



Minimizing Pollution Risk from Livestock Operations

Livestock on your property can increase the risk of water pollution. The main cause of pollution from livestock operations, including horse stables and dog kennels, is improper management of manure. However, improper disposal of dead animals and sediment eroded from poorly maintained corrals, exercise areas, and pastures can also be pollution problems. Although large operations have more manure to manage and thus higher pollution risks, even very small operations with only a few animals can cause pollution problems.

This worksheet is designed to provide basic information on livestock management and its potential impact on water pollution. People who maintain small numbers of swine, horses, cattle, or other livestock can use these materials to identify the level of pollution risk from current management practices and to develop an action plan of practices that reduce these risks. If you have pastures, use this worksheet along with HAPPI-Farm 8, *Pasture management*, to make a more complete assessment of your pollution risks.

For more detailed information on livestock management and, particularly, livestock waste management issues, please consult your local CTAHR Cooperative Extension Service (CES) livestock agent or the publication *Guidelines for livestock waste management* published in 1996 by the Wastewater Branch of the Hawaii Department of Health.

Location of your livestock

Livestock operations located near streams or the ocean have an increased risk of causing water pollution. According to state law, all livestock operations including pig pens, chicken houses, horse stables, corrals, and exercise yards should be located at least 50 feet from surface water bodies. Runoff from livestock areas can transport animal manure to locations that may cause water contamination. Steep slopes, high rainfall, and poor maintenance all increase runoff from your facility. Surface water runoff and runoff from roofs should be diverted away from the facility or collected for other uses. Try to *keep the clean water clean*.

Improperly located and managed livestock operations can also put drinking water resources at risk. According to state regulations, all livestock operations must be located at least 1000 feet from any public drinking water source. Although the regulations do not cover private drinking water wells, these

wells should still be protected from potential contamination to help keep your family safe. Livestock should not be housed within 100 feet of a well, and manure should not be stored within 250 feet of a well. If space is available, keep livestock and store manure downhill and as far away from wells as possible.

Manure management

With the development of new water quality guidelines and potential regulations targeting livestock operations, proper management of manure to prevent water pollution is even more important. The law already requires very large producers to develop a written manure management plan, and regulations have been proposed that will require moderate-sized producers to have written plans. Although small-scale operations that do not pollute do not have to develop a written plan, a plan is still useful to help avoid future problems.

Written plans, developed with the assistance of your Soil and Water Conservation District (SWCD) or CES livestock agent, will outline how you manage and dispose of animal waste at your operation. Manure management plans are also referred to by various agencies as "pollution prevention" ("P2") plans and "comprehensive nutrient management plans" (CNMP). The plan includes the amount of manure generated by your operation, the capacity of your storage system (e.g., lagoon), local rainfall and evapotranspiration data, and any withdrawals from your manure storage system, such as manure used for land application as fertilizer. The plan should be updated regularly, particularly if there are changes in the size or type of the operation. Even if you are not required by law to have a written plan, thinking about how you manage manure and developing an effective management strategy will help you to avoid future problems.

Manure storage

Proper manure storage is an important part of manure management for most livestock operations. At the present time, on-site storage is the most commonly used option for people who own or house livestock in Hawaii.

Manure is generally stored in either liquid, semi-solid, or solid form. Each of these can be stored safely. Your CES livestock agent or local SWCD office can provide informa-

tion on proper storage practices. According to state law, all manure storage facilities must be more than 50 feet from of any water body. Siting them even further away will help reduce pollution risk. Storage facilities should be designed to prevent unplanned off-site movement of manure.

In many parts of Hawaii, large amounts of rain can fall in a short period of time. By law, your manure storage facility must be large enough to contain the manure and the rainwater from a 25-year, 24-hour storm event without overflowing. The 25-year, 24-hour rainfall is the predicted amount of rain that would fall within 24 hours during the biggest storm in 25 years. Your SWCD staff or CES agent can help you to assess the amount of manure you generate from your operation and the storage capacity that you need. Although the volume of stored manure will gradually be reduced through decomposition and evaporation, reducing the volume of stored livestock waste by using it regularly is a good practice.

Where you store manure is also important. In some areas of Hawaii, such as parts of Oahu's Waianae coast and Ewa plain, the rock underneath the soil and the soil itself are derived from coral. Water flows through these very easily. If you store manure in these areas, nutrients from the manure can be carried through the soil by rainwater. This is called leaching. Leached nutrients can pollute groundwater and can be carried through the water table to the ocean.

Livestock facilities maintenance

Regular inspection and maintenance of livestock facilities including manure storage tanks and lagoons can reduce water pollution risks. If you have a lagoon or earthen pond, you should inspect the fluid level to ensure that it is below the "freeboard level." This is the maximum level to which it can be filled and still contain rainfall from the 24-hour, 25-year storm event. Look for unexpected changes in the lagoon level, because these may indicate that manure is leaking into the soil under the lagoon. Also be alert for signs of wet spots, bank erosion, or sunken areas on the berm or side walls. These are evidence of possible leaks or weaknesses that could result in a major spill. Burrowing animals such as rats and mongooses can also damage lagoon walls. Abnormally green vegetation near barns, corrals, or manure storage areas, or vegetation in those areas that is brown or dying, can be another indicator of manure leakage or runoff.

In addition you should regularly inspect all components of your operation including pens, barns, corrals, and exercise areas to be sure that they are clean and well maintained and that manure is being disposed of properly. A clean, well run livestock operation has less risk of causing water pollution, supports better animal health, and has less odor. Both odor minimization and pollution risk management will help you stay on good terms with all your neighbors and will reduce the chance that you will have to take the time and money necessary to respond to an official complaint.

Emergency action planning

Although you may not expect problems to occur, it is important to develop an emergency action plan to deal with an unexpected manure spill. The plan should contain the names and contact information for people who should be notified in the event of a spill. By law, if you have a spill that may enter any state waters, including drainage ditches, you must also notify the Hawaii State Department of Health. The plan should also contain an assessment of where an accidental discharge is most likely to enter a water body and describe measures that need to be taken to prevent contamination. You may want to contact other producers in your area about forming a group to help each other respond if an emergency arises. Be sure that everyone living and working on the farm is aware of the plan and knows where the plan document is located. Reporting a spill when it happens and obtaining assistance from the appropriate agencies is the right thing to do and preferable to being cited for violation of antipollution regulations.

Waste minimization

Reducing the amount of waste generated in your operation is another way to reduce water pollution risks. This will also make it easier for you to store or dispose of the manure that is generated. If you are raising pigs, consider using a woven-wire or dry-litter system instead of the traditional daily-wash system. Because the wash water from your pig pens contains manure, it can also cause pollution. These alternatives reduce waste water.

Small numbers of cattle and horses on pasture areas are unlikely to generate large amounts of waste and cause major problems. But wastes may still accumulate, especially in areas where the animals are concentrated, such as stables and exercise yards, watering areas, or if livestock on tethers are not moved regularly. These accumulated wastes can cause water pollution, particularly if these areas are near water bodies. Refer to HAPPI-Farm 8, *Pasture management*, for more information.

Alternative uses for manure

Used properly, manure can be an important source of nutrients for crop and pasture areas. But application of manure in excess of plant requirements or in high-risk areas can cause water pollution. If your land cannot use all the manure produced, perhaps a neighbor could use it. Composting is another possible option. At the present time, a permit is not required for composting operations that use only materials from the farm. However, if you bring in materials from off the farm, such as tree trimmings, you need to obtain a permit from the Hawaii Department of Health. Composting transforms the manure into a less bulky and more marketable product. Although very little locally produced compost is currently on the market, a survey conducted in 1998 by CTAHR suggests that properly generated and certified compost could be a potential income source for some livestock producers.

Risk Assessment Table for Livestock Operations

	Low risk	Moderate risk	High risk	Your risk
Site location	All pens, barns, corrals, and exercise areas located at least 100 ft from surface water bodies; surface and roof runoff water diverted away from livestock areas	Some pens, barns, corrals, and exercise areas located 50–100 feet downhill from water bodies; most surface and roof water runoff diverted away from livestock areas	Some pens, barns, corrals, and exercise areas located uphill from or within 50 feet of surface water bodies; surface and roof runoff not diverted away from livestock areas	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Manure management planning	Have up-to-date, approved pollution prevention (P2) plan	Have manure management plan that does not yet meet P2 guidelines	Do not have a manure management plan	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Manure storage	Manure stored in well maintained facility located >50 ft from water bodies and that can contain the water from a major storm without overflowing; manure not stored over a coral base	Manure stored in well maintained facility located >50 ft from water bodies that can contain the water from normal rainfall without overflowing	Manure stored in a poorly maintained facility, or one that overflows after some rainfall events, or is located within 50 ft of water bodies; manure stored over a coral base	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Facilities inspection and maintenance	All components of livestock facility including manure storage areas are inspected at least weekly; all facilities well maintained	Manure storage facilities inspected at least once every 2 weeks; other facilities inspected at least monthly; facilities receive necessary maintenance	Facilities not inspected at least monthly; facilities poorly maintained	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Emergency action plan	Have a written emergency action plan; have made arrangements with others to get help if necessary	Have a written emergency plan, no arrangements for outside help	No written emergency action plan, or plan does not reflect current situation	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Waste minimization (swine)	Use dry litter or other waste-minimizing management practice	Use waste-reducing practice like woven wire	Use water-intensive management practices	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Alternative use for manure	>50% of manure is applied on crop land or pasture, or is composted	25–50% of manure used for fertilizer or compost	<25% of manure used as fertilizer or compost	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Field application of manure	Apply manure to fields or pastures as part of up-to-date nutrient management plan; fertilizer applications adjusted based on manure nutrient content; manure not applied near streams or water sources	Reduce fertilizer applications after manure application, but do not systematically assess impact of manure on soil nutrients	Apply manures without considering their nutrient content or potential impact on nutrient availability; manure is applied near streams or water sources	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high
Dead animal disposal	Dead animals disposed of in approved landfill or by incineration	Dead animals composted on property in approved facility	Dead animals disposed of on property without composting	<input type="checkbox"/> low <input type="checkbox"/> moderate <input type="checkbox"/> high

Some basic guidelines should be followed if manure or compost is applied to crop or pasture land. First, include the nutrient content of manure when planning other nutrient applications. Apply all manure with properly calibrated equipment. Maintain records of all manure applications. Manure applied within 100 ft of wells, streams, ponds, or lava tubes can quickly contaminate groundwater or surface water bodies. Planting a grass filter strip between these sensitive areas and your crop fields will help to reduce the risk pollution risks. For more information on managing manure applications, refer to HAPPI-Farm 4, *Nutrient management*.

Disposal of dead animals and offal

Improper disposal of dead animals and offal on your property can cause water pollution. Decomposing animals can be a concentrated source of pollutants including nutrients and microorganisms. Small animals are best disposed of in a state-

approved landfill. Incineration is more commonly used for larger animals. Composting is another potential disposal option for small animals, especially chickens; however, compost facilities must obtain a permit from the Hawaii Department of Health. Contact your local CES livestock agent or the Solid Waste Management Branch of the Hawaii State Department of Health for specific requirements.

Assessing your risks and making your action plan

Complete the Risk Assessment Table on page 3 to determine your water pollution risks. For each category, choose the set of practices that best fits your situation.

After you have assessed your management practices, you can take action to change practices that may be causing water pollution. For areas that you identified as high or moderate risk, decide what action you need to take and fill out the Action Plan below.

Write down all your moderate-risk and high-risk activities below	What can you do to reduce the potential risk for water pollution?	Set a target date for action
<p>Samples of action items:</p> <p><i>Runoff water from horse corral flows onto gravel parking lot.</i></p>	<p><i>Build concrete curb to divert runoff water onto grassy exercise area.</i></p>	<p><i>Before the end of the month</i></p>



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