

Improving Environmental Stewardship:

Outdoor Animal Lot Runoff Management

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Housing dairy cattle outdoors on either earthen or concrete lots is a common practice in Michigan. In recent years, the use of outdoor lots has come under scrutiny. Why the concern? Nutrients from manure and/or feeds can cause polluted runoff. If these nutrients reach ground or surface waters there is an environmental concern.

In the 1960's and earlier, recommendations for new dairy facilities included large uncovered concrete lots. The concept emphasized the benefits of exercise, sun exposure, and air quality on animal health and performance. Today, many animal facilities from that era and even newer facilities still utilize outdoor lots. The concept of outdoor lots and their management has remained unchanged over the years, but our understanding of potential negative environmental impacts from outdoor lot runoff has changed. The ecological and regulatory consequences of manure and feed nutrients along with the concern for pathogens entering surface and groundwater can be a significant. As a result of recent emphasis on reducing pollution from agricultural sources, outdoor animal lots are receiving new attention. Dairy and livestock producers need to understand the environmental expectations placed on outdoor animal lots as they relate to facility design and management.

The Michigan Right to Farm Generally Accepted Agriculture and Management Practices (GAAMP) for Manure Management and Utilization indicates a need for producers to assess outdoor animal lots. If lot runoff is found to have an adverse impact on surface or ground water or leaves the property of the farmer, then runoff control is required for nuisance protection under the GAAMP. It is unacceptable for outdoor lot runoff to reach a neighbor's land, roadside ditch, stream, lake, and wetland. The ponding of runoff in a low spot is also of concern due to the potential leaching of nutrients and pathogens to groundwater.

It is important to distinguish between a pasture and an outdoor lot. The *Answers to Frequently Asked Questions* (available at www.maeap.org document for Comprehensive Nutrient Management Plans (CNMP) development) defines a true pasture as follows,

Three essential characteristics of a true pasture:

- 1.) Land used primarily for production of forages, which livestock graze,
- 2.) Predominance of desirable vegetation, and
- 3.) Stocking densities and management ensure stand sufficient to slow runoff, control erosion, and slow movement of manure nutrients.

Any outdoor animal housing area not meeting all three of these pasture characteristics would be considered a “lot” and thereby needs managed to reduce the risk of negative impact on surface or ground waters.

Commonly overlooked outdoor lots include those areas that may have once been a pasture but no longer maintain the characteristics of a true pasture yet are still referred to as a pasture. High use areas within a true pasture may also be of concern. These areas include traffic lanes, corrals, and areas around waterers and feeders.

Assessing your facilities for potential areas of concern is the first step in taking action to improve environmental stewardship associated with outdoor lots. A simple and effective method of identifying these concerns is to wait for a rainy day and follow the water. During a rain event, investigate if the water made contact with outdoor lot surfaces containing manure and feedstuffs and assess where the runoff travels. The direct movement of lot runoff to surface water either across the surface or through basins and tiles is a problem that should be promptly addressed. There are, however, less obvious concerns. For instance, the frequent ponding of runoff in a low spot or the accumulation of manure solids in an adjacent area may be an equal threat to ground water because of the concentration of nutrients in a single location and its eventual leaching downward. Be sure to observe if the runoff travels to areas near well casings, tile inlets, drainage ditches, and other less obvious direct links to ground and surface water.

There are numerous options to reduce or eliminate the risk of lot runoff. What appears to be the best option for one farm, may lead to economic hardship or adverse management implications to the next farm. Solutions should be tailored to each farm’s location, existing facilities, financial position, and management style.

Reducing or completely eliminating runoff may hold more opportunity to improve a situation in a profitable manner. Think about the following questions regarding the lot being addressed:

1. Is the lot needed? Sometimes the use of an outdoor lot is more of a tradition or a perceived need than an actual necessity for profitable animal housing.
2. Can the lot be reduced in size? Eliminating the lot may not be an option, but can it be made smaller. Oftentimes, lots are much larger than what is necessary for maintaining profitable animal performance and well-being. For example, many older facilities have 50 to 100 feet between the barn and a fence line feed manger. Meanwhile, Midwest Plan Service (MWPS-7) indicates a minimum space required for a mature cow feed alley of only 12 to 14 feet. In this instance, there is opportunity to significantly reduce the lot area exposed to runoff potential.
3. Can it be covered? Rarely is this a viable option; however, it is worth considering whether or not a roof could be constructed over the lot. Economics and practical implications such as ventilation usually reduce the likelihood of implementing this alternative.

4. Is clean water unnecessarily contacting the lot surface? Precipitation landing on barn roofs, driveways, and areas adjacent to animal lots is normally “clean” water. By diverting this water before it contacts the animal lot, it becomes unnecessary to treat it. **Gutters:** Properly sized, installed, and maintained industrial roof gutters can redirect clean roof water to an appropriate alternative location. With properly installed industrial guttering, the common concern of ice slide damage can be avoided. **Diversions:** It is equally valuable to ensure that water from adjacent driveways and other clean areas is not passing through the animal lot. Grading and diverting this water away from manure areas can prevent the need for treating this water as well.
5. Can lot management reduce the concentration of nutrients and pathogens in the runoff? Keep lots, whether concrete or earthen, scraped so there is less manure available for transport via runoff. A practical implication would be to scrape the lot frequently, but especially in advance of a forecasted precipitation event.
6. For earthen lots and high use areas of pastures, can conservation practices be implemented to reduce environmental risk? For instance, can stocking densities be reduced with either fewer animals or more area? Can rotational management of paddocks be utilized to maintain adequate vegetation? Can high use areas such as watering and feeding areas be frequently relocated and the previous site re-vegetated? Can a cover crop be grown in corn stalk stubble that is to be grazed?
7. Can the integrity of the lot surface be improved and demonstrated to minimize risk to ground water? Since soil and subsurface characteristics of earthen lots influence risk to ground water, can this risk be managed? Is an engineered, compacted clay earthen lot appropriate? Are cracks, holes, or other indications of poor integrity evident in concrete or paved lot surfaces?

If generation of lot runoff cannot be entirely avoided, then containing and treating it is the next option to be considered when addressing concerns. Containment and treatment options include storage and land application as well as settling basins in conjunction with filtration areas or constructed wetlands.

The most simplistic containment option would be to simply capture the runoff in an existing manure storage. The disadvantage to this alternative is that it decreases the storage volume for manure and increases the amount of water that will need to be hauled. To illustrate the magnitude of runoff volume, consider that Michigan receives approximately thirty-four inches of rain annually. That equates to about twenty-one gallons of water per square foot per year. A relatively small lot of only 50 ft. by 50 ft. would have nearly 53,000 gallons of precipitation hitting its surface each year. That’s a lot of water to handle in storage and field apply!

Constructing a separate, designed storage exclusively for runoff is another option. It does not eliminate the need to handle the volume of runoff for field application, but it will not impact the capacity of other manure

storages. This may be an appealing option if irrigation can be used for field application. Runoff is typically very dilute in solids and nutrients and may work well in an irrigation system.

Utilizing a settling basin to remove manure solids in conjunction with a designed grass filtration area or a constructed wetland may be another option for treating outdoor animal lot runoff. Design criteria, site characteristics, space availability, expense, and management requirements may limit the appropriateness of this option, but it may be feasible under certain circumstances for a portion of a runoff management strategy.

The implementation and management of practical solutions can reduce much of the concern related to runoff from outdoor lots. It is the responsibility of each dairy or livestock producer to seek input for their specific situation from appropriate professionals such as the USDA Natural Resources Conservation Service (NRCS), Soil and Water Conservation Districts, MSU Extension, or private consultants and engineers. Pursuing a balance between economic feasibility, practical feasibility, and the long-term goals of the farm will lead to the most appropriate solution. Remember that the bottom line is the demonstration that a discharge of nutrients or pathogens to surface or ground water or to another property is not occurring.