Snyder County Agricultural BMP Guide

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Produced by

Snyder County Conservation District

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SNYDER COUNTY
CONSERVATION DISTRICT

Conserving Natural Resources for Our Future

Dear Reader,

As you read this fourth edition of the "Snyder County Agricultural BMP Guide," you will see the different types of agricultural best management practices (BMPs) installed on various farms within Snyder County. This edition was printed as part of the Conservation District's "Agricultural BMPs Tour" held on April 28, 2016. (Just like this edition, the first edition was printed as part of a county agricultural BMP Tour held in June 2005.) We hope this guide is useful in giving farmers ideas of what BMPs they can install on their farms. These BMPs prevent sediment and nutrient pollution from entering our local watersheds and groundwaters as well as the Chesapeake Bay. Farmers may have worked with the Snyder County Conservation District (SCCD), USDA—Natural Resources Conservation Service (NRCS) or others agencies and organizations to plan, design, construct, inspect and fund the BMPs similar to or shown in this guide.

While farmers earn a living with their land and animals, they must take care of the soil and water resources in order to produce the agricultural products we need now and in the future. Farmers also work in an atmosphere of increased scrutiny from the general public.

Pennsylvanians that produce or handle animal manure must have a manure management plan (MMP) or nutrient management plan (NMP). Cropland needs to follow practices under an agricultural erosion & sedimentation plan (Ag. E&S Plan) or an NRCS developed conservation plan that meets PA regulations. Air emissions, odor reduction and tougher permitting procedures are also becoming a reality.

Each farm has unique challenges to prevent sediment and nutrient pollution of surface and groundwaters. There are no "one size fits all" solutions regarding agricultural BMPs. It is the hope of the Conservation District that this guide will encourage farmers to seek assistance to prevent sediment and nutrient pollution on their farms. The Conservation District also hopes that any other people who read this guide may come away with an appreciation of what farmers can do, and will do, to protect our surface and ground waters.

Sincerely,

Directors and Staff,
Snyder County Conservation District

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Manure & Composting Facilities

Manure storages are designed to help farmers manage their manure in a way that allows them to apply nutrients at a more opportune time. When designing a manure storage, items such as where the storage is located, type and number of animals, type of manure being stored, type of bedding used and type of manure spreading equipment on the farm are considered.

Manure storages allow farmers to spread when conditions are most favorable. Winter spreading of manure could result in nutrient runoff. However, a manure storage cannot control how the manure nutrients are spread on the field. A manure storage is only as good at the farmer's management ability.

Liquid manure storage concrete tank constructed to store not only manure but also milkhouse wastewater from a pipe (above, see red arrow) or collected barnyard water from a pipe (right, see yellow arrow).

Liquid manure storages may be designed and built to allow the farmer to scrape manure from barnyards into them through tractor push-off ramps (with tractor guards) (left and below).

Typically, liquid manure storages have pads where portable manure pumps can be placed (left). Farmers have also installed liquid manure storages made of metal (right).

Liquid manure storage tank (poured in place with slatted floors) for a heifer raising facility (left). Similar structures have been built for swine and certain poultry facilities.

Roofed manure storage stacking structures with concrete walls constructed to store dry stackable manure (right and below).

Manure can enter roofed manure stacking structures either by gutter cleaner from the stanchion barn (above) or through a tractor push-off ramp (with tractor guard) from the barnyard (left).

All structures to store liquid and semi-liquid manure need to be designed by a professional engineer. All structures built since January 2000 also have to be approved by a professional engineer. If a manure storage built before January 2000 needs repairs, a professional engineer must certify the proposed and finished repair.

Roofed manure storages with concrete walls for various management situations. Top left: Dairy stackable manure from a gutter cleaner and a nearby barnyard. Below: Liquid dairy manure scraped from alleyways regularly into a roofed storage to limit additional rainwater. Second from bottom: Roof installed over existing concrete manure stacking area for a beef herd barnyard.

An unroofed manure stacking area with concrete walls serving a concrete cattle barnyard and lot. (left)

All these structures shown on this page have a poured concrete floor.

The primary goal of keeping stormwater away from poultry manure is so that farmers can apply this highly concentrated nutrient source at a low rate per acre for crop growth (left).

Roofed poultry manure stacking structures have been built with treated wood and concrete curbing (three photos above and center right), poured concrete walls (bottom right) and precast concrete wall sections (bottom two left pictures).

Roofed poultry manure storages can vary from farm to farm*. For instance, a storage can have an access pad and loading dock attached (above left), a ceiling that prevents starlings from roosting in the building (left), accommodate gutter cleaners (above right) and have a mortality composter attached to one side (right).

*Depending on the program, these examples may not be eligible for financial assistance.

State regulations limit farmers on what they can do with dead animals. Although proper burial, through incineration, or hiring a rendering service to take dead animals are viable options, composting dead animals into a nutrient source is also a possibility.

Farmers can compost dead animals in piles or trenches at locations where leaching cannot take place. In this way additional stormwater flows into the compost and compost leachate does not reach wells, waterbodies and concentrated flow areas.

Having the right ratio of manure and dead animals (nitrogen source) with straw or sawdust (carbon source) and moisture are key requirements for operating a functional mortality composter.

Stand alone poultry mortality composter structure constructed with treated lumber (right).

Stand alone poultry mortality composter structures constructed with treated lumber (left) and concrete walls (below).

Mortality composting bins as part of a roofed poultry manure stacking structure on two separate farms (above and right). One has walls of treated lumber (above) and the other consisting of concrete walls (right).

Mortality composting facility for a swine finishing operation (left).

Barnyard/Concentrated Area Improvements

A major source of where nutrients could leach or run off are barnyards. These are places where livestock gather to eat, drink and eventually deposit manure. (Barnyards fall into a group of farm BMPs or water quality concerns referred to as animal heavy use areas (AHUAs), heavy use areas (HUAs), heavy use area protections (HUAPs) or animal concentrated areas (ACAs).

Improved and properly functioning barnyards and concentrated areas are designed so farmers can utilize the manure by collecting and applying it immediately or taking it to a storage. When improving a barnyard, considerations must be given to items such as location in relation to streams and manure storages, type and number of animals and the treatment of nutrient laden barnyard water due to precipitation. Other supporting BMPs, such as roof gutters and vegetative filter areas may also be needed. Many improved barnyards and ACAs work hand in hand with manure storages.

A newly installed and improved barnyard (right) for a dairy operation allowing the farmer to feed and move the cattle while giving space for them to move around. Notice that the concrete floor allows the farmer to scrape the manure on a regular basis.

Although not easily visible in this photo, other photos show roof gutters and downspouts keeping that water clean and away from the barnyards. Dirty barnyard water can either be diverted to a manure storage or filtered and transferred to a vegetative filter area where the plant life can treat the water and use the manure nutrients for growth.

An improved concrete barnyard under construction on a dairy farm (left). Notice the roof gutters and downspouts that keep roof water from reaching the barnyard. The farmer can push the manure away from the barnyard and into the roofed manure storage stacking structure on the left. Hidden from view is the screen box that filters manure solids and allows barnyard water to flow into an underground concrete septic tank where it will be later pumped to a vegetative filter area.

The dairy farmer (left) had improved his existing barnyard. This allows him to feed his cattle and transfer manure directly into a manure spreader with an existing gutter cleaner or a newly installed push off ramp (green arrow). The farmer below connected a newly improved barnyard with a liquid manure storage via push off ramp (yellow arrow).

A farmer can utilize a manure storage stacking area connected to an improved barnyard. This beef farmer has a manure storage stacking area with 4 ft. concrete walls and floor (left).

A screen box (left and below left, different operations) filters manure solids that flow from an improved barnyard during a rain event. The first screen (below left) prevents heavy solids from entering the screen box. The second and third screens have smaller spaces that filter smaller solids. Notice the water flowing from the final screen marked with a red arrow (left). This water flows into a concrete septic tank where the water settles, then is siphoned or pumped to a vegetative filter area. **Regular cleanout maintenance is needed for this BMP to work to its fullest capacity.**

Two photos (right and bottom, next page) show how a properly designed improved barnyard should work during a rainstorm. The water laying within the barnyard indicates that the floor is sloped towards the screen box (green arrow, right photo) and the concrete curbs contain and hold the stormwater and do not allow it to leave the site (right photo and next page's bottom photo).

Top two photos show different attempts to improve barnyards for horses. The first owner (top, above) installed a reinforced gravel pad to collect manure in his barnyard. The other owner (left) reduced the size of his gravel barnyard and seeded and mulched a grass filter area to catch manure runoff from entering a nearby road ditch. Both owners installed roof runoff controls (not shown in either photo) to limit extra water from entering their barnyards.

Farmers seeing these roofed barnyards/(ACAs) in this guide should note that the goal of these structures is to limit stormwater to the areas while allowing farmers to feed their livestock and collect and, depending on the situation, store a limited amount of manure. As a rule, conservation agencies and non-government organizations do not farmers in designing and installing new barns and animal production facilities.

*Depending on the program, these examples may not be eligible for any financial assistance.

A combination of an open and roofed barnyard/ACA. Notice the roof runoff controls (above).

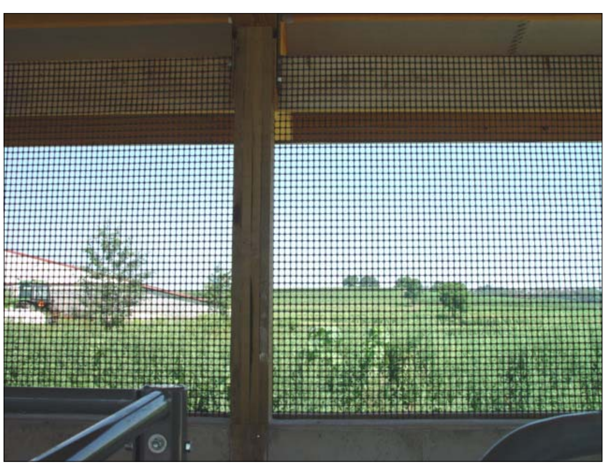
Barnyard improvements can be designed with how the farmer feeds and waters the livestock as shown in the top two and center left photos on this page.

The barnyard shown on the center right photo utilizes a concrete settling basin (outlined in red) to filter manure laden water before it is screened and pumped to a filter area in one of the nearby pastures (not shown)

Two roofed barnyards/animal concentrated areas (ACAs) in the process of being built for two separate beef operations (above and right). Although not visible in these photos on this page, roof runoff controls, underground outlets and other BMPs may be needed.

Photos in this guide were taken at Snyder County farms by Snyder County Conservation District and USDA-Natural Resources Conservation Service, Middleburg Field Office staff.

Two stand alone roofed barnyards/ACAs structures (above) and one barnyard/ACA with a roof extended from the main barn (below).



Although not funded by any public financial assistance grants, this farmer installed netting and a type of monoslope roof that prevents starlings from roosting in his roofed ACA (left and above).

Wastewater Treatment Systems

This section covers two types of wastewater: milkhouse wastewater and barnyard water.

Milkhouse wastewater contains small amounts of milk and detergents used to clean milk handling equipment. This end product, if it enters streams, can cause fish kills and other aquatic habitat damage. Bacteria break down the wastewater using dissolved oxygen in the stream that would normally be used for aquatic life.

Milkhouse wastewater can be taken directly to a liquid manure storage, stored temporarily for later land application, or treated by a vegetative filter area.

Barnyard water contains animal manure. This water must either be diverted to a liquid manure storage or filtered and treated by a vegetative area.

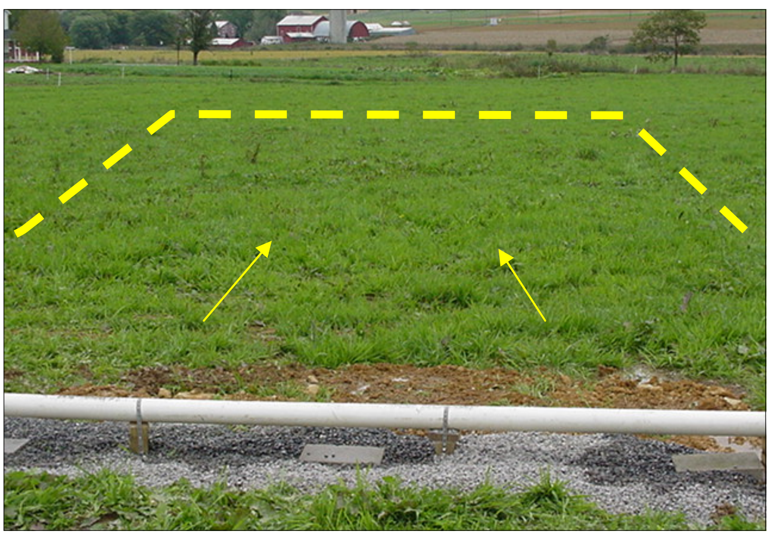
Concrete septic tanks being installed to intercept milkhouse wastewater at a dairy farm (right). The outlet goes to a vegetative filter area.

On this dairy farm, the milkhouse wastewater is pumped from a concrete septic tank (not shown) and flows into a manure hopper cast in place in a barnyard where it flows into a concrete liquid manure storage concrete tank (left). Other farms temporarily store their milkhouse wastewater into a concrete tank, where it can later be pumped into a manure spreader for field application.

Milkhouse wastewater can either be pumped (far left) or siphoned from the concrete tank. The other bottom pictures (left and above) show a special type of siphon called a flout.

On many dairy farms, both milkhouse wastewater and barnyard water flow into either a manure storage or into a vegetative filter area. For example, both milkhouse wastewater (inlet not shown) and barnyard water (screen box shown above left) flow into concrete septic tanks before it is pumped to a vegetative filter area. At another location, barnyard water is scraped into a concrete settling basin where the solids are filtered before entering a concrete septic tank (above right).

A concrete septic tank being installed to handle barnyard water and/or milkhouse wastewater (right). Typically each septic tank has two compartment.



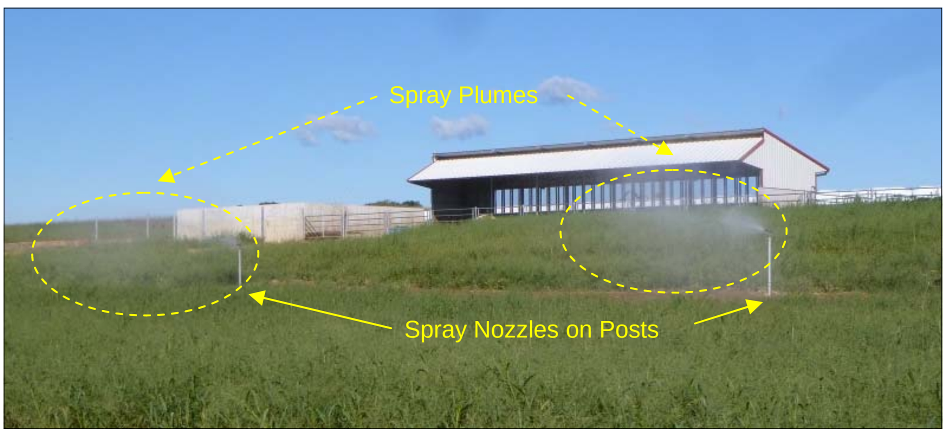
Living vegetation helps water quality by reducing nutrient, sediment, pathogen and waste flows into surface and ground waters. In regards to treating milkhouse wastewater and barnyard water, these filters are either permanent pastures or hay fields. These vegetative filters work together with the parts of the barnyard water/milkhouse wastewater treatment system.

In a vegetative filter area, the grass uses the wastewater nutrients and traps the sediment from reaching surface waters. The soil binds and filters the other wastes and detergents from entering the ground water.

The picture at the left shows a manifold distribution system for milkhouse wastewater. The yellow dashes represent the filter area while the yellow arrows represent the gradual downward slope of the land away from the milkhouse wastewater manifold distribution pipe.

Bottom left: A milkhouse wastewater & barnyard water distribution line in action at the top of a vegetative filter area on a dairy farm.

Another method of distributing wastewater in a vegetative area is by irrigation. The wastewater is pumped to the vegetative filter area where it irrigates the site through a spray nozzle. A nozzle is shown at the left. The center photo shows barnyard water and milkhouse wastewater being sprayed in a permanent pasture. Second from bottom: Barnyard wastewater from a dairy heifer operation irrigates a permeant pasture from two nozzles (see yellow markings).



Just as we read signs to help us navigate, we hope this guide offers farmers some ideas for their farms. (above).

Streambank Crossings & Fencing

Cattle need water and traditionally streams supply livestock with that water. However, unlimited access to streams can not only degrade streambanks and stream water quality, but also cause livestock health issues such has hoof problems and mastitis. Streambank crossings and streambank fencing are BMPs that help water quality and livestock.


Above photos show an excavator, in coordination with NRCS staff, build a cattle walkway and stream crossing for a dairy farm. Notice the different types of stone used. The arrow points to the vibratory roller needed and bulldozer.

Currently, there are no PA environmental regulations or laws that prohibit animal access to any waterbody. However, the animals cannot degrade any waterbody.

An excavator laying a base layer of rock over geotextile for a cattle stream crossing (center left of this page).

Stream crossings may be designed to handle farm equipment as well as livestock.

4 in. 2RC Stone

8 in. PA #4 Stone

Geotextile Fabric

Examples of completed stream crossings with reinforced gravel (below and bottom two photos).




A few cattle stream crossings have been constructed with “seconds” concrete pig slats not used for swine facilities (left).

Stream crossing projects will require a permit through the PA Department of Environmental Protection (DEP).

In pastures, streambank fencing go hand in hand with cattle stream crossings.

Research shows that the larger the grass and tree buffer area is between the streambank fence and the streambank itself, the greater the nutrient filtration and sediment trapping ability.

All but the top photo show examples of permanent streambank fencing.

The photo at left shows a grassy area protected from cattle access along a stream with trees planted within the buffer. This is called a riparian buffer.

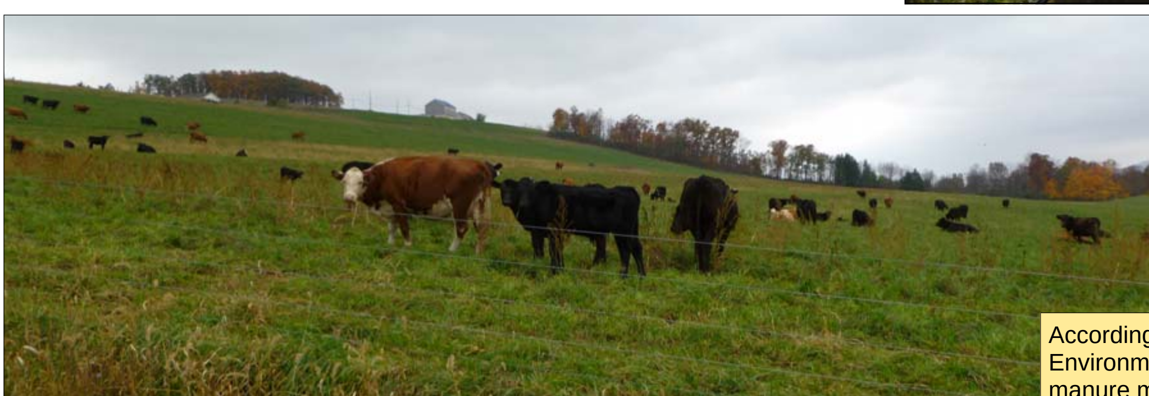
Pasture Management Improvements

When cattle have access to one large paddock, the cattle selectively choose to eat certain vegetation. Before the more palatable vegetation has a chance to rest (replenish root reserves and grow large amounts of lush leaves) the cattle eat that vegetation again. Over time, the palatable vegetation may die off. Bare spots may be created, thus exposing the soil to erosion and degrading the quality of the pasture.

A properly managed pasture is divided into smaller paddocks. The cattle have access to only a small portion of pasture at one time. After a brief time (depending on the number and species of livestock) the cattle are moved to another paddock. The small paddock forces the cattle to be not as selective while grazing. Also, when the cattle leave the paddock, this gives the vegetation time to rest in order to replenish root reserves and grow lush vegetation for the next time. This type of grazing allows the farmer to utilize a valuable resource while keeping the soil covered with vegetation. If managed correctly, a farmer can increase the amount of pasture forage being fed to the livestock. Watering systems, cattle walkways, cattle stream crossings, streambank fencing may complement and improve the management of pastures..

Newly installed pasture fence with interior fencing to sub-divide pasture into smaller paddocks for a beef and sheep farm (left). Interior fence is right above the red dashed line in photo. The interior fencing may be permeant or temporary, depending on the pasture management strategy.

Newly installed pasture fence on a beef operation keeping cattle out of a waterway. This pasture was formally a crop field (right).



According to PA Department of Environmental Protection (DEP) manure management rules, farmers with pastures must either:

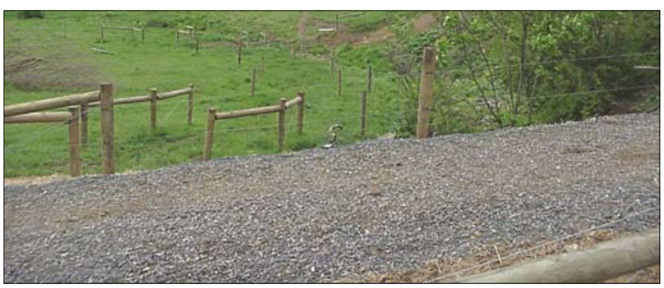
a.) follow a NRCS developed "Prescribed Grazing" plan, or

b.) maintain dense vegetation (average height at least 3 inches) throughout the growing season.

Some equine species such as horses (shown above), naturally graze well below 3 inches. This can be challenging in order to meet DEP manure management rules regarding pastures.

Pastures need to be flexible for operator and livestock. This includes the types of fencing, gates, watering systems, ability to harvest hay in paddocks, and desirable vegetation in the pastures (top four pictures in this page).

A sacrifice area is a place near or in an pasture where animals may be confined when pastures are not suitable for grazing due to low vegetation height, wet conditions, etc. These areas should not be near any waterbodies or locations where water runoff can transport pollution to waterbodies. On some operations, creating a reinforced gravel ACA, barnyard or sacrifice lot is desirable. Above, reinforced gravel is being placed at an equine operation.



Completed cattle walkway made of reinforced gravel (left).

Reinforced gravel ACAs, sacrifice lots, barnyards, stream crossings, cattle walkways and access roads typically consist of a geotextile fabric on the bottom, a coarser rock above the geotextile (near right) and a finer stone mix to top (far right). Excavation and compaction are necessary to complete the project. A finer stone mix that is shown in the far right photo for the finished top layer may be desired by equine and some other livestock owners.

Reinforced gravel cattle walkways and pads around pasture waterers, water troughs and hay feeders will help prevent turning some pasture sections into large bare spots and mud holes.

Example cattle walkways at two separate farms (above and left). Geotextile may be needed at some places due to soil type and the nearness to streams.

Geotextile fabric laid before stone is placed for cattle walkway (bottom). Construction of the same cattle walkway shown at left.

Base layer of stone being placed overtop of geotextile fabric around a precast concrete spring development trough on a dairy farm (left).

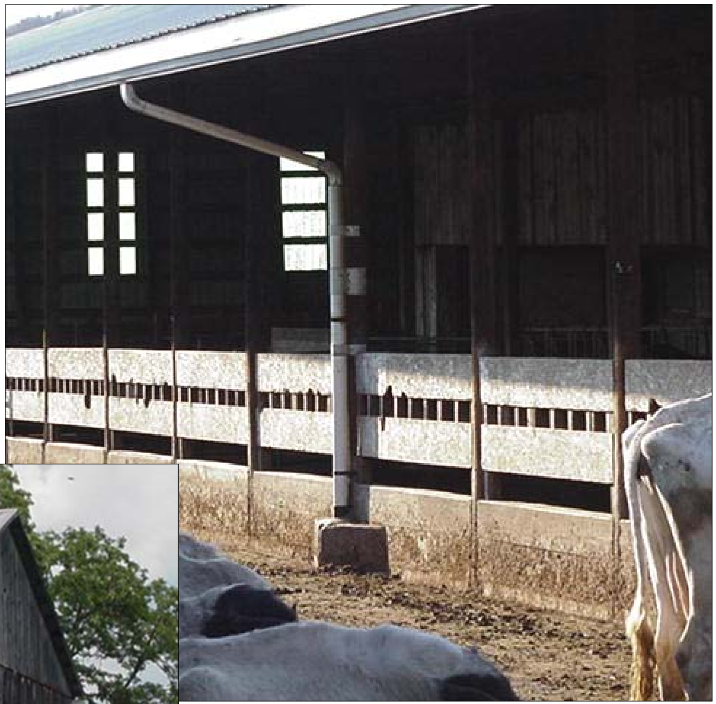
Reinforced gravel pads placed around newly installed water troughs and waterers at various beef and equine operations (left, right, below and right).

Example of portable water troughs in pastures (two left and right photos). For some operators, flexibility with locating water troughs is suitable for how they manage their pastures.

A frost free hydrant located in a pasture (right). At left, a quick disconnect for a water line where water trough portability is preferred.

Farmstead Stormwater Controls

When farmers think of agricultural BMPs, they normally do not think about roof gutters and downspouts. This simple practice keeps the clean roof water from reaching manure covered barnyards, pastures and manure stacking areas. The less water that reaches a potential nutrient or sediment source, the less contaminated water that has to be treated by a filter area or placed in a storage. Roof runoff controls usually work with underground pipes and outlets and help other BMPs, such as improved barnyards and roofed manure storages function more efficiently.



Roof runoff being diverted away from a concrete barnyard on two separate dairy farms (top two photos) and a horse pasture on another farm (center photo).

Example of roof gutters and downspouts installed on a roofed ACA far (left) and a composter attached to a poultry manure storage (below)..

Underground outlets carrying roof runoff water can outlet its water into a rock lined basin (top center) or lined with rock in some manner that is does not cause scouring (top left). An animal guard at a pipe outlet (top right) prevents curious animals from entering the pipe but allows potential debris from exiting the pipe.

An example of a rock lined inlet diverting water away from poultry facility (above left). An outlet pipe taking stormwater to a drop box (above right)

Sometimes, diversions and waterways have to be constructed in order to divert water away from farm buildings (barns, sheds, etc.) and BMPs (such as manure storages and improved barnyards). The lower three photos show a diversion alongside a liquid manure storage (right) or a diversion carry stormwater away from a roofed poultry manure storage (bottom two photos).

Cropland Preservation Management & Practices

This is a group of BMPs that keep the soil in place. They include planting crop rotations, contour strips, cover crops and no-till planting. The more crop residue or vegetation that exists on the soil surface, the less soil that is exposed to rainfall and other precipitation.

Cover crops keep the soil covered during harsh winter weather. Originally, farmers normally plowed the cover crop as a “green manure” for the future field crop. While the cover crop completed its mission over winter, the soil becomes exposed to spring showers until the new crop establishes a canopy.

However, farmers have additional options now. The cover crop can either be killed by a herbicide or harvested as a forage. In this way, the cover crops continue their soil saving mission even after they die. The dead stems and roots keep the soil intact long enough for the new crop to establish a canopy.

No-till planting works on a similar principal by covering the soil from rains and other precipitation. Research has shown that tillage burns soil organic matter into carbon dioxide (CO_2).

Continuous no-tilling combined with cover crops and diversity in the crop rotation can keep the existing soil organic matter available for future crop. Some farmer have actually increases soil organic matter as well as improve soil structure.

Corn no-tilled into a field that was in alfalfa/ grass the year before on a farm (directly above). The farmer sprayed a herbicide to kill the alfalfa and grass the previous year. No-till corn planted in a field that had soybeans the previous year, and corn the year before (above left). At left, two no-till drills on a harvested wheat field during a Conservation District sponsored no-till field day event.

A team of four horses pull a no-till row planter (above left) and a no-till drill (directly above) on harvested wheat fields during a Conservation District sponsored field day event. At left, two farmers get ready to demonstrate how a no-till transplanter works during a Conservation District sponsored field day event. The no-till transplanter can plant seedlings such as pumpkin, tomatoes and squash.

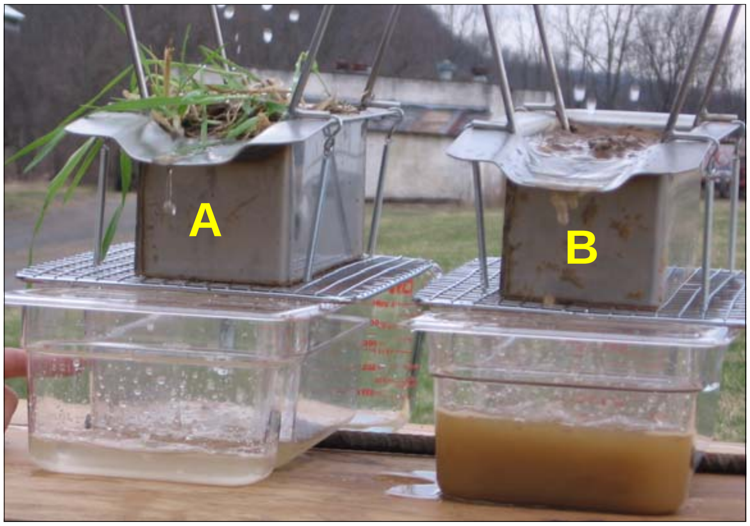
Farmers and researchers have been experimenting planting a cover crop between crop rows (such as field corn or sweet corn) while the crop is approximately "knee high." One piece of equipment that was tried in Snyder County was an interseeder (above), a no-till drill designed to plant between row crops spaced 30 inches apart. Farmers walk through an unharvested corn field where the interseeder was used during a Conservation District field day event (left). Notice the established cover crop between the corn rows (left and below).

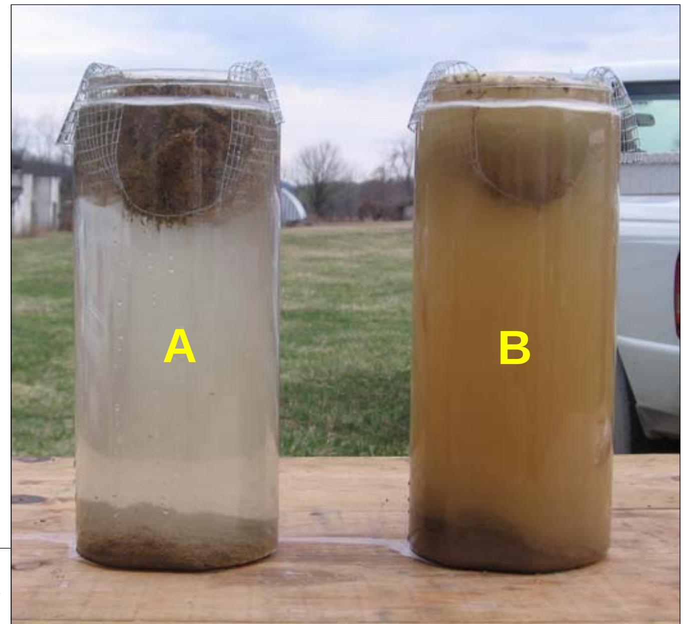
Two farms where a small grain cover crop species was planted after harvested corn silage (left and right). The photo at left was taken in early spring while the right photo was taken in late fall.

A tillage radish (above) planted in a harvested small grain field to improve water infiltration. Typically, tillage radish is planted with other cover crop species for a more thorough living cover. Photo taken in late fall.

Three different cover crop mix test plots on a farm (above, left and bottom left). Photos taken in late fall.

Some farmers have been experimenting with various cover crop mixes, such as clovers and grasses, while others experimented with newer varieties and species. Some farmers and researches believe the more diverse the cover crop mixture, the better the soil health (e.g., water holding capacity, organic matter). Pest control, nutrient retention for future crops, nitrogen fixing ability are also some potential benefits.





The upper two photos are results from two separate soil health demonstrations, conducted by an NRCS staff person during a field day event sponsored by the Conservation District. It compares no-tilled soil (left, "A") and continuously conventionally tilled soil (right, "B"). In the upper right photo, notice that A's soil clump on the wire mesh on top is still holding together due to the soil organic matter allowed to accumulate over time. In B, the soil clump has lost is shape at the wire mesh on top due to lower organic matter content. Tillage allows the oxygen to burn the organic matter and the lost carbon is released into the air instead of binding soil and becoming a source of plant nutrients and other soil organisms' feedstuff. The cloudy jar B indicates water easily breaking up the soil clump while the clearer water in A shows that the soil clump is more resistant to degradation by water.

The above left photo show mimics a rainfall event over no-tilled soil with a cover (A) and a continuously conventionally tilled soil without cover (B). This demonstration shows the amount of water runoff the soil surface, its condition and how much is absorbed. The runoff from soil A is much cleaner than from soil B. Although not readily visible in the left photo, water infiltrates soil A more than soil B.

When soil is not tilled, earthworms work the soil, and after consuming it with crop residue, produces a "glue" that helps keep soil together. A sign of earthworm activity is a middling, a hole that they make when burrowing. An example is marked in yellow (right).

Continuous no-till and cover crops are good for soil health. However, these practices work better when in cooperation with contour strips and crop rotation. When working together, these practices limit sheet erosion on cropland. Other practices that prevent sheet erosion are vegetative field strips, riparian buffers with trees and permanent grass along streams and field borders.

Vegetative contour field buffer strip (marked by arrow in above left photo) in crop field. This strip will prevent sediment from traveling a longer distance to a road ditch below (not shown) that eventually flows into a stream. At right, a field buffer where permanent grass will be grown instead of rotating in and out with row crops. Edges of fields are places where erosion (sheet, rill and gulley) can take place due to direction of the crop rows and typically lower crop residue from lower production. Once established, field borders reduce erosion and possibly produce a hay crop.

Even with continuous no-till and cover crops, some other practices are needed to prevent gulley erosion where water can concentrate. Once water moves downhill in a concentrated motion, the velocity can erode large amounts of valuable topsoil from crop fields. Some of these places are created not by the slope of the crop field, but the location of road ditches and culverts.

In this page, photos of diversions and grassed waterways either being constructed or already established. Over time, some of these practices may need to be reshaped and/or reseeded in order to properly transport cropfield stormwater. When diversions and waterways are constructed, a combination of straw, seed and a type of matting are needed to prevent erosion during storm events before vegetation is firmly established. Notice the jute matting (top left photo) and plastic matting (right) used in the grass waterways.

Rocks are placed at waterway inlets (center right) and in the waterway itself (center left and upper photos) to prevent water scouring due to the water's high velocity either from culvert pipes or due to topography. In the bottom photo, an above ground inlet (yellow arrow pointing to a perforated pipe) takes water from a grass waterway and outlets the water to another location.

Nutrient & Manure Management

All of the structural manure BMPs mentioned in this booklet are useless if the farmer spreads the manure improperly. A nutrient management plan or manure management plan guides a farmer with the amount of manure to apply for a certain crop at a specific time of year. Other things that a farmer needs to do in order to be certain that excess manure nutrients are not applied is to calibrate the manure spreader and take soil and manure tests. Manure is a crop nutrient source, not just an animal waste product.

Every farm in Pennsylvania that land applies manure or agricultural wastewater (generated on the farm or received from an importer), regardless of size, is required to have and follow a written manure management plan (MMP). This includes direct application of manure by animals on pastures and in animal concentration areas (ACAs). Some operations due to animal numbers or animal density are required to have hire a certified nutrient management specialist to write a nutrient management plan (NMP). Contact the Conservation District for details.

Liquid manure is being pumped out of a circular concrete manure tank and into a liquid manure spreader on a dairy farm. Not more than 9,000 gallons of liquid manure (e.g., dairy, swine, veal) may be applied per acre at one time. In winter, that rate is reduced to 5,000 gallons/acres.

A poultry farmer loading a dry manure spreader (above). Since poultry manure is nutrient rich compared to some other drier manures, farmers have to land apply it at lesser amounts. Some farmers may have to decrease their manure application rates on certain fields due to high phosphorus levels or proximity to streams. Most animal manures contain a higher amount of phosphorus than nitrogen for agronomic crops to use during a growing season.

Your MMP or NMP will help you to determine the specific application rates on your farm. It will also guide you on where you cannot spread. For instance, manure cannot be spread by a manure spreader within 100 ft. of any waterbody (stream, pond) unless there is a 35 ft. permanent vegetative buffer. In winter, the no spread zone is 100 ft. regardless of the existence of a buffer. Also, manure cannot be applied within 100 ft. of a private drinking well.

Calibrating your manure spreader is similar to calibrating your sprayer. Knowing the amount of manure you are actually applying will help with records, as well as knowing how much nutrients the crop is receiving. Combining this knowledge with a manure sample and a soil test will enable the farmer to make better use of the operation's resources. Bottom Photos: A manure spreader calibration demonstration is being conducted during a Conservation District field day event.

Farmers land applying manure (top and center left photos in this page). Below, a liquid manure spreader with a low disturbance injection attachment parked on a farm field.

Miscellaneous Practices

The BMPs shown from this point forward are practices that fall into two categories: a.) practices that seem minor but help our local water quality and work with other BMPs or b.) stand alone practices that are not the typical BMP that conservation agencies deal with on a normal basis.

Seed & Mulch Excavated Areas

When the project is almost completed, no matter if it is a grassed waterway (left) or an improved barnyard (below), establishing vegetation to keep the soil in place is critical. Mulching is necessary to protect the seed and maintain soil moisture during early vegetation growth.

Vegetation along manure BMP sites (top three) where earth was disturbed during construction.

A permit is required if an excavation/ construction project disturbs, at minimum, 1.0 acre of earth over the life of the project.

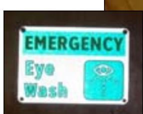
Farmstead Access & Farm Roads

Most people on a farm do not usually think of farmstead traffic as a problem. However, if a road turns into a muddy mess, not only can sediment leave the farm, but typically is a nuisance for the farmer. The four photos on the bottom half of this page show reinforced access roads serving farm buildings, barnyards and the farm in general.

Reinforced gravel roads along an improved barnyard (right) and a roofed ACA (below) to aid in livestock feeding.

The bottom three photos show conveyor belt water bars (ready for installation or already installed) for a forest access road to limit road washouts. These water bars can be also used on farm access and farmstead lanes and roads.

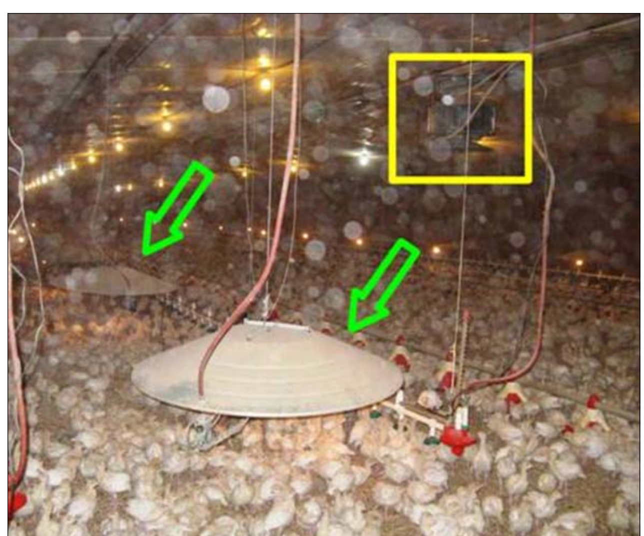
Chemical Handling Facilities



Many farmers handle pesticides and other potentially hazardous liquids. If there is a leak or an accident, containment of the spill or treatment of the victim is important. Pictures on the top half of this page show images from two separate facilities.

Manure to Energy Conversion Facilities

One swine facility installed a manure digester that produces methane gas which runs an electric generator (above and left) to run its operation as well as excess to sell. Two poultry facilitates burn their poultry manure and use the heat produced to warm their own poultry houses (below left and right). At one farm, young turkeys enjoying heat from traditional brooders (green arrows) and one of the additional ceiling heaters connected to the manure burner (yellow box).



Special Thanks to ...

2016 Agricultural BMP Tour Assistance & Tour Stops:

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Cooperating Agency Staff:

Providing technical and financial assistance for projects shown in this brochure and for other projects in Snyder County from 1999 to 2016:

- *Snyder County Conservation District Staff (Listed Below)*
- *NRCS Middleburg Field Office Staff (Listed Below)*
- *Union County Conservation District Engineering Staff*
- *Other NRCS Field Office Staff (Sunbury, Mifflintown, Burnham. Lewisburg, Montoursville)*
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- *NRCS State Conservation Engineering & Ecological Sciences Staff, Harrisburg*
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The Snyder County Conservation District engages and leads through partnerships, innovation, and implementation to conserve, promote, and improve Snyder County's natural resources.

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