practices (AEN-123). <http://www2.ca.uky.edu/agcomm/pubs/AEN/AEN123/AEN123.pdf>
- Closing a Liquid Manure Storage Structure (AEN-125). <http://www2.ca.uky.edu/agcomm/pubs/AEN/AEN125/AEN125.pdf>
- All-Weather Surfaces for Cattle Watering Facilities (ID-229). <http://www2.ca.uky.edu/agcomm/pubs/ID/ID229/ID229.pdf>
- Drought Risk Management for Beef Cattle Farms (AEN-130). <http://www2.ca.uky.edu/agcomm/pubs/AEN/AEN130/AEN130.pdf>
- Kentucky Nutrient Management Planning Guidelines (KyNMP) (ID-211). <http://www2.ca.uky.edu/agcomm/pubs/ID/ID211/ID211.pdf>
- Farmstead Planning: Old Farm Buildings Repurposed for Better Farming: How to Develop a Complex (AEN-131). <http://www2.ca.uky.edu/agcomm/pubs/AEN/AEN131/AEN131.pdf>
- Providing Water for Beef Cattle in Rotational Grazing Systems (ID-236). <http://www2.ca.uky.edu/agcomm/pubs/ID/ID236/ID236.pdf>

Species-Specific BMP Manuals

- Environmental Chapter in the Kentucky Beef Book (See accompanying document)
- Best Management Practices for Kentucky Dairy Operations (See accompanying document)
- Best Management Practices for Small Ruminant Operations (See accompanying document)

Displays and Signage

- KHP Walking Tour Signage with QR codes for web-based references



Water Quality Improvement Projects at the Kentucky Horse Park:

A part of the Cane Run & Royal Spring Watershed-Based Plan Implementation Project

About the Project

The University of Kentucky's College of Agriculture, Food, and Environment was awarded two United States Environmental Protection Agency §319(h) grants to develop and implement a watershed-based plan for the Cane Run Creek and Royal Spring Watershed. The goal of the watershed-based plan is to improve and protect the water quality of the watershed so the Cane Run Creek is no longer impaired and to improve drinking water quality for the city of Georgetown. To achieve this goal, a variety of Best Management Practices (BMPs) have been implemented throughout the watershed to mitigate non-point source pollution. Agricultural BMPs include restricting livestock from the stream, enhancing streamside vegetation, and reducing erosion with grade control structures. Urban BMPs include rain gardens, rain barrels, and other runoff controls. In addition, thousands of trees have been planted in the watershed to restore streamside habitat and reduce pollution movement into the Cane Run Creek.

Where & What is Karst?

A landscape with sinkholes, sinking streams, caves, and springs, formed by the dissolution of soluble rocks such as limestone, dolomite, and gypsum.

Cane Run & Royal Spring Watershed

About the Watershed

The Cane Run Watershed is located in central Kentucky in Fayette and Scott counties. This 28,000-acre watershed includes a portion of the city of Lexington, a University of Kentucky research farm, and the Kentucky Horse Park. Like other watersheds, it is a land area that drains water into a common lake or stream—in this case, the Cane Run Creek. Because the Cane Run Watershed has karst features (sinkholes, springs, and caves), water that enters the Cane Run Creek can take one of two paths—the water may flow into the Royal Spring Aquifer or eventually enter the North Elkhorn Creek. The Royal Spring Aquifer is a source of drinking water for Georgetown, KY, making the Cane Run Watershed an important water resource for the region.

Sinkhole in the Cane Run Creek.

Water Quality Improvement Projects

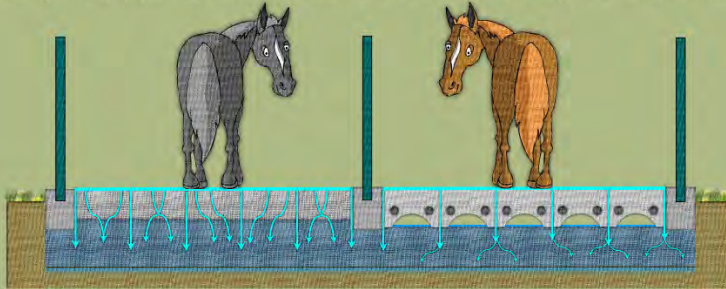
Source: Kentucky Geological Survey

This work was funded in part by a grant from the U.S. Environmental Protection Agency under §319(h) of the Clean Water Act.

PERVIOUS WASH RACKS

Horse washwater can be a water quality pollutant because of the manure, soap, and other chemicals it may contain. If washwater is diverted to a stormdrain, it does not receive water quality treatment prior to being discharged into surface waters. Allowing the washwater to infiltrate into the soil, as opposed to entering a stormdrain, can provide water quality treatment. Beneficial microorganisms that live in the soil degrade the mild pollutants in the washwater.

The rack to the right allows water to infiltrate between the gaps of the *impervious* concrete blocks, and the rack to the left is constructed with *pervious* blocks, which allow water to infiltrate through the entire block. Because these wash racks are frequently used, a two-foot deep rock sub-base was used to provide a larger volume of washwater storage. For wash racks used less frequently, the pervious or concrete blocks can be installed directly in a well-draining soil.



This work was funded in part by a grant from the U.S. Environmental Protection Agency under §119(h) of the Clean Water Act.

DRY LOT



Unlike a sacrifice lot, a dry lot contains an all-weather surface.

This all-weather surface was constructed with a geogrid product and rock. An all-weather surface facilitates manure collection. As the name implies, dry lots are used to keep horses out of the mud during wet times of the year, but they can also be used to protect pastures during a drought. Keeping horses confined during these times will prevent mud and loss of pasture and keep the animals clean and healthy. Dry lots can also be used for feeding and handling and managing caloric intake for overweight horses. Dry lots used in conjunction with a rotational grazing system provide a versatile and efficient grazing system.

For more information on dry lots, scan the QR code.

This work was funded in part by a grant from the U.S. Environmental Protection Agency under §119(h) of the Clean Water Act.

Riparian Buffer

The area behind this sign was planted with native grasses, herbaceous flowering plants, and trees to provide many water quality and wildlife benefits:

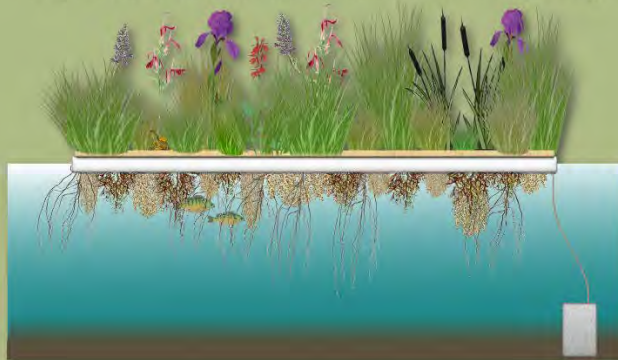
- **Contaminant Filtering:** Runoff can easily infiltrate into soil in vegetated areas, allowing bacteria and plants to filter contaminants from the water.
- **Sediment Trapping:** Vegetation slows runoff, allowing sediments and organic matter to settle before entering the stream.
- **Nutrient Utilization:** Growing vegetation degrades organics and utilizes nutrients.
- **Erosion Reduction:** Roots of vegetation help hold soil in place.
- **Groundwater Recharge:** Vegetated areas slow runoff and allow time for infiltration.
- **Wildlife Habitat:** A diversity of trees, shrubs, and grasses provide food and shelter for birds, insects, and more.



This work was funded in part by a grant from the U.S. Environmental Protection Agency under §319(b) of the Clean Water Act.

FLOATING WETLAND

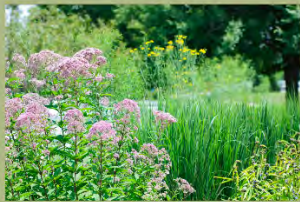
This structure allows plants to grow hydroponically in the pond. The plant roots and the beneficial microbes that live on them filter, consume, and break down nutrients and organic matter, which helps improve water quality. Floating wetlands also provide wildlife habitat and shelter for fish, turtles, birds, butterflies, dragonflies, and more. These systems are inexpensive, easy to construct, low maintenance, and aesthetically pleasing.



This work was funded in part by a grant from the U.S. Environmental Protection Agency under §319(b) of the Clean Water Act.

Wildflower Garden

Wildflower gardens are used to attract natural pollinators, provide vegetative cover (reduce erosion), and serve as a filter strip to help improve water quality. Wildflower gardens are low maintenance, low cost alternatives to traditional landscaping and they regrow each year as they develop a seedbank. Wildflowers do well even in poor soils where other plants may struggle.



This work was funded in part by a grant from the U.S. Environmental Protection Agency under §106(h) of the Clean Water Act.

Stream Restoration



This stream was restored to enhance the physical, chemical, biological, & societal functions of the stream.

- **Physical Functions:** The stream's dimensions and pattern were altered to prevent stream bank erosion and to create a floodplain.
- **Chemical Functions:** By helping prevent stream bank erosion and by allowing vegetation to grow along the stream, water quality parameters such as sediment, temperature, dissolved oxygen, nutrients, and others have been improved.
- **Biological Functions:** Because the chemical functions have been restored, the stream can now provide suitable aquatic habitat for macroinvertebrates and other lower food chain organisms that support healthy aquatic ecosystems.
- **Societal Functions:** With the aforementioned functions restored, the stream is now aesthetically pleasing and provides an opportunity to see and enjoy the wildlife associated with a healthy aquatic ecosystem.

To learn more about stream restoration, scan the QR code.

This work was funded in part by a grant from the U.S. Environmental Protection Agency under §106(h) of the Clean Water Act.

WATERING AREA



Horses should be provided with a clean water source and be restricted from natural surface water sources such as streams and ponds. These paddocks contain an automatic watering fountain supplied with city water and are surrounded with an all-weather surface to collectively establish a healthy and durable watering area. The area surrounding a water source is frequently and heavily used. Consequently, this heavy-use-area is prone to mud and the creation of surface depressions. The surface depressions can become a health concern for horses because the animals are standing in excrement and mud while they drink. An all-weather surface such as a combination of concrete, rock, and geotextile fabric is necessary to prevent these erosion and animal health concerns. For more information on how to properly site and install a watering area, scan the QR code.



This work was funded in part by a grant from the U.S. Environmental Protection Agency under §319(b) of the Clean Water Act.

BIORETENTION BASIN

Bioretention basins are soil and plant-based filtration structures that collect runoff and remove pollutants and sediments through a variety of natural processes. Runoff that enters the structure travels across an elongated flow path to maximize sunlight exposure and ultraviolet treatment of pathogens. The runoff then infiltrates into an amended soil layer that filters fine sediment and degrades organic matter and bacteria. Plants are used to absorb nutrients from the degraded organics and absorb water. An adjustable depth anaerobic layer provides enhanced bacterial and nutrient removal.

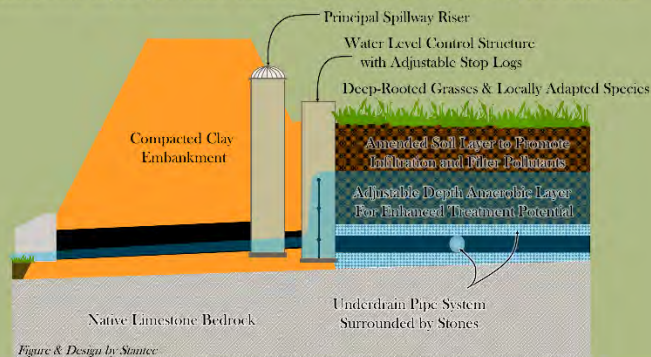


Figure & Design by Stantec

This work was funded in part by a grant from the U.S. Environmental Protection Agency under §319(b) of the Clean Water Act.

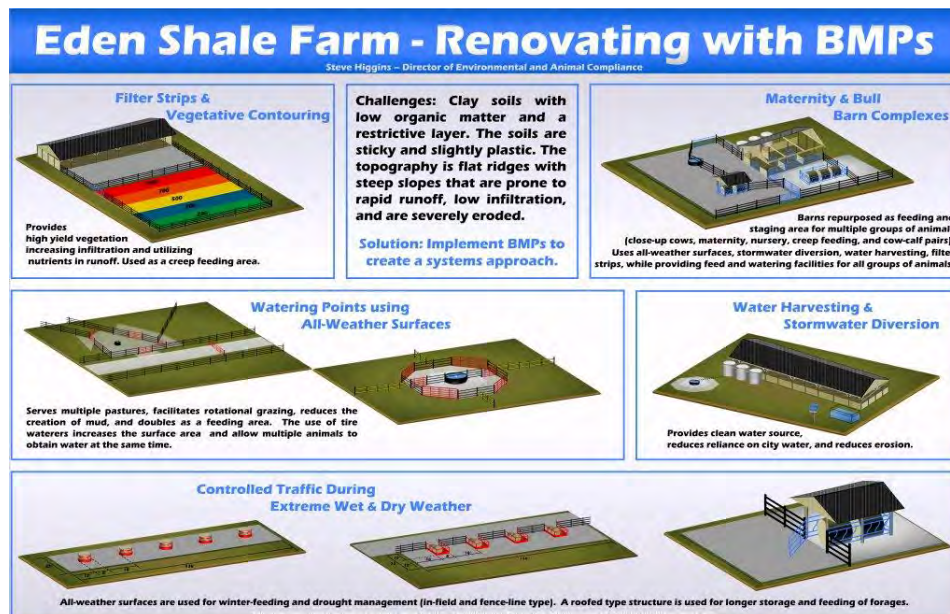
**NO MOW
ZONE**

**WATER QUALITY
IMPROVEMENT**



KENTUCKY HORSE PARK

- Signage developed and displayed at Eden Shale Farm and at the University of Kentucky Department of Biosystems and Agricultural Engineering



- Signage developed and placed around UK North Farm delineating no-mow buffer zones and descriptive signage detailing the importance of these areas



**ENHANCED
RIPARIAN
AREA**

**DESIGNATED No
Mow ZONE**

UK University of Kentucky

- Display at Reforest the Bluegrass 2015



- Beef Bash 2014



Presentations/Field Days

Photos from selected events are included below. A comprehensive list of events can be found in Appendix A.

- Conservation Education Planning Field Day 2012



- Princeton BMP Field Day 2012



- KHP BMP Tour 2014



- Eden Shale Farm Pasture to Plate 2015



- Eden Shale Open House 2015



- Princeton, KY Pasture to Plate 2016



- WKY Nutrient Management Planning Training 2015



- Morgan County Extension Farm Nutrient Management Planning Training 2015



- UK North Farm and Dairy Nutrient Management Planning Training 2016



- Eden Shale Tour with New Commissioner of KYDEP 2016



- KAWQA Tour at Eden Shale Farm 2016



- Eden Shale Beef Producer Group Tour 2016



- Weaning Workshop 2016



Agency Trainings

Photos from selected events are included below. A comprehensive list of events can be found in Appendix A.

- NRCS/DCA Field Day 2015



Educational Tours

Photos from selected events are included below. A comprehensive list of events can be found in Appendix A.

- UK Greenhouse Program Tour at KHP 2015

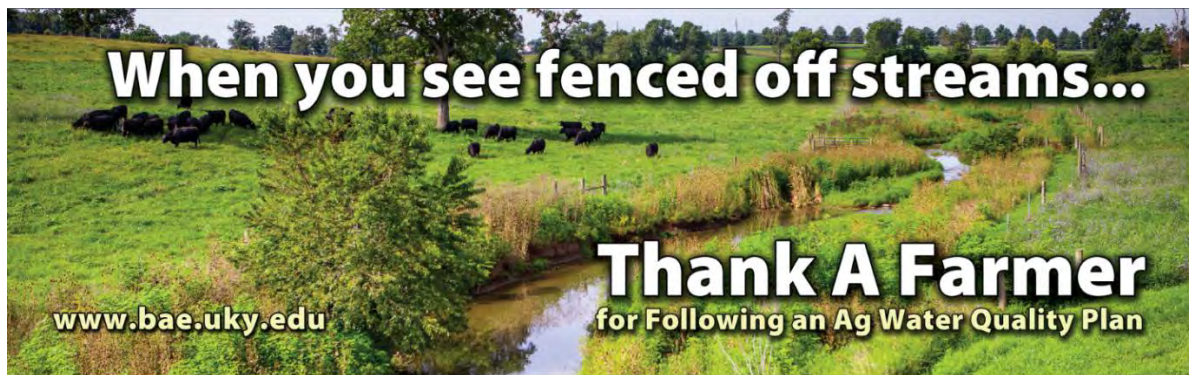


- Montessori tour at KHP 2015



Advertisements

- Billboards installed statewide dealing with environmental issues in Agriculture



Miscellaneous Materials

- Other educational materials developed for the project included brochures (See accompanying document), videos, a website ([https://www.uky.edu/bae/awqp](\"https://www.uky.edu/bae/awqp\")), and a virtual tour ([https://leemoser.maps.arcgis.com/apps/MapTour/index.html?appid=0b7f4bef2efd46689549c8e8db19969d](\"https://leemoser.maps.arcgis.com/apps/MapTour/index.html?appid=0b7f4bef2efd46689549c8e8db19969d\")).

CONCLUSION

This project had both regional and statewide appeal through producer education programs that included Master Cattleman, Pasture to Plate, Master Stocker, and Master Grazer programs, Sheep Profit Field Days, Ewe Profit Schools, and multiple other producer field days. UK animal science and sustainable agriculture courses, as well as local high school agriculture and environmental science classes, regularly visited BMP demonstration sites as part of their curriculum. It is anticipated that implemented BMPs will continue to be used for tours and field days that may include K-12 students, college studies, special interest groups, advisory groups, state agency personnel and committees (e.g. DOC, DOW, Soil and Water Commissioners, Ag Water Quality Authority, GOAP, etc.), as well as farmer and livestock producer field days.

The legacy knowledge and implementation experience gained from this project can be leveraged for future water quality BMP demonstration projects statewide. Future projects and BMP demonstration efforts will likely focus on extending the reach of this project to other regions of Kentucky. The continued development of Kentucky's agriculture water quality BMP demonstration site network is a critical next step in building on the work from this project. A follow-up project is currently in the process of gaining funding to satisfy this need by establishing agriculture water quality BMP demonstration sites in South-Central and Eastern Kentucky. Knowledge gained from this project will also be utilized in assisting agricultural producers with environmental issues statewide on a case-by-case basis upon referral from County Extension Agents or State/Federal Agency Staff.

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Appendices

Appendix A. Financial and Administrative Closeout

Application Outputs		Expected Begin	Expected End	Actual Begin	Actual End
General Grant Requirements					
1	Submit all draft materials to KDOW for review and approval	Duration of Project			
2	Submit quarterly invoices and project progress reports	Duration of Project			
3	Develop and submit a Scope of Work Plan	Duration of Project			
4	Submit annual report to KDOW during each year of the project	Jan-13	Sep-16	Jan-13 & Jan-14	Sep 16
5	Submit two hard copies and one electronic of the final report and all products produced by this project	Jan-13	Sep-16	Jan-13	Sep 16
BMP Development and Implementation					
6	Develop a KDOW-approved BMP implementation plan	Jan-13	Sep-16	Jan-13	Sep 16
7	Evaluate sites for BMPs	Jan-13	Sep-16	Mar-Jun-13	Sep 16
	<i>Evaluated sites for demonstration of winter feeding areas</i>				
	<i>Developed design for winter feeding structure</i>				
	<i>Began planning BMP projects at the Eden Shale Farm</i>			Oct-14	Sep 16
8	Coordinate and complete BMP Installation	May-13	Sep-16	May-13	Sep-16
	<i>Redesigned cattle shade structure for sheep</i>			Jun-13	Sep-13
	<i>Built 5 sheep shade structures</i>			Jun-13	Sep-13
	<i>Repurposed old winter feeding area</i>			Jul-13	Aug-13
	<i>Installed octagonal watering pad for demonstrations</i>			Jul-13	Aug-13
	<i>Renovated four run-down sheds for horses at the UK North Farm</i>			Oct-14	Dec-14
	<i>Began renovation of dry-cow lot at the UK Dairy, which consists of a new barn, new watering facilities, new pasture configuration to minimize mud, and improved manure collection strategies. Began planning for upgraded environmental management associated with new Pack Barn. Began planning closure of old structures and removal of old plumbing from lagoon liquid manure management system.</i>			Oct-14	Sep 16

	<i>Removed and recycled two tons of wire from a hidden dump at the Eden Shale Farm</i>			Oct-14	Nov-14
	<i>Installed three different pervious floorings in horse stalls at the UK North Farm</i>			Oct-14	Dec-14
	<i>Constructed portable feed wagon to be used with rotational grazing on small ruminant operations. Demonstrated at the C. Oran Little Research Farm.</i>			Sep-14	Apr-15
	<i>Installed floating straw baskets in ponds at the North Farm to mitigate nutrient pollution</i>			Nov-14	Apr-15
	<i>Began installation of four pasture watering system at Eden Shale Farm</i>			Jun-15	July 15
	<i>Dry lot and shade structure renovation at KHP.</i>			May-15	Aug-15
	<i>Installed floating wetlands for nutrient management at North Farm.</i>			Apr-15	Apr-15
	<i>Began installation of storm water diversion system at Eden Shale Bull Barn</i>			July 15	Oct 15
	<i>Began installation of Eden Shale Dairy Barn Water Harvesting System and heavy use area</i>			July 15	Dec 15
	<i>Began Installation of Eden Shale fencing to reduce compaction in sensitive areas and to partition pastures for rotational grazing</i>			July 15	Dec 15
	<i>Began Installation of 5 way watering structure at Eden Shale farm</i>			July 15	Sept 15
	<i>Installation of water harvesting and stormwater diversions at cistern area at Eden Shale Farm for BMP demo.</i>			Aug 15	Nov 15
	<i>Installation of heavy use areas and alternative water sources at Eden Shale Bull Barn</i>			Sept 15	Dec 15
	<i>Installation of Winter Feeding Area for hay ring feeders in field at Eden Shale</i>			Nov 15	Nov 15
	<i>Installation of Winter Feeding Area with fence-line feeder past hoop barns at Eden Shale</i>			Nov 15	Nov 15
	<i>Installation of covered feeding structure at Dairy Barn for Winter Feeding</i>			Oct 15	Feb 16
	<i>Renovation of Heifer Barn at Eden Shale Farm to demonstrate the influence of ventilation on mud and manure management issues in winter feeding barns.</i>			April 16	April 16
	<i>Conducted riparian enhancement wildflower seeding throughout the UK North Farm</i>			May 16	May 16
	<i>Installed additional no-mow buffer zone signs around riparian areas at UK's North Farm</i>			May 16	May 16

Education and Outreach					
9	Develop KDOW-approved advertising and educational material to promote field days and workshops	Nov-12	Sep-16	Nov-12	Sep-16
10	Advertise public demonstration events	May-13	Sep-16	May-13	Sep-16
11	Develop and disseminate presentations and other educational materials	Nov-12	Sep-16	Nov-12	Sep-16
	<i>ID-202: Feedlot Design and Environmental Management for Backgrounding and Stocker Operations</i>			Jan-13	Mar-13
	<i>AEN-115: Appropriate All Weather Surfaces for Livestock</i>			Jan-13	Mar-13
	<i>ID-200: Environmental Compliance for Dairy Operations</i>			Jan-13	Apr-13
	<i>ID-211: Kentucky Nutrient Management Planning Guidelines (KyNMP)</i>			Feb-13	Feb-14
	<i>AEN-121: Increasing Dry Cow and Bred Heifer Performance with Environmental Management</i>			Dec-13	May-14
	<i>AEN-123: Lowering somatic Cell Counts with Best Management Practices</i>			Dec-13	May-14
	<i>AEN-125: Closing a Liquid Manure Storage Structure</i>			Aug-14	Aug-14
	<i>Presented on pervious horse washing pad at North Farm and livestock composting at Woodford Farm to Master Farm Homemaker Guild</i>			Sep-13	Sep-13
	<i>Presented on winter feeding areas at Field Day in Danville</i>			Sep-13	Sep-13
	<i>Presented at Field Day at Woodford county farm on repurposing old winter feeding areas</i>			Nov-13	Nov-13
	<i>Presented to equine and beef science students on BMPs</i>			Nov-13	Nov-13
	<i>Presented on mortality composting at producer's farm in Oneida, KY</i>			Jan-14	Jan-14
	<i>Presented on water quality and pesticide/fertilizer BMPs to turf managers at the Level 2 KY Certified Professional Turf Managers Workshop in Lexington</i>			Jan-14	Jan-14
	<i>Presented on composting to Clark county Cattleman</i>			Feb-14	Feb-14
	<i>Presented BMPs for small ruminant producers at the Small Ruminant Grazing Conference</i>			Dec-13	Mar-14
	<i>Presented to 35 beef producers at Estill, Scott, and Oldham county extension offices on managing mud and nutrients</i>			Mar-14	Mar-14
	<i>Presented on BMPs and environmental compliance in Lincoln, Shelby, Nelson, Fleming, Christian, Warren, Metcalf, and Adair counties</i>			Mar-14	Mar-14

	<i>Visited four operations in Princeton to assist with environmental management</i>			Mar-14	Mar-14
	<i>Interviewed for Living the Country Life radio show on BMPs for streamside grazing</i>			Apr-14	Apr-14
	<i>Presented on nutrient management for cattlemen in Boyd county</i>			Jul-14	Jul-14
	<i>Presented on nutrient management as part of CAIP training for 25 livestock producers in Hopkinsville, KY</i>			Jul-14	Jul-14
	<i>Presented on composting livestock mortalities in Hardinsburg, KY</i>			Jul-14	Jul-14
	<i>Presented on nutrient management at the KACD convention</i>			Jul-14	Jul-14
	<i>Presented in Larue county on BMPs for beef operations</i>			Aug-14	Aug-14
	<i>Presented in Robertson county on composting animal mortalities for livestock producers</i>			Sep-14	Sep-14
	<i>Conducted tour of the Cane Run for the Kentucky Association for Environmental Education Conference attendees</i>			Sep-14	Sep-14
	<i>Presented twice on the geology and soils in the Inner Bluegrass and how landuse impacts water quality to 40 students (freshmen) at Woodford County High School</i>			Oct-14	Nov-14
	<i>Presented on siting a cattle confinement facility at the Managing Beef Cattle in Confinement Conference in Lexington, KY</i>			Nov-14	Nov-14
	<i>Conducted a tour of the BMP Paddock to the DOW</i>			Nov-14	Nov-14
	<i>Presented on composting livestock mortalities in Robertson, KY</i>			Nov-14	Nov-14
	<i>Presented to animal science students on BMPs for livestock operations</i>			Nov-14	Nov-14
	<i>Conducted a three-hour bus tour of BMPs at the KY Horse Park and Royal Spring Park for Woodford County High School students (freshmen)</i>			Nov-14	Nov-14
	<i>Produced a video of the 2014 Beef Bash BMP demonstration bus tour and shared on YouTube: https://www.youtube.com/watch?v=MJ4JO6VQArU&list=UUjLmlBb3hAPB927mQmijXxnw</i>			Dec-14	Dec-14
	<i>Presented to beef producers on BMPs at McLean county Extension office</i>			Jan-15	Jan-15
	<i>Presented to the Research Center Administrator's Society on BMPs implemented at UK's Research Farms</i>			Feb-15	Feb-15
	<i>Presented to Livestock Production Principles college class on nutrient management planning and regulations</i>			Feb-15	Feb-15
	<i>Presented to beef producers on BMPs at Meade county Extension office</i>			Feb-15	Feb-15

	<i>Presented twice at the Turf and Landscape Management Short Course</i>			Feb-15	Feb-15
	<i>Provided tour of BMPs and water quality issues at KHP to freshman at Woodford County High School</i>			Mar-15	Mar-15
	<i>Provided tour of BMPs and water quality issues at KHP to students in Greenhouse residential college at UK</i>			Mar-15	Mar-15
	<i>Presented at the Integrated Pest Management training on biosolids</i>			Mar-15	Mar-15
	<i>Presented two, one-hour presentations on watersheds, land use impacts on water quality, and BMPs to middle school students at the Montessori School</i>			Apr-15	Apr-15
	<i>Conducted two, three-hour BMP tours at the KHP for middle school students at the Montessori School</i>			Apr-15	Apr-15
	<i>Developed a tree management guide for the farm crews at UK's farms</i>			Nov-14	Jun-15
	<i>ID-229: All-weather Surfaces for Cattle Watering Facilities</i>			Jun-14	Jun-15
	<i>Presented at the AgBootcamp on the KAWQA, AQWPs, NMPs, and BMPs to representatives from KY Dairy, KY Soy, and KY Cattle Association</i>			May-15	May-15
	<i>KFB Talk</i>			May-15	May-15
	<i>Mississippi State BMP tour at North Farm</i>			July 15	July 15
	<i>BMP field day with new staff from KDOW, DCA, Conservation District Staff, and Bacon Creek Watershed members</i>			August 15	August 15
	<i>4 days of Outreach Events for Beef Cattle producers regarding BMP implementation at Eden Shale, Princeton, Shelby County and Morgan County</i>			Sept 15	Sept 15
	<i>Presentation of "Composting Livestock Mortalities" BMP at Veterinary Science Symposium</i>			Aug 15	Aug 15
	<i>Equine management class guest lecture and field demonstrations of BMPs and environmental considerations</i>			Sept 15	Sept 15
	<i>Participated in animal mortality composting meetings with local county government officials</i>			Aug 15	Aug 15
	<i>Participated in KFB water working group meetings to further awareness of water quality BMPs and their implementation</i>			Jul 15	Aug 15
	<i>Participated in AWQA meeting and advocated for new BMPs to be adopted to improve water quality</i>			Sept 15	Sept 15
	<i>Participated in animal mortality composting meeting in regards to avian influenza and methods for disposal of mortalities that reduce human exposure</i>			Sept 15	Sept 15
	<i>Production of AWQ BMP field implementation guide</i>			Sept 15	Sept 15

	<i>Participated in regional beef field day as a presenter regarding AWQ BMPs and their operational and environmental benefits</i>			Sept 15	Sept 15
	<i>Coverage of 319 funded water quality and management improvements at UK Dairy in Progressive Dairyman September Edition</i>			Sept 15	Sept 15
	<i>Presentation of AWQ BMP installations at Eden Shale Open House for Kentucky Cattlemen's Association attendees</i>			Oct 15	Oct 15
	<i>Presentation of AWQ BMP installations at Eden Shale Open House for KDOW</i>			Oct 15	Oct 15
	<i>Master Cattleman presentation regarding farmstead management/ planning and BMP installations in Woodford County.</i>			Oct 15	Oct 15
	<i>Master Cattleman presentation regarding farmstead management/ planning and BMP installations in Wayne County.</i>			Oct 15	Oct 15
	<i>Master Cattleman presentation regarding farmstead management/ planning and BMP installations in Morgan County</i>			Nov 15	Nov 15
	<i>Began work on a publication focusing on drought and the beef cattle industry</i>			May 15	Dec 15
	<i>Master Cattleman presentation regarding farmstead management/ planning and BMP installations for Hardin, Larue, and Meade Counties</i>			Nov 15	Nov 15
	<i>Two classes of presentations to ASC 406 class regarding farmstead management/ planning and AWQA BMP</i>			Nov 15	Nov 15
	<i>Brief presentation at November Ag Water Quality Authority advocating improved winter feeding structures and bedded structures to reduce environmental impact of cattle operations. Resulted in the doubling of cost share funding for related structures.</i>			Nov 15	Nov 15
	<i>Pasture to Plate Presentation at Princeton, Eden Shale, and Morgan County Farms regarding water quality BMPs and environmental considerations associated with cattle production in Kentucky.</i>			Oct 15	Oct 15
	<i>Tour of Eden Shale Water Quality BMP installations for NRCS staff</i>			Nov 15	Nov 15
	<i>Master Cattleman presentation regarding farmstead management/ planning and BMP installations for Northern Kentucky</i>			Nov 15	Nov 15
	<i>Master Cattleman presentation regarding farmstead management/ planning and BMP installations for Lexington area</i>			Nov 15	Nov 15
	<i>Watershed science and agricultural water quality field trip for Jessamine County Technical Center</i>			Dec 15	Dec 15
	<i>Watershed science and agricultural water quality educational tour at North Farm for visiting State Senator</i>			Dec 15	Dec 15
	<i>Met with several Woodford County beef producers regarding confined feeding and the environmental benefits of appropriate confinement management.</i>			Dec 15	Dec 15

	<i>Completed publication regarding renovating existing farm structures to provide environmental benefits (AEN 131)</i>			Dec 15	June 16
	<i>Completed publication regarding livestock watering systems in a rotational grazing system. Pending publication through Ag Comm.</i>			Oct 15	June 16
	<i>Began distribution of Dairy Manual at Spring Nutrient Management Planning Sessions</i>			Mar 16	April 16
	<i>Completed Drought Risk Management for Beef Cattle Farms paper (AEN-130)</i>			April 15	Feb 16
	<i>Visited multiple producer farms and evaluated manure management systems and made recommendations for federal funding (RCPP) to improve environmental issues.</i>			Jan 16	Sept 16
	<i>Participated in Pasture to Plate program development meetings to determine presentation topic needs and how ag water quality BMPs can be addressed in the context of the program</i>			July 16	July 16
	<i>Richmond, KY extension presentation</i>			Mar 16	Mar 16
	<i>Hart County BMP and manure management presentation</i>			Feb 16	Feb 16
	<i>Fleming County BMP and manure management presentation</i>			Feb 16	Feb 16
	<i>Rowan County BMP and manure management presentation</i>			Feb 16	Feb 16
	<i>Pulaski County BMP and manure management presentation</i>			Feb 16	Feb 16
	<i>Morgan County NRCS Ag Water Quality meeting</i>			April 16	April 16
	<i>Hosted KSU faculty and staff at Eden Shale Farm regarding Ag Water Quality BMP installations and potential future partnership</i>			April 16	April 16
	<i>Washington, Nelson, and Marion County BMP and manure management presentation</i>			Feb 16	Feb 16
	<i>Met and discussed RCPP program specifics with participating agencies to improve program implementation and current progress with on-ground farm visits and evaluations</i>			April 16	June 16
	<i>Presentation and discussion of conservation practices at Eden Shale Farm to KSU staff</i>			Jan 16	Jan 16
	<i>Participated in and presented at Spring Nutrient Management Planning Training at UK's North Farm</i>			April 16	April 16
	<i>Participated in and presented at Spring Nutrient Management Planning Training at Morgan County Extension Farm</i>			April 16	April 16
	<i>Met with NRCS regarding improved winter feeding areas for livestock for environmental benefits. Began working on redesign of structure for more widespread adoption and applicability.</i>			April 16	April 16
	<i>Visited producer farm in Lee County to evaluate developed spring watering system and provide guidance for future changes in funding for similar practices</i>			Jan 16	Jan 16
	<i>Met with Oran Little Research Center Users Group to discuss environmental management issues and other general unit management issues.</i>			April 16	April 16
	<i>Served as focus group participant with Kentucky Beef Network KBN 9 program to develop list of livestock and environmental issues facing the Kentucky Beef Industry and how to educate/develop outreach related to these topics</i>			April 16	Aug 16

	<i>Met with NRCS to plan future conservation needs and practices for KY beef producers</i>			Feb 16	Feb 16
	<i>Served on Cane Run Watershed Based Plan Committee member regarding upcoming plan implementation phase</i>			April 16	Sept 16
	<i>Presented to a group of French foreign exchange students regarding ag water quality and the horse industry</i>			May 16	May 16
	<i>Hosted Barren County producer group at Eden Shale for BMP tour</i>			Feb 16	Feb 16
	<i>Presented at and participated in KBN board meeting at Eden Shale Farm regarding ag water quality BMPs and on farm improvements.</i>			June 16	June 16
	<i>Met with local non-profit management team to present and discuss ideas for controlling erosion in horse paddocks and utilize repairs as demonstration areas</i>			Jan16	Mar 16
	<i>Hosted field day at Eden Shale Farm for commissioner of DEP and presented ag water quality BMP topics during tour</i>			June 16	June 16
	<i>Hosted ag water quality BMP field day for producer group at Eden Shale Farm</i>			May 16	May 16
	<i>Hosted ag water quality BMP field day for commissioners of various state agencies</i>			May 16	May 16
	<i>Hosted ag water quality BMP field day at UK North Farm for several visiting scholars</i>			May 16	May 16
	<i>Presented ag water quality topics at KY Grazing School in Woodford County</i>			May 16	May 16
	<i>Met with UK Dairy management committee regarding environmental issues and plans to address issues moving forward</i>			May 16	May 16
	<i>Met with Lee County goat producer regarding ag water quality BMPs and potential projects related to operation</i>			May 16	May 16
	<i>Met with NRCS staff member regarding designing electric fencing demonstration to encourage use to protect sensitive, on-farm water resources</i>			June 16	June 16
	<i>Met with KY Ag Water Quality Authority working group and recommended appropriate changes to existing BMP coverage and discussed new BMPs that may be appropriate to include in program</i>			June 16	June 16
	<i>Presented BMP and manure management topics to ASC 382 class</i>			Feb 16	Feb 16
	<i>Met with contractors at Eden Shale Farm to develop and install demonstration electric fencing and standard four board fencing to improve water quality BMP demonstration offerings on farm.</i>			June 16	June 16
	<i>Participated in UK CAFE Water Resources working group to discuss collaborative, concerted efforts in water resources and current University needs in the realm of water resources</i>			June 16	June 16
	<i>Presented ag water quality stormwater management topics at Kentucky Stormwater Conference in Louisville, KY</i>			June 16	June 16
	<i>Met with representatives of Churchill Downs regarding developing a composting facility for horse manure and bedding to improve water quality</i>			June 16	June 16

	<i>Princeton, KY Ag bootcamp presentation of BMP and manure management topics</i>			Feb 16	Feb 16
	<i>Radcliff, KY Ag bootcamp presentation of BMP and manure management topics</i>			Mar 16	Mar 16
	<i>Owingsville, KY Ag bootcamp presentation of BMP and manure management topics</i>			Mar 16	Mar 16
	<i>London, KY Ag bootcamp presentation of BMP and manure management topics</i>			Feb 16	Feb 16
	<i>Presented BMP and manure management topics at Biosystems and Agricultural Engineering Departmental Seminar</i>			Feb 16	Feb 16
	<i>Presented information related to covered manure stack pads and winter feeding facilities to Agricultural Water Quality Authority that led to further cost share coverage and BMP adoption</i>			Mar 16	Mar 16
	<i>Participated in Stanford Stockyard tour and provided insight to tour group related to water quality BMPs on-site</i>			Mar 16	Mar 16
	<i>Presented Dairy BMP and site management concerns on-site at WKU Spring Nutrient Management Planning training session</i>			Mar 16	Mar 16
	<i>Designed and hosted virtual tour to display BMP implementation at Eden Shale Farm. Received coverage in Kentucky Beef Network's Eden Shale Farm Blog</i>			Feb 16	Feb 16
	<i>Provided multiple presentations and testimonies related to new siting and BMP implementation for Bluegrass Stockyards</i>			Mar 16	April 16
	<i>Developed "Checklist for a Multipurpose Barn" article, which appeared in April 2016 Cow Country News</i>			Mar 16	April 16
	<i>Writing and coverage of Eden Shale Farm Maternity Barn renovations in April 16 Cow Country News</i>			April 16	April 16
	<i>Writing and coverage of integrated conservation practice management system in "Farmstead Planning" article in June 2016 Cow Country News</i>			June 16	June 16
	<i>Writing and coverage of water harvesting and the benefits of alternative water sources for livestock in "Plan B" article in July Cow Country News article</i>			June 16	July 16
	<i>Writing and coverage of "Providing Water for Beef Cattle in Rotational Grazing Systems with Tire Waterers" in July extension grazing newsletter</i>			June 16	July 16
	<i>Wrote short "mapping of farm resources" paper to aid in educating producers how to effectively map and communicate on-farm resource related issues with maps</i>			May 16	May 16
	<i>Began writing "Climate Change and Nutrient Management" paper</i>			May 16	May 16
	<i>Updated ID-188 to address specific issue in the dairy and beef cattle industries</i>			May 16	May 16
	<i>Developed before and after Eden Shape Farm BMP implementation posters for upcoming presentations and field days at the farm.</i>			May 16	June 16
	<i>Began writing "Runoff" article for possible future publication in popular press</i>			June 16	June 16

	<i>Developed “DIY Solar Pumping Solutions” document to describe how to design and install a solar pumping system as an alternative water source.</i>			June 16	July 16
	<i>Developed “environmental issues and cattle stress” article for future coverage in popular press</i>			June 16	July 16
	<i>Revised materials for environmental section of KY Beef Book</i>			June 16	July 16
	<i>Presented topics in water quality to Robison Scholars group at UK</i>			June 16	June 16
	<i>Met with Morgan County Extension Farm Staff regarding upcoming Ag Water Quality BMP demonstration installations</i>			May 16	May 16
	<i>Writing and Coverage of “Are Your Stressed Cattle Stressing You Out?” in August Cow Country News</i>			July 2016	Aug 2016
	<i>Presented Environmental topics at Pasture to Plate Program at 3 locations across the state</i>			Aug 2016	Aug 2016
	<i>Writing and Coverage of “What Type of Environment Do Your Cattle Have?” in September Cow Country News</i>			Aug 2016	Sept 2016
	<i>Participated in statewide CAIP planning meeting with Agriculture Development Board to serve as expert opinion on BMPs and future funding needs</i>			Aug 2016	Aug 2016
	<i>Established new project sites at St. Catherine’s Farm and Loretto Motherhouse and set agenda for farm improvements.</i>			Aug 2016	Aug 2016
	<i>Presented Environmental Topics at Master Cattlemen Program in Adair, Green, and Taylor Counties.</i>			Aug 2016	Aug 2016
	<i>Met with NRCS and St. Catherine’s Farm management to determine project possibilities for BMP installations.</i>			Aug 2016	Sept 2016
	<i>Presented environmental topics to beef cattle producers at Eden Shale Weaning Day Workshop</i>			Sept 16	Sept 16
	<i>Presented environmental topics to beef cattle producers at Eden Shale Grasslands Workshop</i>			Sept 16	Sept 16
	<i>Presented BMP topics at Kentucky Agriculture Water Quality Authority meeting</i>			Sept 16	Sept 16
	<i>Met with new management team at Kentucky Horse Park regarding the importance and maintenance of streamside buffer zones</i>			Sept 16	Sept 16
	<i>Eden Shale Farm BMP tour for Barren County beef cattle producers group</i>			Sept 16	Sept 16
	<i>Bus tour and Cane Run Project recap for representatives of EPA Region 4, KDOW, and others</i>			Sept 16	Sept 16
	<i>Presented environmental topics at 2016 Beef Bash in Princeton and led a tour of a beef compost bedded pack barn facility.</i>			Sept 16	Sept 16
	<i>Presented environmental topics for Washington County producer group</i>			Sept 16	Sept 16
	<i>Presented animal mortality composting information to producers at Madison County field day</i>			Sept 16	Sept 16
12	<i>Develop comprehensive manuals that detail environmental considerations for cattle, dairy, and equine producers</i>	Nov-12	Sep-16	Nov-12	Sep-16
	<i>Printed and disseminated small ruminant manual</i>			Oct-14	Nov-14

	<i>Peer-review of dairy manual by animal science specialists</i>			Oct-14	Nov-14
	<i>Began rough draft of beef manual, a chapter for the KY Beef Book</i>			Dec-14	Jun-15
	<i>Finalized Dairy Manual. Began distribution at Spring Nutrient Management Planning Training Sessions.</i>			Jun-15	March 16
13	Develop KDOW-approved evaluative tools	Nov-12	Sep-16	Nov-12	Sep-16
14	Present material from this project in the Master Cattleman programs	Apr-14	Sep-16	Apr-14	Sep-16
	<i>Presented six times on BMPs and environmental compliance to Master Cattleman participants</i>			Jan-13	Dec-14
	<i>Presented two times on BMPs and environmental compliance to Master Cattleman participants</i>			Feb-15	Mar-15
	<i>Presented on BMPs and environmental compliance to Master Cattleman participants</i>			Apr-15	Apr-15
	<i>Master Cattleman presentation regarding farmstead management/planning and BMP installations in Woodford County</i>			Oct 15	Oct 15
	<i>Master Cattleman presentation regarding farmstead management/planning and BMP installations in Wayne County.</i>			Oct 15	Oct 15
	<i>Master Cattleman presentation regarding farmstead management/planning and BMP installations in Morgan County</i>			Nov 15	Nov 15
	<i>Master Cattleman presentation regarding farmstead management/planning and BMP installations for Hardin, Larue, and Meade Counties</i>			Nov 15	Nov 15
	<i>Master Cattleman presentation regarding farmstead management/planning and BMP installations for Northern Kentucky</i>			Nov 15	Nov 15
	<i>Master Cattleman presentation regarding farmstead management/planning and BMP installations for Lexington area</i>			Nov 15	Nov 15
15	Present material from this project in the Master Stocker programs	Apr-14	Sep-16	Apr-14	Sep-16
	<i>Presented on BMPs and environmental compliance to 50 Master Stocker participants</i>			Mar-14	Mar-14
	<i>Presented through Lync on BMPs and environmental compliance to 70 Master Stocker participants</i>			Apr-14	Apr-14
16	Present material from this project in the Master Grazer programs	Apr-14	Sep-16	Apr-14	Sep-16
17	Present material from this project at Sheep Profit Field Days	Apr-14	Sep-16	Apr-14	Sep-16
18	Present material from this project at Ewe Profit Schools	Apr-14	Sep-16	Apr-14	Sep-16

19	Conduct workshops at Coldstream Dairy	Apr-14	Sep-16	Apr-14	Sep-16
20	Present “Show-and-Tell” BMP Sessions for KDOW staff	Nov-12	Sep-16	Nov-12	Sep-16
	<i>Conducted a tour of BMPs installed on UK’s farm and at the KY Horse Park</i>			Apr-14	Apr-14
	<i>Demonstrated livestock mortality composting at Little Research Center</i>			Jul-14	Jul-14
	<i>Gave a three-hour bus tour of the KY Horse Park and the UK North Farm to KDOW inspectors</i>			Nov-14	Nov-14
	<i>Demonstrated BMPs implemented at the Eden Shale farm to KDOW staff</i>			Apr-15	Apr-15
	<i>BMP field day with new staff from KDOW, DCA, Conservation District Staff, and Bacon Creek Watershed members</i>			Aug 15	Aug 15
	<i>Presentation of AWQ BMP installations at Eden Shale Open House for KDOW</i>			Oct 15	Oct 15
	<i>Presented to staff at Spring Nutrient Management Planning training sessions</i>			April 16	April 16
21	Organize and lead training events for Conservation District staff from around the state	May-13	Sep-16	May-13	Sep-16
	<i>Held a two-day workshop on Nutrient Management and AWQPs in Princeton, Jabez, Versailles, Carrollton, London, West Liberty, and Bowling Green</i>			Aug, Sep, Oct, & Nov-13 Jan-14	Aug, Sep, Oct, & Nov-13 Jan-14
	<i>Demonstrated BMPs implemented at the Eden Shale farm to Conservation District staff</i>			Apr-15	Apr-15
	<i>BMP field day with new staff from KDOW, DCA, Conservation District Staff, and Bacon Creek Watershed members</i>			Aug- 15	Aug-15
	<i>Presented to staff at Spring Nutrient Management Planning training sessions</i>			April 16	April 16
22	Organize and lead training events for Cooperative Extension staff from around the state	May-13	Sep-16	May-13	Sep-16
	<i>Held a two-day workshop on Nutrient Management and AWQPs in Princeton (twice), Jabez, Versailles, Carrollton, London, West Liberty, and Bowling Green</i>			Aug, Sep, Oct, & Nov-13. Jan-14 & May-14	Aug, Sep, Oct, & Nov-13. Jan-14 & May-14

	<i>Demonstrated BMPs implemented at the Eden Shale farm to Cooperative Extension staff</i>			Apr-15	Apr-15
	<i>Presented at the AgBootcamp on the KAWQA, AQWPs, NMPs, and BMPs for Cooperative Extension staff</i>			May-15	May-15
	<i>Cooperative Extension field day at Meade County farm</i>			Aug 15	Aug 15
	<i>Presented to staff at Spring Nutrient Management Planning training sessions</i>			April 16	April 16
23	Organize and lead training events for Natural Resource Conservation Service (NRCS) staff from around the state	May-13	Sep-16	May-13	Sep-16
	<i>Presented to NRCS staff about agriculture water quality in Hopkinsville, Mount Sterling, and Campbellsville</i>			May-13	May-13
	<i>Held a two-day workshop on Nutrient Management and AQWPs in Princeton (twice), Jabez, Versailles, Carrollton, London, West Liberty, and Bowling Green</i>			Aug, Sep, Oct, & Nov-13. Jan-14 & May-14	Aug, Sep, Oct, & Nov-13. Jan-14 & May-14
	<i>Presented on mortality composting presentation in Hopkinsville</i>			Aug-13	Aug-13
	<i>Demonstrated BMPs implemented at the Eden Shale farm to NRCS staff</i>			Apr-15	Apr-15
	<i>Presented at the Conservation Planning Training for TSPs with the NRCS</i>			May-15	May-15
	<i>Presented at the AgBootcamp on the KAWQA, AQWPs, NMPs, and BMPs for TSPs</i>			May-15	May-15
	<i>Presented to staff at Spring Nutrient Management Planning training sessions</i>			April 16	April 16
24	Create and install advertisements promoting responsible practices and environmental compliance in industry magazines, newspapers, and on billboards	May-13	Sep-16	May-13	Sep-16
	<i>Conducted research to determine optimal billboard locations</i>			Jul-13	Jul-13
	<i>Took professional photographs for billboard backdrop</i>			Jul-13	Jul-13
	<i>Developed billboard designs for promoting water quality BMPs</i>			Jul-13	Jul-13
	<i>Installed billboards in Somerset and Glasgow</i>			Sep-13	Oct-14
	<i>Installed billboards in Bowling Green</i>			Nov-13	Aug-14
	<i>Published article in Farm Press on water quality compliance and BMPs for grazing livestock</i>			Nov-13	Nov-13

	<i>Published article in Farmer's Pride on Sustainable Winter Feeding</i>			Nov-13	Jan-14
	<i>Published two articles in the Farmer's Pride and UK's Dairy Notes on the Ag Water Quality Act and Nutrient Management Plans</i>			Feb-14	Apr-14
	<i>Contributed to article on harmful algal blooms in Off the Hoof</i>			Jul-14	Jul-14
	<i>Published article in Cow Country News on how backgrounding operations can achieve environmental compliance</i>			Aug-14	Aug-14
	<i>Featured in an article in the Kentucky Farm Bureau magazine on KAWQPs</i>			Aug-14	Aug-14
	<i>Published article on how to prevent harmful algal blooms in Cow Country News</i>			Oct-14	Oct-14
	<i>Published article on composting livestock mortalities in HoofPrint</i>			Nov-14	Nov-14
	<i>Featured in an article in the UK mAGazine on how UK is helping to revive the dead zone and what farmers and urban citizens can do to help</i>			Dec-14	Dec-14
	<i>Work to remove scrap wire at Eden Shale farm was featured in the Cow Country News</i>			Jan-15	Jan-15
	<i>Coverage of confined feeding outreach efforts in Caldwell County in Cow Country News in June 2015</i>			Jun-15	Jun-15
	<i>BMP implementation at Eden Shale covered in Cow Country News in June 2015</i>			Jun-15	Jun-15
	<i>Coverage of winter feeding structure benefits in August 2015 Cow Country News</i>			Aug 15	Aug 15
	<i>Coverage of Conservation Person of the Year Award in August Cow Country News, which advocates adapting management practices to the environment.</i>			Aug 15	Aug 15
	<i>Coverage of 319 funded water quality and management improvements at UK Dairy in Progressive Dairyman September Edition</i>			Sept 15	Sept 15
	<i>Coverage of BMP installations at Eden Shale Farm in December 2015 Cow Country News</i>			Dec 15	Dec 15
	<i>Coverage and reference of ID-188 (Strategic Winter Feeding of Cattle Using a Rotational Grazing Structure) in October 2015 Cow Country News</i>			Oct 15	Oct 15
	<i>Coverage of BMP installations at Eden Shale Farm in November 2015 Cow Country News</i>			Nov 15	Nov 15
	<i>Coverage of Winter Feeding Structure installations at Eden Shale Farm in February 2016 Cow Country News</i>			Feb 16	Feb 16
	<i>Coverage of New BMP installations at Eden Shale Farm in January 2016 Cow Country News</i>			Jan 16	Jan 16
	<i>"Checklist for a Multipurpose Barn" appeared in April Cow Country News</i>			April 16	April 16

	<i>Coverage of Maternity barn renovations in April Cow Country News</i>			April 16	April 16
	<i>Coverage of Eden Shale BMP implementation and Eden Shale Virtual Tour on Kentucky Beef Network's Eden Shale Farm Blog</i>			Jun 15	Mar 16
	<i>Coverage of "Checklist for a Multipurpose Barn" article, which appeared in April 2016 Cow Country News</i>			April 16	April 16
	<i>Coverage of Eden Shale Farm Maternity Barn renovations in April 16 Cow Country News</i>			April 16	April 16
	<i>Coverage of integrated conservation practice management system in "Farmstead Planning" article in June 2016 Cow Country News</i>			June 16	June 16
	<i>Coverage of water harvesting and the benefits of alternative water sources for livestock in "Plan B" article in July Cow Country News article</i>			July 16	July 16
	<i>Coverage of "Providing Water for Beef Cattle in Rotational Grazing Systems with Tire Waterers" in July extension grazing newsletter</i>			July 16	July 16
25	Create displays that demonstrate project BMPs and other topics related to KAWQA compliance and nutrient management planning	May-13	Sep-16	May-13	Sep-16
	<i>Presented to producers during Field Day on how to repurpose winter feeding areas to manage mud, manure, and runoff</i>			Aug-13	Aug-13
	<i>Developed a display for the Big Blue Goes Green Sustainability Fair to demonstrate BMPs on Woodford Farm</i>			Oct-13	Oct-13
	<i>Constructed a soil erosion display to be used for educational events</i>			Apr-15	Apr-15
	<i>Developed a display for Reforest the Bluegrass, held at the KHP, to demonstrate BMPs implemented at the KHP</i>			Apr-15	Apr-15
	<i>Developed departmental display for the Department of Biosystems and Agricultural Engineering at UK to present current work in BMP implementation</i>			May 16	May 16
	<i>Developed permanent BMP implementation display for use at Eden Shale Farm field days</i>			May 16	May 16
	<i>Began development of permanent "Before and After BMP implementation" display board for Eden shale Farm</i>			June 16	Sept 16
26	Present evaluative material to KDOW	Oct-15	Sep-16	Oct-15	Sep-16
Walking Tour at the Kentucky Horse Park (Amendment)					
	<i>Created floating wetlands to help reduce nutrients in park ponds</i>			May-14	Jun-14
	<i>Created educational signs to inform visitors on BMPs</i>			May-14	Jun-15

	<i>Built cedar birdhouses and installed on top of educational signs</i>			May-14	Jun-14
	<i>Planted bioswales, bioretention basin, and other sensitive areas with high nutrient-removing, native plants</i>			May-14	Jun-14
	<i>Created pervious splash blocks to create a pervious horse washing pad</i>			May-14	Jun-14
	<i>Created rain barrels to make a pet watering station</i>			Jun-14	
	<i>Created stormdrain filters to filter sediment from runoff</i>			May-14	Jun-14
	<i>Installed denitrifying bioreactor</i>			Aug-14	Aug-14
	<i>Constructed two pervious horse wash stalls</i>			Aug-14	Sep-14
	<i>Installed three automatic watering fountains and adjacent heavy use areas</i>			Aug-14	Sep-14
	<i>Worked with KY Horse Park staff to develop rotational grazing system</i>			Aug-14	Sep-14
	<i>Extended no-mow zones along the Cane Run at the KY Horse Park. Signs with birdhouses delineate these areas</i>			Oct-14	Nov-14
	<i>Planted native wildflowers in no-mow zones</i>			Oct-14	Oct-14
	<i>Installed a new drylot for miniature horses and repaired drainage issues</i>			Oct-14	Nov-14
	<i>Installed a run-in shed</i>			Oct-14	Dec-14
	<i>Developed a brochure that allows KHP visitors to find BMPs implemented at the park and discusses ways visitors can protect water quality. The brochures are located on educational signs throughout the park.</i>			Apr-15	May-15
	<i>Developed a brochure that describes floating wetlands and their benefits and how they can be constructed. The brochures are located on the floating wetland signs near the floating wetlands.</i>			Apr-15	May-15
	<i>Developed a website on the KHP's webpage that describes BMPs implemented at the park and provides links to extension publications.</i>			Apr-15	May-15
	<i>Installed QR codes on educational signs at the KHP that direct to the website mentioned above.</i>			Jun-15	Jun-15
	<i>Installed new brochure holders at KHP that contain BMP educational material.</i>			Jun-15	Jun-15
	<i>Installed new floating wetland in stream near front gate</i>			Jun-15	Jun-15

Detailed Budget				
Budget Categories (Itemize all Categories)	§319(h) (60% of funds)	Non-Federal Match (40% of funds)	TOTAL	Final Expenditures
Personnel	\$156,032	\$131,262	\$287,294	\$204,810.13
Supplies	\$305,377	\$173,377	\$478,754	\$531,201.54
Equipment	\$3,000	\$2,000	\$5,000	\$3,287.68
Travel	\$1,500	\$800	\$2,300	\$3,095.80
Contractual	\$0	\$0	\$0	\$15,946.85
Operating Cost	\$47,091	\$31,394	\$78,485	\$47,091.27
Other	\$5,000	\$6,500	\$11,500	\$0
TOTAL	\$518,000	\$345,333	\$863,333.33	*\$863,333.33

*This total is equal to the cumulative agency portion: \$518,000 + UK Total Direct: \$303,274.89 + UK Unrecovered Indirect: \$42,058.44.

The University of Kentucky was reimbursed \$518,000. All dollars were spent; there were no excess project funds to reallocate.

Equipment Summary:

Item	Fund	Amount
Stereo sound bar	Cost Share	\$ 31.84
2 x 27 inch Dell monitors	Cost Share	\$ 1,455.98
Dell PC	Sponsor	\$ 843.86
Dell accessory	Sponsor	\$ 57.19
Dell accessory	Sponsor	\$ 64.99
Dell PC	Sponsor	\$ 812.86
Amazon PC accessory	Sponsor	\$ 20.96

No equipment has a current per-unit fair market value exceeding \$5,000.

Special Grant Conditions:

There were no special conditions placed on this grant by USEPA.

Appendix B. BMP Implementation Plan

Managing Mud, Manure, and Runoff: Kentucky Livestock BMP Demonstration and Training Project - BMP Implementation Plan -

University of Kentucky College of Agriculture

February 2015

I. Planned Best Management Practices

The following BMPs may be implemented as part of this project. When applicable, the NRCS Practice Codes are given.

- Animal Mortality Facility – Code 316
- Composting Facility – Code 317
- Diversion – Code 362
- Fence – Containment – Code 382
- Grade Stabilization Structure – Code 410
- Heavy Use Area Protection – Code 561
- Nutrient Management – Code 590
- Prescribed Grazing – Code 528
- Rotational Grazing
- Riparian Forest Buffer – Code 391
- Riparian Herbaceous Cover – Code 390
- Stormwater Runoff Control – Code 570
- Stream Crossing – Code 578
- Stream Habitat Improvement and Management – Code 395
- Streambank Protection – Code 580
- Use Exclusion – Code 472
- Vegetated Treatment Area – Code 635
- Waste Storage Facility – Code 313
- Winter Feeding Structure

II. BMP Selection Process

The BMPs listed in the previous section were selected because they work well for the land uses and pollutant sources common in the region in which the BMPs will be demonstrated. Pollutant load reduction effectiveness and the overall aptitude for them to be installed and maintained with the highest level of project participation and support were also factors in BMP selection. In addition, most of these BMPs address producers' management concerns, as well as environmental issues, and are already familiar to the project team and stakeholders in the region, making them appealing for producers and suitable for this demonstration project.

III. Targeting Selected BMPs

BMPs for this project will be targeted with demonstration in mind. Convenience for demonstration and willingness of the landowner (University of Kentucky Experiment Station) to place BMPs in an area will

dictate where BMPs are ultimately placed; however, areas that are representative for farmers in the region and provide realistic conditions for BMP demonstration will be favored.

IV. Financial Plan of Action

The University of Kentucky, College of Agriculture will bear 40% of the total budget. Contributions include the use of facilities, labor, and equipment for all implementation activities. In addition, the University of Kentucky, College of Agriculture, Food and Environment will leverage labor, field days, office supplies, vehicles, fuel, computing equipment, and meeting space costs.

V. Landowner Maintenance Agreement

The University of Kentucky Experiment Station agrees to maintain all BMPs installed as a part of this project for the duration of the life expectancy of each BMP.

VI. Notification Process

The Kentucky Division of Water, NPS Section Technical Advisor (TA) will be advised of the selected BMP at least one week before implementation begins. This may take the form of either a letter or an electronic notification to the TA describing the BMP, the location where the BMP will be installed, and the expected date of implementation.

VII. Assurance Statement

The Kentucky Agriculture Water Quality Act (KRS 224.71-100 through 224.71-140) was enacted by the 1994 General Assembly to guide the state's agriculture industry in its efforts to address environmental issues. The KY Agricultural Water Quality Plan (KY AWQP) was developed as a result of this Act. The KY AWQP is an effort to produce a practical, flexible, coordinated natural resources management system that protects the waters of the Commonwealth and complies with applicable government rules and regulations. It is based on pollution prevention through the use of best management practices (BMPs). KRS 224.71 defines BMPs as the most effective, practical, and economical means of reducing and preventing water pollution. BMPs establish minimum acceptable quality levels for planning, siting, designing, installing, operating, and maintaining agriculture and silviculture facilities and operations. BMP's used as a part of this project will conform to guidelines identified in the KY AWQP as well as all

local, state, and federal guidelines. In addition to compliance with the KY AWQP, all BMPs have been cross referenced with NRCS technical standards when applicable and will be implemented accordingly.