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- Federation of Canadian Municipalities  
- North American Wetlands Conservation Council  
- Saskatchewan Agriculture and Food  
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* now with Agriculture and Agri-Food Canada
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PREFACE

In January 1995 the Canadian Pork Council, representing Canadian hog producers, created a national Environmental Resource Group to lead the development of this Canadian Code of Practice for Environmentally Sound Hog Production. The Group included representatives from the Canadian Pork Council and its provincial members, the National Agriculture Environment Committee, Research and Policy Branches of Agriculture and Agri-Food Canada, Environment Canada, provincial governments, universities and lending institutions. A complete list of the individuals and organizations involved is provided on the inside of the cover of the Code.

Drafts of the Code were circulated to other groups, also listed on the inside of the cover, for their comments.

The Canadian Pork Council endorses this Code and urges all hog producers in Canada to ensure that their operations are consistent with it. The Code will be updated as circumstances demand. Recommendations for changes should be made to the Council or to its provincial member organizations.

Review or development of future proposed amendments to this Code shall be the responsibility of the Canadian Pork Council.
INTRODUCTION

The production of pork is a major part of agriculture in Canada. In 1995 approximately 17.9 million hogs were raised by 20,000 producers, bringing well over two billion dollars in farm cash receipts. The industry provides nearly 100,000 jobs and is a significant contributor to the country’s trade balance. More than $1.15 billion of live hogs and pork products – over one third of production – were exported in 1995 to more than fifty-five countries.

The long term existence of this important part of the economy is dependent upon protecting land and water resource bases. Production practices need to be continually reviewed to ensure that they are in harmony with the environment. The Code was developed to help producers with this, and to assure Canadians and foreign purchasers of hogs and pork products that hog producers take their stewardship responsibilities seriously.

OBJECTIVES

The principal objectives for the development of a Code for the Canadian hog industry are to provide:

1. A means of assuring our national and international consumers that Canadian hog producers use environmentally sound agricultural practices.

2. Provincial and local governments with a code of environmentally sound practices which can be incorporated into regulations affecting hog production.

3. Canadian hog producers with various options for managing their farms in an environmentally sound manner.

4. Producers and the financial sector with a code to use when assessing whether individual producers are practising due diligence in their operations to avoid potential environmental pollution liability.

5. A framework or production strategy that will ensure the continued availability of the very favourable resource base for hog production in Canada, while fully respecting our society’s expectations to protect the environment.

The Code focuses on three major concerns of the industry:

1. Protecting land, water and air resources
   Practices and changes in hog operations should be based on sound agricultural principles, which are consistent with both the protection of the environment and the needs of agriculture. Nothing that causes or could cause impairment of surface and grounds waters, soil and the air can be accepted as good agricultural practice. In this regard, one of the major management concerns of the Canadian hog industry is the handling, storage and use of hog manure.

2. Ensuring a positive public perception of the hog industry
   Public perception of the environmental impacts of hog production is one of the most important factors affecting the Canadian pork industry's ability to meet the market opportunities. According to Canada Pork International, the potential for environmental regulations to restrain hog production expansion in many parts of Canada needs to be addressed.

3. Meeting legal requirements
   Certain Federal and Provincial laws are designed to protect the land, water and air resources from contaminants. These can come from many sources, including agriculture. There is a wide range of legislation within the provinces that requires the agricultural sector to meet specified environmental standards. In addition, many local governments establish plans and enforce bylaws under provincial laws containing various standards and requirements applicable to hog production. Some related to the spreading of manure are given in Appendix A.
The Canadian Code of Practice outlines mandatory and optional production practices that will address these concerns. The Code is not law, but it does indicate what should be considered environmentally acceptable hog production practices. The guidelines provide producers with technical advice on ways of implementing them.

Not all portions of the Code need apply to every hog producer, and it is the responsibility of the individual producer to consider the options in this document along with other alternatives. In certain situations, options not found here may need to be implemented on the farm to prevent pollution from occurring. However, in these cases, producers may need to seek advice from professionals qualified in environmental assessment before proceeding.

The Code can offer protection for the hog producer against unwarranted nuisance complaints. Over the past few years, there has been a steady increase in the number of residential dwellings on or near farmland. This has often resulted in neighbours making complaints against producers. Most provinces have enacted some form of right to farm legislation. However, the protection provided under such legislation requires producers to be using environmental sound practices. Complaints against producers can be shown to be unjustified when production practices conform to the Code.

**ORGANIZATION**

The Code consists of three sections:

**Section 1: Code of Practice for Managing Manure and Other Organic Materials**
This describes principles that should govern hog production. It is written in a legal manner so that it can be used in laws and regulations. It can also be used by producers, governments, and advisors to both groups to identify environmentally sound and unsound practices. A producer can reasonably claim to have shown due diligence when the Code has been used to assess and, where necessary, modify the hog operation. Due diligence is a legal term indicating that the person concerned has taken proactive measures to avoid a problem or committing an offence. This issue is becoming increasingly important when farmers seek financial assistance. Several lending institutions are now performing an assessment of environmental credit risk as part of an overall credit analysis. An example of an environmental questionnaire for farmers used by lending institutions is provided in Appendix B.

**Section 2: Government Jurisdictions**
This section provides a summary of the types of legal environmental requirements that already exist and apply to hog production. It describes the basic framework of laws that exist across Canada. However, producers are advised to contact local agencies for the precise requirements governing their operation.

**Section 3: Environmental Guidelines**
This section provides some technical guidelines on how to address the major environmental challenges faced by hog producers in Canada.

**NOTE**

The following Code only applies to hog production. When other livestock, poultry, farmed game or any other agricultural production is occurring on the same farm, the total effects on the environment of all the farm activities must be addressed. For example, the total amount of manure being applied to a field must be considered, not just the amount from hog production.
SECTION 1: CODE OF PRACTICE FOR MANAGING MANURE AND OTHER ORGANIC MATERIALS

PART 1: PURPOSE

1. The purpose of the Code is to describe environmentally sound practices for using, storing and managing manure and other organic materials.

PART 2: INTERPRETATION

2. The interpretation of the terms used in this code are shown in the left hand margin close to the first use of each term in the Code.

PART 3: GENERAL

3. Manure and other organic materials, and mortalities should be collected, stored, handled, used and disposed of in accordance with this Code and in a manner that prevents pollution. Nothing in this Code is intended to prohibit emissions into the air of various odours derived from hog operations on the farm provided such operations are carried out in accordance with the Code.

PART 4: STORAGE AND USE OF MANURE

Storage methods

4. The storage, handling, use or removal of manure on a farm shall not cause pollution.

5. Manure shall be stored in storage facilities according to the requirements specified in sections 6 and 7, or those specified in section 8.

Storage facility

6. A storage facility should:
a. be of sufficient capacity to store all the manure produced or used on the farm for the period of time needed to allow for:
   i. the application of manure as a fertilizer or soil conditioner, or
   ii. the removal of the manure, without causing pollution, or
   iii. the processing of the manure so that the resulting product can be discharged without causing pollution,

b. prevent the escape of any manure that causes pollution and,

c. be maintained in a manner to prevent pollution.

Location of a storage facility

7. A storage facility must be located at a sufficient distance from any watercourse or any source of water used for domestic purposes to conform with all applicable acts and regulations of provincial and local governments.

Where an existing storage facility is closer than the above distance, then an environmental assessment should be carried out in accordance with provincial legal requirements and standards to ensure no pollution is occurring.

Field storage

8. Manure stored by field storage is permitted providing that:

a. only solid manure is stored,

b. the length of time of field storage does not exceed nine months,

c. the field storage is located at a sufficient distance from any watercourse or any source of water used for domestic purposes to conform with all applicable acts and regulations of provincial and local governments,

d. the base of the storage area prevents pollution resulting from the leaching of manure into the ground water,

e. any berms constructed around the storage area are adequate to prevent runoff that can cause pollution, or, in areas that
receive high precipitation, the stored manure should be covered adequately to prevent runoff or leaching of manure that can cause pollution.

Composting facilities and structures

9. Subject to provincial guidelines, manure may be composted on a farm if:

   a. the location of the composting site is sufficient distance from any watercourse or any source of water used for domestic purposes to conform with all applicable acts and regulations of provincial and local government, and

   b. the composting facility is constructed to prevent seepage and the escape of any manure that can cause pollution.

PART 5: APPLICATION OF MANURE TO LAND

Discharge to water

10. Manure must not be directly discharged into watercourses or or leach to the ground water.

Allowable application

11. Manure can and should only be applied to land as a fertilizer or soil conditioner to meet crop requirements. It should not be
applied to land in excess to that required for plant growth. Soil testing and manure evaluation is recommended to guide in the determination of the appropriate rate of application.

Prohibited application

12. Manure should not be applied to the land when climatic, topographical, soil conditions, or the rate of application, will result in runoff or the escape of manure that:

a. causes pollution of a watercourse or ground water, or

b. goes beyond the farm boundary.

PART 6: STORAGE AND USE OF OTHER ORGANIC MATERIALS

Allowable uses

13. Other organic materials may be used for hog bedding, compost material, fuel for wood fired boilers, ground cover, plant mulch and soil conditioner. They can also be applied to areas where hogs are confined or exercised, and to on-farm access ways.

Storage

14. Other organic materials stored and used on a farm shall be managed in such a manner as to prevent any escape of:

a. particulate or solid matter from the organic materials into the air, and

b. particulate or solid matter or leachate from the organic materials into any watercourse or ground water that causes pollution.

Prohibited use

15. Organic materials used on a farm must be used on sites located away from any watercourse or any source of water used for domestic purposes in accordance with any distance requirements of the provincial and local governments.
PART 7: ON-FARM DISPOSAL OF MORTALITIES

Burial and incineration

16. The burial or approved incineration of mortalities on the farm in which they died must not cause pollution and must conform with all applicable regulations of provincial and local governments.

17. Any burial pits must be covered, and located at a distance which meets any distance requirements from any watercourse or any source of water used for domestic purposes contained in the acts and regulations of provincial and local governments.

Composting

18. Mortalities may be composted on-farm if:

   a. the composting site is located at a distance which meets any distance requirements from any watercourse or any source of water used for domestic purposes contained in the acts and regulations of provincial and local governments, and

   b. the composting does not cause pollution or create a disease risk.

PART 8: ACCESS TO WATER

Confined hog areas

19. A confined hog area must:

   a. prevent access of hogs to a watercourse

   b. be located at a sufficient distance from any watercourse or any source of water used for domestic purposes to conform with all applicable acts and regulations of provincial and local governments.

   c. be operated in a manner that does not cause pollution.
Seasonal feeding areas

20. A seasonal feeding area must:

a. prevent access of hogs to a watercourse

b. be located at a sufficient distance from any watercourse or any source of water used for domestic purposes to conform with all applicable acts and regulations of provincial and local governments.

21. In a seasonal feeding area, if manure is intended to be used for fertilizer, then movable feeders should be used to ensure distribution of the manure over the area.

PART 9: USE AND STORAGE OF PRODUCTION INPUTS

Production inputs

22. Production inputs should be managed, used and stored in a manner that prevents the escape of any substance that causes pollution.
SECTION 2: GOVERNMENT JURISDICTIONS

A wide variety of environmental requirements at the federal, provincial and local or municipal level apply to the hog producers in Canada. Noncompliance with any legislative requirement of an agency can be serious. When provincial and federal acts or regulations change, producers must meet the new requirements. This may not always be the case with legislation and acts administered by local governments.

FEDERAL GOVERNMENT

Fisheries Act – the federal government cannot license or regulate the use of land and water under provincial jurisdiction. However, Fisheries and Oceans Canada, and Environment Canada, jointly administer the federal responsibility for marine and anadromous fish in marine and freshwater environments. Under this authority, the federal Fisheries Act plays a significant role in controlling pollution that is deleterious to fish populations and fish habitat. Shellfish are defined as fish in the Fisheries Act.

Under section 36(3) of the Act, it is an offense to deposit any harmful substance into water frequented by fish, including water that may eventually enter water frequented by fish. Section 35(1) prohibits harmful alteration, disruption or destruction of fish habitat, defined to include spawning grounds and nurseries, rearing, food supply and migration areas on which fish depend to carry out their life processes.

While the federal departments have no formal approval process for activities on provincial lands affecting water systems, prosecution for destroying fish habitat or depositing harmful substances is possible. Manure, runoff from outside livestock yard areas, suspended solids, fertilizer, wood by-products leachate, improperly disposed mortalities, and fuel or pesticide runoff may be considered under the Act as harmful substances if they threaten fish and fish habitat. The Act has provisions for stiff fines and imprisonment.

Transportation of Dangerous Goods Act – this Act regulates the handling and transportation of poisonous substances, flammable liquids, or products hazardous to the environment. Dangerous goods may include pesticides, fuel and oils. Transportation of large quantities [more than 500 kg (1100 lb.) of pesticides] may require shipping documents, special product labels, and vehicle placards.

PROVINCIAL GOVERNMENT

Canada's provincial governments administer a wide variety of acts that influence farm practice. Although provinces have different standards they tend to follow a similar approach. The following types of legislation may contain sections applicable to hog production:


b. Health acts

c. Environmental assessment acts

d. Agricultural standards acts

e. Right to farm acts

f. Soil conservation acts

g. Pesticide control acts

h. Municipal acts

LOCAL GOVERNMENT

Local governments have the authority to enact and enforce a variety of land use plans and zoning bylaws. A zoning bylaw can identify particular areas for agricultural use within a region or district. Zoning
bylaws can also establish specific setbacks for the siting of farm buildings. Local governments use specific setback distances from lot lines to help reduce conflicts between neighbours. Setbacks from watercourses are intended to reduce pollution. Local governments have authority to establish legislation affecting agriculture usually given under a municipal act.

When changes are made to a zoning bylaw, existing hog operations may be protected under the nonconforming section in a municipal act. An operation could be considered legally nonconforming when it is incompatible with the new zoning. This would allow it to continue operating. However, any future expansion would have to meet the requirements of the new bylaw.

Each municipality or regional district has a variety of bylaws affecting hog producers. Prior to starting a new operation or expansion of an existing facility, contact should be made with local government officials to ensure compliance with all requirements.

The number of bylaws that affect agriculture varies with each local government. Local government legislation can regulate:

- specific areas where hog production is permitted;
- specific setback distances from lot lines for farm buildings;
- building requirements in flood plains;
- nuisances, for example, excessive noise from farm machinery; and
- setback distances from farm facilities to watercourses.
SECTION 3: ENVIRONMENTAL GUIDELINES

A: PLANNING FACILITIES

This section contains general information on site planning, building construction, ventilation and feed processing and storage for hog operations. Recommendations are made for good manure management and other practices in establishing new facilities and expanding existing ones to ensure that they are environmentally safe. Detailed construction information is available in various provincial publications and plans – for more information contact your local Department of Agriculture.

- Locate the operation within an area zoned for agricultural uses.
- Evaluate the land base available to ensure sufficient cropland is available to use agricultural wastes as an organic fertilizer for crop production.
- Consider prevailing winds to avoid drift of dust and odours to neighbours and the farm house.

1: SITE PLANNING

The importance of good farmstead planning cannot be overemphasized. Effort spent in carefully selecting a building site can reduce conflicts with neighbours and avoid potential environmental problems. New building sites should be selected after considering the following points:

- Be aware of local government bylaws, and federal and provincial requirements.
- Take advantage of natural terrain and landscaping to minimize conflicts with neighbours over nuisances such as flies and odours. Air turbulence created by shrubs and trees will dilute odours.
- Locate buildings on an adequately drained site, being careful to avoid low areas subject to flooding.
- Grade the area to divert polluted runoff into manure storage facilities, and unpolluted
runoff water away from the buildings and manure storage areas.

- Outside yards should be graded or bermed to allow collection of runoff to prevent it from entering surface or ground water.

- maintain an adequate supply of fresh air within the building; and

- control of the temperature and humidity of the air inside the building.

A variety of ventilation systems are available. When properly designed, both mechanical (using fans) and natural ventilation systems can be suitable. However, for proper ventilation, conventional buildings should be adequately insulated for local climatic conditions. For hog comfort, low level winter ventilation should be continuous, and in summer, thermostats should be used to control the higher ventilation rates that will be necessary. To ensure dunging over slats make sure the ventilation system is well designed.

3: VENTILATION

Ventilation of the hog barn is an important part of overall management to minimize odour production. A good ventilation system will have the following benefits:

- removal of dust, gases and odours from the buildings;

4: FEED PROCESSING AND STORAGE

Good storage and processing facilities for feed and feed ingredients are a sound investment. Sound facilities and proper management can help avoid pollution. They can also reduce losses from spoilage, insect and rodent damage, and spontaneous combustion.
New feed storage facilities should incorporate a storage and handling system adequate for present and future requirements. When designing a new or modified facility consider the following:

- Choose a building site with good drainage, preferably elevated and easily accessible.
- Allow for roof water and any clean water to be diverted away from the site.
- Include containers for all feed and feed ingredients to prevent contamination of surface or ground water.
- Allow for the collection and storage of contaminated runoff.
- Consider locating the feed processing and handling centre in an area that will allow access of large vehicles.
- Allow for sufficient setback from neighbours to avoid problems with noise levels, dust, traffic and the threat of a fire.

results in the release of many odorous and sometimes dangerous gases, including ammonia, amines, hydrogen sulphide, mercaptans and methane. Anaerobic conditions occur when wet manure is piled in heaps, or when liquid manure is stored in deep tanks.

Odours in hog production generally originate in one or more of the following locations:

- barns;
- manure storage and handling areas; and
- fields while spreading manure.

Producers should consider the following ways of reducing odours:

Odours from the barn
Odours within the hog barn, and hence odours detected in ventilation exhaust air, are a combination of hog body odours, manure odours, and odours associated with feed handling. To minimize odours, consider the following recommendations:

- Locate barns and related facilities as far from neighbouring non-agricultural land uses as possible. Keep in mind that zoning regulations must be met.
- Design and manage the building to ensure clean pens and clean hogs.
- Keep dust levels to a minimum. Odours are carried around on dust particles which can be carried considerable distances from the barn in air currents.
- Consider adding moisture or oil to feed to suppress dust.
- Remove manure from the barn as frequently as possible, preferably once a week.
- Handle solid manure in as dry a state as possible.

B: SANITATION

The implementation of proper measures to minimize odour emissions from livestock operations will go a long way in maintaining good relationships with neighbours. This section contains some practical methods for odour control. The section also outlines recommendations on other sanitation measures related to fly and rodent control and the disposal of dead animals.

1: ODOUR CONTROL

Odours associated with livestock operations are largely the result of compounds released from decomposing organic matter. When manure is decomposed in the presence of oxygen, termed aerobic decomposition, few malodorous gases are produced. On the other hand, the decomposition of manure in the absence of oxygen, termed anaerobic decomposition,
• Remove dead animals and afterbirth from the building, and promptly dispose of them in an approved manner.

• Keep the farm and access roads in good and neat condition. Your neighbours will be impressed, and this may make them more tolerant of occasional unavoidable odours.

Covered Storage – covers on storage provide two benefits. They can reduce odours, and they can prevent rain and snow from increasing the amount of waste that has to be managed.

Agitation – be considerate of neighbours when planning to agitate manure before spreading. Careful attention should be given to minimize splashing when agitating manure.

Aeration – air can be introduced into stored liquid manure by mechanical agitation, or under pressure with compressors or blowers. The resulting aerobic breakdown of manure is much less odorous than the more conventional anaerobic systems. However, this process requires high energy and capital inputs. Consider aeration when a farm is located very close to an urban area, or when odours are a problem when land spreading. Design of the aeration system is critical. Aerators perform much differently in hog manure than in domestic sewage.

Composting is a relatively fast and low-odour aerobic biological process in which organic matter is broken
down by bacteria and fungi to produce a dark-coloured humus, carbon dioxide, water and heat. For composting, most manures require the addition of dry bulking material with a high carbon content. Proper siting and management of composting facilities will minimize the risk of problem odours.

**Manure Additives** — proprietary chemicals are frequently advertised for use in the odour control of manure. Selected bacteria and enzymes have also been marketed with similar claims of odour control. While some of the bacteria additives do appear to work on some farms, generally manure additives have not proven to be cost-effective.

**Biogas Production** — anaerobic digestion of manure to produce methane gas has the added benefit of helping to control odours. Although this is not currently an economical way to produce gas for energy, researchers are exploring ways to make it viable.

**Odours from field spreading**
To minimize odours from land spreading of manure, consider the following:

**Time of Spreading** — choose manure spreading times carefully. As general guidelines, spread manure:

- when prevailing winds blow away from the closest urban area or neighbouring residences;
- on cool days;
- on windy days;
- early in the day; and
- on midweek days rather than on weekends or holidays.

**Manure Irrigation Systems** — these systems have to be particularly carefully managed when they are used close to urban areas. The higher manure is sprayed into the air, the worse odours will be.

**Spreading on Grassland.** — consider spreader adaptations that place manure directly on the ground without any aerial spray. The method is to attach a boom to the spreader outlet and to use either dragging curtains or flexible down tubes.

**Rapid Cover Systems** — ultimately, these may be the best solution for odour control and nutrient retention. On ploughed land, either follow the spreader closely with a disc or plough, or directly inject the manure with commercially available injection equipment. With such practices, you will be maximizing returns from the manure as a fertilizer.

### 2: FLY CONTROL

Flies near hog production buildings and manure storage areas are a nuisance to farm operators and nearby residents alike. Furthermore, flies may transmit disease from one farm to another.

A successful fly control program may involve one or more of the following measures:

- Regularly remove manure and wet feed from the building, at least once a week during the fly breeding season.
- Prevent scattering of manure and feed outside the building during barn cleaning operations.
- Dispose of dead animals and afterbirth.
- Store manure in enclosed structures.
- Keep manure collection areas dark.
- Protect ventilation inlets with screens.

In many situations, regular spraying with insecticides may be necessary. Advice from a qualified pest control person should be sought before embarking on such a fly control program. Only use approved chemicals. Remember, however, that spraying is never a substitute for adequate cleaning.
3: RODENT CONTROL

Rodents such as rats and mice are one of the most widespread and destructive pests in the world. They eat and contaminate vast amounts of food, destroy buildings and spread many diseases. Constant vigilance and vigorous control measures are necessary. Consider employing a professional exterminator to conduct a thorough program on your farm.

4: DEAD ANIMAL DISPOSAL

The disposal of dead animals is usually governed by provincial legislation. Options for disposal of dead hogs include rendering, burial, incineration and composting. For more information on ways of disposing of dead hogs in your province, consult your local Department of Agriculture.

C: MANURE STORAGE

Manure is a valuable by-product of a hog operation. However, to avoid pollution problems, a well-planned manure storage system is required. This section deals the design and location of manure storage facilities. For information on ways to limit odour emission from manure storage see section Odours from manure storage and handling areas under B - Sanitation, on page 16.

Runoff collection and manure storage structures, whether an earthen basin or a reinforced concrete tank, require similar siting and sizing considerations. These structures must be constructed to:

- meet provincial and/or local government setback requirements.
- provide enough storage to enable the operator to spread manure when crop uptake of the nutrients is rapid and when manure runoff from fields to surface water is unlikely.
- if open, have sufficient capacities to contain the expected local precipitation.
- be structurally sound (consider professionally engineered designs for both earthen and concrete structures) and watertight.
- contain contaminated runoff from the 25-year storm event.
- prevent the accidental entry of humans, animals or machinery.
- fit the local ground water and soil conditions.

In addition, they must be located or have their sites graded to exclude entry of clean surface runoff from adjacent areas.

Ideally, manure storage facilities should meet all these requirements and allow manure to be contained for six to eight months. This would allow hog producers to use manure as an organic fertilizer with the least risk of causing pollution.

D: LAND APPLICATION OF MANURE

Animal manure is a valuable source of plant nutrients and organic matter. Manure contains a vast array of organisms that add to the biological activity in soils. However, if not managed with sufficient care, manure can cause contamination of surface and/or ground water. Fortunately, maximizing the fertilizer value of manure also minimizes the risk of adverse environmental impacts.

This section provides information on composition and benefits of manure, factors affecting water contamination from manure, as well as practical guidance on land application, manure application rates and manure spreading equipment. For information on ways to limit odour emission at the time of spreading, please see section Odours from field spreading under B - Sanitation on page 17.
1: COMPOSITION AND BENEFITS OF MANURE

Manure contains the major fertilizer ingredients - nitrogen, phosphorus and potassium - as well as many secondary nutrients and micronutrients. Management and handling can affect how much of these ingredients will ultimately be available to plants, and, consequently, manure's value as a fertilizer. To maximize fertilizing value, manure could be incorporated into the soil at the time of spreading or as soon as possible after spreading.

Manure can also improve a soil's physical structure (tilth). The addition of organic matter can improve aeration, improve permeability, increase the water holding capacity of a soil, and buffer pH. However, application rates should not exceed the nutrient requirements of the crop grown.

2: FACTORS AFFECTING WATER CONTAMINATION

When spreading manure, the following factors should be considered to minimize the risk of contaminating surface and ground water:

- soil characteristics;
- drainage;
- compaction;
- slope;
- level of nitrates in the root zone;
- extent of cover crops; and
- expected spring runoff.

3: ENVIRONMENTALLY SOUND MANURE MANAGEMENT

Environmentally sound manure management incorporates the following considerations:

Long term manure storage
Adequate storage capacity allows producers to select the best time to apply the manure. Maximum benefit, in terms of crop uptake, is derived from manure when it is spread on the land in spring or summer. At this time, leaching and runoff risks are low and crop
growth and nutrient uptake is high. See section *C - Manure Storage* on page 18 for more details.

**Adequate land base**
Sufficient land should be available to receive the amount of manure produced each year. Consult a waste management specialist for information on recommended application rates. Manure should only be spread on land that has not yet received its maximum nutrient application.

**Incorporation of manure**
Incorporation of manure either by injection, plough down, or other tillage methods will:

- maximize nutrient recovery by minimizing ammonia losses,
- reduce the risk of manure runoff, and
- minimize the generation of odours.

**Prevention of water contamination**
To prevent water contamination, hog manure must not be spread:

- on steep slopes, where erosion and/or surface runoff is likely to occur;
- on saturated soils, where manure will not infiltrate into the soil;
- within the high water mark of field depressions during times of the year when there is a high risk of direct surface runoff to a watercourse;
- in excess winds, when drift can occur;
- on frozen or snow covered ground when runoff of snowmelt to open watercourses might occur; and
- on areas having standing water.

It must also be spread in accordance with provincial and local regulations defining the minimum separation from watercourses, wells and springs used as domestic water supply. Appendix A describes a few examples of the siting requirements in relation to water and slope of land that currently are in force in Manitoba, Nova Scotia and Québec.

**Odour control**
Land applications of manure from intensive livestock production facilities frequently lead to complaints. Consideration of neighbours with respect to time of day and weather conditions when spreading manure can do much to avoid conflict. Longer storage periods to reduce the frequency of spreading, as well as immediate incorporation of the manure into the soil to minimize odour is encouraged. For more details on suggested spreading techniques to reduce odour nuisance problems, see section *Odours from field spreading under B - Sanitation* on page 17.

**Manure application rates**
Proper management is the key to using manure to promote crop production and soil improvement while minimizing any hazard to the environment. Manure should be applied at rates and times of year that:

- are compatible with the nutrient requirements and growing characteristics of the crop;
- take into account soil characteristics, drainage and the slope of the land; and
- protect the quality of surface and ground water.

Manure application rates should be based on the amount of nitrogen needed by the crop. If the amount of nitrogen applied exceeds crop needs, the excess amount will be lost to the environment, where it may cause a problem. However, by applying the require nitrogen dosage, the amount of phosphorus applied might become excessive in the long term and could lead to water contamination problems with phosphorus.
The amount of nitrogen that a crop requires depends on such factors as:

- plant requirements,
- amount of nitrogen already in the soil,
- amount of manure added in previous years,
- length of time manure is left on the soil surface prior to incorporation,
- amount of crop refuse left in the field, and
- presence or absence of a winter cover crop.

When manure is applied to pasture land, application rates should be reduced by the amount of nitrogen returned to the soil by grazing animals.

**Land area required**
Consult a waste management specialist to figure out acceptable minimum area and the application rate required to spread manure safely from a hog herd.

- Operate the application equipment so that spray drift does not enter a watercourse or leave the property.
- Minimize soil compaction by not driving repeatedly over the same areas of the field with heavy tanks of manure.

Hog manure spreading equipment should be:

- of tight construction so manure will not spill during transportation;
- filled in such a manner that manure does not spill from the sides of the equipment.

Producers should ensure that the wheels of spreading equipment do not carry manure onto public roadways.

Manure irrigation equipment should have all connections securely fastened to avoid leaks.

**4: MANURE SPREADING EQUIPMENT**

Common ways of spreading manure include box spreaders for solid manure, and tankers or irrigation systems for liquid manure. Tankers provide the option of broadcasting or injecting the manure.

During manure application, follow these guidelines:

- Apply the correct amount per hectare.
- Apply manure uniformly so as not to over-apply in some areas and under-apply in other areas.
- Apply at rates that do not exceed the infiltration rate of the soil.

**E: MANURE TREATMENT**

In general, the treatment of manure, other than by conventional methods, has not proven to be economically feasible on Canadian farms. However, there are circumstances relating to the use or potential sale of a product that may make treatment necessary or practical. The value of composting, aeration, manure additives, and biogas production have been discussed in the section on odour control on pages 16 and 17.

One further option to consider is solid/liquid separation. A mechanical separator can separate manure into a solid and liquid fraction. The solids can be stored and handled as solid manure. Similarly, the liquid portion can be stored and handled as liquid manure. The solid content of the liquid portion is typically quite low, making the liquid well-suited for irrigation or pumping over long distances.
F: OTHER ENVIRONMENTAL CONSIDERATIONS

This section deals with a number of other environmental considerations. These include soil conservation, wood by-products, handling and disposal of pesticides, and farm medical wastes.

1: SOIL CONSERVATION

Any consideration of farming activities from an environmental perspective should include soil conservation. Soil conservation involves any soil management practice that minimizes soil loss from erosion, reduces degradation from acidification, salinization, and compaction, and increases the overall organic matter and fertility status of the soil.

Soil conservation practices are site dependent. They will vary with the soil and landscape conditions, type of farming operation and the critical factor of climate. In many instances, disregard of the production limitations of climate is the major cause of soil degradation. Provisions should be made to protect the soil resources from the impact of rain drops, and runoff from rain and snowmelt.

2: WOOD BY-PRODUCTS

Some hog operations use wood by-products such as sawdust or shavings for bedding. These wood by-products break down with the manure and can be applied to cropland as a soil amendment.

Wood by-products should be stored and covered in such a manner that leachate does not escape to surface or ground water. When not handled properly, they can become a threat to the environment. Leachate from stored wood by-products entering surface or ground water causes pollution and is deadly to fish.

Treated wood and wood by-products should not be used on the farm. They contain chemicals, such as penta and tetrachlorophenol, used for the preservation, stain prevention or fire retardation. Hogs and other animals can breathe in, ingest and otherwise absorb these chemicals when these products are used on the farm.

3: HANDLING AND DISPOSAL OF PESTICIDES

Generally pesticides are not used in hog production. However, hog producers may use pesticides in crop production. Good agricultural environmental practices should be followed when using pesticides. These should cover pesticide storage and spraying,
and the disposal of containers. Producers are encouraged to take a pesticide applicator course; most provinces offer them. There are a number of restricted pesticides that can only be applied by an applicator who has passed an applicator's course and who has been certified.

4: FARM MEDICAL WASTES

The use of medication in livestock production is a common practice. Spent medicines, empty containers and other medical items should be disposed of in an acceptable manner. Appropriate government agencies can provide requirements and advice on the safe disposal of farm medical wastes.
APPENDIX A
EXAMPLES OF PROVINCIAL REQUIREMENTS FOR MINIMUM OR RECOMMENDED DISTANCES FROM WATER BODIES FOR FACILITIES OR STORAGE AND LAND APPLICATION OF LIVESTOCK MANURE

1. Guidelines for the management and use of animal manure in Nova Scotia
(Nova Scotia Department of Agriculture and Marketing, revised 1991)

<table>
<thead>
<tr>
<th>Separation distance in metres</th>
<th>clay loam &amp; loam soils</th>
<th>sand &amp; gravel soils</th>
</tr>
</thead>
<tbody>
<tr>
<td>dug or drilled wells</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>Watercourses:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>slope towards watercourse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>less than 2 percent</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>2-5 percent</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>5-10 percent</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>over 10 percent</td>
<td>not recommended</td>
<td>not recommended</td>
</tr>
</tbody>
</table>

Minimum recommended separation distances for manure storage and watercourses/wells: 100 metres.

2. Règlement sur la prévention de la pollution des eaux par les établissements de production animale (Regulation on Water Pollution Prevention from Livestock Operations – Québec, 7 March 1995)

Minimum Manure Storage Setback From Watercourses and Wells

<table>
<thead>
<tr>
<th>Type of operation</th>
<th>Distance in metres to</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>River or lake</td>
</tr>
<tr>
<td>New operation:</td>
<td></td>
</tr>
<tr>
<td>liquid manure</td>
<td>100</td>
</tr>
<tr>
<td>solid manure</td>
<td>100</td>
</tr>
<tr>
<td>Modification or expansion:</td>
<td></td>
</tr>
<tr>
<td>liquid manure</td>
<td>75</td>
</tr>
<tr>
<td>solid manure</td>
<td>30</td>
</tr>
</tbody>
</table>

Minimal distance for land application of manure from any river or lake or source of domestic water is 30 metres.
Minimum manure storage setbacks from watercourses and wells

<table>
<thead>
<tr>
<th>Storage type</th>
<th>Distance in metres to</th>
<th></th>
<th>Source of domestic water</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Watercourse</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Storage (except earthen)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earthen storage</td>
<td>100</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Field storage</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Composting</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

Minimum distance\(^1\) from watercourses and wells for manure spreading (metres)

<table>
<thead>
<tr>
<th>Slope</th>
<th>Application method</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface applied and irrigation(^2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No incorporation(^3)</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Incorporation within 48 hours</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Injection</td>
<td>5</td>
</tr>
<tr>
<td>Less than 4 percent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 to 6 percent</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>6 to 12 percent</td>
<td></td>
<td>90</td>
</tr>
</tbody>
</table>

Notes:
\(^1\) distances based on soils not supporting perennial forage crops or with minimum trash cover.

\(^2\) where a perennial forage crop or good trash cover is present, distances may be reduced by one half.

\(^3\) for frozen soil conditions, a perennial forage crop or good trash cover should be present, otherwise increase these distances five times.
APPENDIX B
ENVIRONMENT CLIENT QUESTIONNAIRE

The following questions are asked of borrowers by a major financial institution in order to assess the environmental credit risk associated with a farm business. Additional questions, not given here, are included to describe the land and buildings, the crops grown and the livestock raised.

Please respond to the following questions within the scope of a 25-year time span. Additional details have to be provided when answering yes to any of the following questions:

1. Have any environmental assessments of the property been carried out in the last 5 years?

2. Are there any conditional use and/or special compliance permits required?

3. Has the property ever had a non-agricultural use?

4. Are there any past, pending or threatened actions/investigations by any government environmental agency involving conditions on the farm?
   - against you?
   - involving conditions on adjacent properties?

5. Are there any cross property easements/entitlement, i.e., railway, pipelines, oil wells, etc. and are they in use at this time?

6. Do your operations involve the generation, handling, disposal or other use of chemicals or hazardous materials other than agricultural chemicals?

7. Do your operations involve storage of bulk quantities of agricultural chemicals, such as pesticides and fertilizers, other than for your own use?
   Have bulk quantities of the same ever been stored on the farm in the past other than for your own use?

8. If your operations involve the use of irrigation, are additional substances applied other than water?

9. Does the farm contain any of the following:
   a. Above ground storage tanks? If yes, please provide the following details:
      - whether your province has a program for the registration of such tanks and are your tanks are registered,
      - the location of each tank (by land parcel number),
      - whether the tanks are in use or abandoned,
      - the approximate age of the tanks,
      - whether the tanks have been inspected or repaired,
      - whether any of these tanks are known to leak.
b. An operating or inactive lagoon or manure pit of other surface impoundment? If yes, please provide the following details:
   - the location of manure storage sites (by land parcel),
   - how the manure is stored and the ultimate disposition of the same.

c. An operating or former dump, landfill or other waste disposal area? If yes, please provide details.

d. Ground water wells? If yes, please specify uses:
   - livestock,
   - human consumption,
   - irrigation,
   - aquaculture.

Have any wells been tested for the presence of hazardous materials? If yes, give the date and results of the test.

e. A septic system, drain field, dry well, oil separator, etc?

f. Surface water (stream, river, wetlands, etc.)?

g. Evaporation, irrigation dugouts or storage ponds?

10. Has municipal or industrial sludge ever been used as fertilizer on the property?

11. Are there gravel pits, manure pits, silage pits or other excavations on the property?

12. Does your insurance cover environmental incidents? If yes, please indicate the amount and type of insurance coverage.

13. List all farm sources of waste water, and where these waters are discharged (i.e., tile bed, storage, lagoon, septic or other containment system, ditch creek, etc.)

14. List licenses or permits held and effective dates (e.g., chemical application permit, certificates of compliance, etc.)

15. Describe how you dispose of pesticide/herbicide containers and waste oil.

16. Please provide details concerning any other matters which you believe may be an environmental concern.
REFERENCES


Gouvernement du Québec, *Règlement sur la prévention de la pollution des eaux par les établissements de production animale*, Q-2, r. 18, à jour au 7 mars 1995 (dernière modification: 1er janvier 1994)

Manitoba Agriculture, *Farm practices guidelines for hog producers in Manitoba*, May 1994


Additional copies of this document may be obtained from:

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75 rue Albert Street, Suite 1101
Ottawa ON Canada K1P 5E7
tel: (613) 236-9239
fax: (613) 236-6658

and its member organizations:

Alberta Pork Producers Development Corporation (403) 474-8288
Fédération des producteurs de porcs du Québec (514) 679-0530
Manitoba Pork est. (204) 233-4991
New Brunswick Hog Marketing Board (506) 458-8051
Ontario Pork Producers' Marketing Board (416) 621-1874
Pork Nova Scotia (902) 895-0581
Prince Edward Island Hog Commodity Marketing Board (902) 892-4201
SPI Marketing Group (Saskatchewan) (306) 653-3014