



Livestock and Poultry
Environmental Stewardship
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LPE S Small Farms Fact Sheet series

Got Barnyard Runoff?

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Summary

Uncontrolled runoff from barnyards and open lots can contain nutrients and manure. If allowed to enter nearby surface water like streams and ponds, it can cause significant harm. This fact sheet discusses ways to prevent or reduce the possibility that runoff from barnyards and open lots will pollute the surrounding environment.

Introduction

Runoff caused by rain may wash away manure in barnyards, stables, wintering areas, or open lots. This situation represents one of the most difficult challenges for small farms. Any time runoff touches manure, all of the water flow-

ing though the lot is polluted. Therefore, if 80 acres of pasture runoff drains through a one-acre lot containing manure, the result is 81 acres of polluted runoff. Even though the runoff is watered down, it is still considered a pollution risk (Figure 1).



Figure 1. Runoff from barnyard.
Photo courtesy of USDA NRCS.

However, there are ways to reduce the pollution caused by manure and runoff from small barnyards and open lots. Place grass or other plants below the lot where it can filter runoff before reaching streams and ponds. Try to have at least 100 feet of grass between barnyards and surface water.

If you follow these six principles, you can reduce the chance that barnyards, wintering areas, or open lots will pollute. Livestock owners can change fencing, divert clean water around lots, regularly collect manure from lots, control manure runoff, manage nutrients, and protect water wells from pollution to reduce the possibility that their farm will pollute and to be a good steward of their land.

What is Surface Water?

State and federal regulators and environmental groups look for a connection between where animals are penned and surface water when determining if a farm is polluting or has the potential to pollute the environment.

Examples of surface water include streams that contain water only when it rains; streams and rivers that flow year round; and lakes, ponds, and wetlands. Some state regulators may view road ditches or waterways as surface water.

Fence What You Need, Abandon the Rest

Many livestock producers who have open lots usually have an abundance of space to house animals. Having enough space for exercise and personal space for animals is important for animal well-being. However, having excessive space increases the amount of runoff that pollutes surface water. Animals will use all of the space provided in a dry lot. By sizing your lots appropriately, you ensure



enough room for the animals and minimize the area that contributes polluted runoff. This is the first step to decreasing environmental risk. Table 1 can be used to properly size open lots.

If buffer space outside a pen is limited, reduce the number of animals in the lot before reducing the pen space. Keeping the same number of animals in a smaller lot may negatively affect animal health and comfort. If grass can be established or if an adequate buffer area is available, the amount of space for each animal may be increased.

Divert Clean Water

“Dirty” runoff should filter through grassy areas before reaching ditches, streams, and other surface water. “Clean” water is runoff from crop fields, hay fields, pastures, roofs, or farmsteads. Direct clean water away from the barnyard or open lot.

Table 1. Amount of lot space needed per animal in 25- to 35-inch rainfall areas.

Type of Animal (lbs)	Earthen Lots (sq ft)	Paved Lots (sq ft)
Beef		
Cow-calf	500	75
Calf (600)	250	50
(600-1,400)	350	60
Dairy		
Calf (250)	200	30
(250-400)	300	35
(400-600)	400	40
(600-800)	500	45
(800-1,000)	600	50
Sheep		
Rams (180-300)	40	16
Ewes (150-200)	40	16
Feeder lambs (3-130)	30	10
Swine		
Nursery pigs (30-75)	75	8
Finish Pigs (75-275)	150	15
Gestating Sow	200	20
Boar	200	40
Horses		
Horse (1,000)	500	NA
(1,400)	750	NA



Example

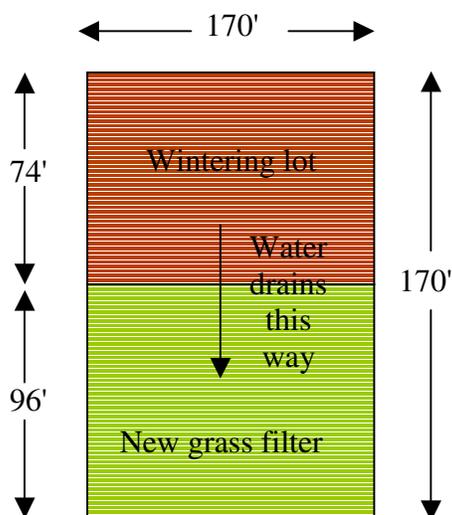
Joe Farmer was rebuilding a wintering lot near the home place and wanted to know how much dry lot space he needed for his 25 beef cows. He uses it to keep cows and calves for four months before turning them out to pasture in the spring. Currently the lot is 170 feet by 170 feet.

From Table 1, cows-calves need 500 square feet per pair.

$$25 \text{ head} \times 500 \text{ sq ft} = 12,500 \text{ sq ft}$$

$$12,500 \text{ sq ft} \div 170 \text{ ft} = 74 \text{ ft}$$

The new lot needs to be 170 feet by 74 feet. Joe decided to move his fence back 96 feet and plant the old lot space to brome for a filter treatment system.



Separate "clean" water from "dirty" barnyard runoff.

Clean water ditches, channels, waterways, and terraces help control the runoff from elevated areas. Direct roof water using gutters (Figure 2).



Figure 2. Shed with gutter drainage system. Guttering prevents roof drainage from entering lot.

Collect Manure

Allowing manure to build up in barnyards and open lots when it is wet makes it harder for animals to move and feed. They use more energy to walk, and contribute more pollutants to runoff when it rains. Collect manure from barnyards and lots monthly to reduce buildup and



the chance manure will leave the barnyard. Pull-type blades, such as a box scraper or a three point blade, work best to clean lots (Figure 3).

Collect manure from barnyards and lots monthly.



Figure 3. Collecting manure with a pull-type blade works best for maintaining lot surfaces.

Research shows that four inches of mud or manure reduces feed efficiency 10% per day. Ruts created by tractors and feed equipment to bunks and hay rings result in animals feeding in an abnormal feeding position. Feeding in an awkward

position wastes feed and reduces body condition. Using concrete or geo-textile fabric around the feeding area eases manure collection.

Manure should be stock-piled in locations where runoff will not drain into surface water. Manure can be stock-piled in a field, away from surface water, and spread when it is more convenient.

Control Manure Runoff

If manure runoff reaches a ditch or stream when it leaves a lot, it pollutes the environment. If runoff from a lot passes through a grass strip before it reaches the ditch or stream, it will be treated. The plants will use the nutrients and excess runoff water. Installing a debris basin, filter fence, or similar device provides additional treatment by settling manure solids before the liquids flow through the vegetation. These are called vegetative treatment areas (Figure 4). A rule of thumb is that a vegetative filter or treatment area should be at least as large as the lot area.



**Rule of thumb:
Vegetative filters
should be at least as
large as the lot area.**



Figure 4. Vegetative filter using gated pipe to take runoff from a lot to a brome filter.

Manage Those Nutrients!

Manure contains valuable nutrients that plants need. If the nutrients are not used, however, they become a pollutant.

A ton of chicken manure can contain up to 70 pounds of nitrogen. If commercial fertilizer costs \$0.30 per pound of nitrogen, the nitrogen in the ton of chicken manure is worth \$21.

Manure on lot surfaces and in sediment basins needs to be

collected and spread on grassland or cropland. Otherwise, the manure is wasted.

Look Out Below!

Loamy and sandy soils and shallow groundwater indicate areas that are easily polluted. Both water wells and wellheads should be installed according to state codes and located uphill of livestock feeding areas and runoff water. Apply less manure on loamy and sandy soils that are close to groundwater because they tend to allow liquids to flow easily through them. Stop using cisterns or hand-dug wells located near feeding sites. Properly plug any watering system that is no longer being used (Figure 5).



Figure 5. Sealing an unused well.
Photo courtesy of USDA NRCS.



Drinking Water?

Animals should have a clean and reliable source of drinking water. Letting animals drink in a stream is the same as dumping a small amount of their manure in the stream everyday. Providing water from a water bowl, water tank, or automatic waterer keeps both the stream and your animals healthy (Figure 6). An alternative solution is to limit your animal's access to streams or ponds with a watering ramp.



Figure 6. Water tank provided in pasture.
Photo courtesy of USDA NRCS.

Am I Subject to Regulation?

Small barnyards, stables, and lots are regulated based on their size and connection

with surface water. If a small farm has a filter strip, debris basin, holding pond, or infiltration field that prevents runoff from directly flowing to surface water, it will probably not be subject to regulation. However, farms that have a connection to surface water could be required to install controls and obtain permits.

Try to maintain as much grass in and below open lots as possible (Figure 7). The grass helps to filter and use nutrients. It is best to bale and feed this grass rather than let livestock graze on it.

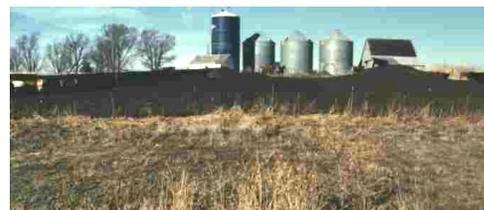


Figure 7. A vegetative buffer area below an open lot will filter runoff before it reaches surface water.

When am I Regulated by EPA?

EPA and state environmental regulators use two acronyms: Animal Feeding Operations (AFO) and Concentrated



Animal Feeding Operations (CAFO). Only CAFOs need permits. However, any size of operation can be considered a CAFO. To avoid needing a permit, small-scale farmers should manage their farm so that they will not meet the definition of an AFO. To avoid being called an AFO, small farmers may need to manage their lots near crop fields, pastures, and range land differently than in the past. They may need to limit the amount of time that livestock spend in lots. To be a good steward of the environment, small farmers will need to actively encourage the growth of grass in confined areas and to reduce the chance that runoff will reach surface water.

Regulators will ask the following two questions to determine if you are an AFO:

1. Do animals spend time in any area that does not contain grass or other ground cover?

If the area is completely bare and is not used for crops or hay, it may concern regulators.

2. Are animals restricted to the area more than 45 days during the year?

Housing animals in lots, wintering areas, and barnyards for a short time does not concern regulators as long as it is temporary. Regulators will thoroughly inspect lots and areas that are obviously used more than 45 days if they think they are polluting streams, lakes, or wells.

A small farm must first be an AFO before it can be considered a CAFO.

What is a Small CAFO?

Regulators use the term "small CAFO" to describe a livestock operation that is required to control runoff and manure. This operation requires a permit. Your farm may be a small CAFO if any of the following situations apply to you:

1. Brown-colored water is leaving your lots or barnyards and noticeably flowing into a stream,



- lake, or even groundwater.
2. Brown-colored water is leaving your lots or barnyards in a man-made ditch. A pipe has been installed to drain runoff water from the property.
 3. The regulatory agency in your state has told you that your farm is polluting. They have sent you a letter asking you to correct the problem.

Points to Remember

- Do not place a pipe or ditch from the barnyard or open lot to surface water.
 - Place a grass buffer or filter strip between your barnyard or open lot.
 - When animals are present, it is best to clean the open lot once a month. Cleaning lots once a year is not enough.
- Take steps to prevent extra water from draining into your lot or barnyard from a field.
 - Provide the right amount of lot space for your animals.
 - Avoid a bare open lot that is larger than the animals can use.
 - Plan to spread manure to use the nutrients, not just to get rid of it.
 - Do not allow water to collect near wells or wellheads.
 - Fence off streams and ponds next to your barnyard. Do not allow animals to drink from them.



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For More Information

Educational Resources

<http://www.lpes.org/>—To view the Livestock and Poultry Environmental Stewardship (LPES) curriculum resources
<http://www.reeusda.gov/1700/statepartners/usa.htm/>—To obtain state Cooperative Extension contacts

Environmental Regulations Related Resources

<http://www.epa.gov/npdes/afo/statecontacts/>—To obtain state environmental agency contact

Small Farm Resources

1-800-583-3071—USDA-CSREES Small Farm hotline

State-Specific Resources

The local contact for your land-grant university Cooperative Extension program is listed in the phone book under “Cooperative Extension” or “(county name) County Cooperative Extension.

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