

Agricultural Code of Practice



Ministry of Agriculture and Food
Ministry of the Environment
Ministry of Housing

Ontario

January, 1976

ACKNOWLEDGEMENTS

The Agricultural Code of Practice has been revised through the cooperative efforts of the following Ministries:

- Ontario Ministry of Agriculture and Food
- Ontario Ministry of the Environment
- Ontario Ministry of Housing

Sincere appreciation is due to the farm organizations and individual farmers who made significant contributions.

Special credit should be given to the Ontario Agricultural College, and, in particular, Prof. Tom Lane and Dr. John Robinson.

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AGRICULTURAL CODE OF PRACTICE

INTRODUCTION

In the early 1970's, environmental pollution became one of the most topical issues of the day. Concern for the quality of the environment increased as people realized the consequences of rapid uncontrolled industrialization. While two more recent developments, the energy crisis, and the rapid increase in the cost of living, have received much attention, pollution control continues to be a significant concern of society.

The solution of environmental problems is usually complex. Acceptable tolerance levels are hard to define, and total abatement is often difficult and expensive.

For some time, the livestock industry in Ontario has been concerned about the odours and water pollution potential associated with the storage and utilization of livestock manures, and the disposal of dead animals. In March, 1970, a Suggested Code of Practice was prepared to provide guidelines for livestock producers in meeting these problems. Revisions and changes were made in a subsequent edition published in 1973. While this Code contained a framework for the establishment and expansion of livestock enterprises, it provided little protection from encroachment by other users of land. The Agricultural Code of Practice, 1976, incorporates a number of changes and provides a two-way approach to the maintenance of a strong livestock industry.

Experience indicates that generally farmers have adopted a positive attitude and have managed their manure systems satisfactorily. However, the number of abatement problems is still excessive. Manure production from livestock in Ontario is equivalent to a human population of over 40 million if garbage is not included. This indicates the size of the problem faced by Ontario agriculture.

A number of changes in land use patterns, living habits, and livestock management practices have contributed to the development of the code of practice.

Cities expanded rapidly due to population shift. A trend for urban people to seek housing in rural areas also took place. Inadequate control of land severances resulted in strip development along highways and permitted houses to be built close to livestock enterprises. The potential for problems associated with livestock manure management increased.

The trend to larger livestock enterprises accelerated. Not all farmers have exhibited the management skills necessary to handle the increased volume of manure produced. Manure that is surplus to the needs of that farm can pose as a potential environmental problem.

Confinement rearing of livestock became common. The rapid shift to this efficient system was not always accompanied by a similar increase in efficiency in manure management.

Some livestock enterprises were established without sufficient regard for neighbouring residences or other non-compatible uses of adjoining areas.

It should not be assumed that all livestock farms have serious pollution problems. It depends to a great degree on the management practices employed. There are several measures that assist in reasonable control of odours and water pollution. These include:

- Proper selection and careful management of the manure system.
- Sufficient land available to use manure economically in crop production.
- Sufficient manure storage capacity to hold manure produced until it can be used at the appropriate time on the land.
- Provision of a buffer zone between livestock buildings, manure storages, and neighbouring residences or other non-compatible uses.
- Satisfactory facilities for the prompt disposal of dead animals.
- Mutual concern for the rights of others by both the livestock farmer and other people living in the community.

To ensure that Ontario can maintain a viable livestock industry, it is important that the principles of the Agricultural Code of Practice be implemented in land use planning. Special consideration should be given to:

- Controlling rural land severances
- Organizing the orderly movement of people into rural areas.
- Preserving agricultural lands to meet future food needs.
- Using the Agricultural Code of Practice to complement land use planning.

The success of the Agricultural Code of Practice since 1970 was the result of a high degree of cooperation between farmers, farm organizations, municipal officials and a number of Ministries of the Ontario Government. Because the Code is based on cooperative action, it was developed in the form of guidelines rather than being incorporated in law. If these guidelines are followed and such cooperation continues, it will do much to prevent pollution by the livestock industry. At the same time it should be recognized that the Agricultural Code of Practice will not solve all the pollution problems of Ontario agriculture.

More specific information for use by Municipal Councils is provided in this issue of the Code. Municipal officials are encouraged to become fully aware of its provisions, and to use the Code as recommended. Relevant legislation is listed on Page 38 in the appendix.

PURPOSE OF CODE

The purpose of the Agricultural Code of Practice is to assist farmers in reducing the potential of their livestock operations to pollute air, soil, and water, and to provide guidelines for the rational use of land in relation to the livestock industry. By accomplishing this, situations should be avoided which could lead to disputes between neighbours. The Code does not specifically define "normal farming practice" referred to in The Environmental Protection Act (1972) and amendments. However, it does describe acceptable manure management practices. It is intended that livestock producers who follow the intent of the Code can expect assistance from the Ministries involved in the event of environmental disputes. During the assessment of complaints against farmers, technical specialists from Ministry of Environment and Ontario Ministry of Agriculture and Food are prepared to verify the quality of the design of the livestock enterprise and also the level of management of the operator.

The Agricultural Code of Practice is designed to provide:

- Guidelines
 - (a) for assessing (1) the design, location, and manure management system of new livestock buildings; (2) the renovation or expansion of existing livestock operations.
 - (b) for evaluating the design of the manure management system on established livestock operations.
- Comprehensive manure management plans for all livestock operations.
- Methods to control water pollution caused by livestock watering at streams, ponds, or lakes and prevent pollution of water supplies.
- Advice on disposal of dead animals.
- Guidelines for regulating encroachment on established livestock farms.
- Flexibility in interpretation to cover special cases without being overly restrictive.

For purposes of the Agricultural Code of Practice, livestock is defined as farm animals kept for use, for propagation, or intended for profit and includes:

Dairy and beef cattle	Turkeys
Horses	Goats
Swine	Geese
Sheep	Ducks
Laying hens	Mink
Chicken and turkey broilers	Rabbits

USE OF THE AGRICULTURAL CODE OF PRACTICE

IN THE FARM COMMUNITY

New or Remodeled Facilities

Farmers proposing to build new livestock buildings, or remodel existing buildings, should familiarize themselves with all provisions of the Code. They should then contact the Agricultural Engineer at the local office of the Ontario Ministry of Agriculture and Food for advice on design of these buildings and the manure system.

Existing Facilities

Farmers are encouraged to seek this same advice if they wish to bring their existing operation into compliance with the Code.

Farmers who are concerned about their existing manure management systems should plan corrective action instead of waiting for complaints or legislative control.

Certificate of Compliance

When detailed plans are completed, the farmer should apply for a "Certificate of Compliance" before beginning construction. This certificate is issued jointly by the Ontario Ministry of the Environment and the Ontario Ministry of Agriculture and Food. A Certificate of Compliance is an evaluation of a livestock production unit, its manure system, and the quality of management. It is a measure of the farmer's ability to control pollution. Farmers are encouraged to obtain a Certificate of Compliance for existing facilities as well as new facilities. Application forms are available at all offices of the Ontario Ministry of the Environment and the Ontario Ministry of Agriculture and Food listed on pages 00 of the appendix. The application is forwarded to the nearest office of either Ministry. Evaluation is made by both Ministries based on the guidelines in the Agricultural Code of Practice. It is important to realize there is enough flexibility in the Code to allow for acceptable alternative manure management systems.

The Certificate of Compliance becomes valid upon fulfillment of the agreed-upon factors listed on the certificate, and the implementation of the management practices recommended in the Code.

Complaints

All complaints regarding pollution should be directed to the Ontario Ministry of the Environment.

Land Use Planning

Farmers are encouraged to participate in local municipal land use planning.

BY MUNICIPAL BODIES

To provide for orderly land use and to cope with development pressures, municipal councils are urged to adopt effective land use controls through a comprehensive land use planning program. It is recommended that such a program include the preparation of an official plan and restricted area (zoning) by-laws.

The Code and the Official Plan

An official plan is a policy document prepared by a municipality as a statement of its long-term planning objectives. Municipalities wishing to protect and foster the development of a viable livestock industry should include policies in their official plan with respect to the establishment and expansion of livestock housing and the siting of rural development. In this regard, the *Agricultural Code of Practice* should be used as a guide in the preparation of these policies.

The Code and the Restricted Area (Zoning) By-Law

Implementation of official plan policies is achieved through municipal adoption (and Ontario Municipal Board approval) of a restricted area (zoning) by-law, passed under Section 35 of *The Planning Act*. One of the factors for a municipality to take into consideration when formulating a zoning by-law is the provision of an adequate buffer zone between non-compatible land uses. This objective can be achieved by including the "Minimum Distance Separation" Formulas as a provision of the zoning by-laws. These formulas would regulate the siting and expansion of livestock buildings as well as non-compatible rural land uses.

Committees of Adjustment and Land Division Committees

When considering severance applications, these Committees should rely on the "Minimum Distance Separation" formulas as a technique of evaluation. When considering applications for a minor variance, Committees of Adjustment are strongly urged to maintain the integrity of the buffer zone between noncompatible land uses. It should be recognized that any interference with an established buffer zone by subsequent land use change could seriously restrict the continued agricultural use of that land.

For further information on the use of the "Code" in a local planning program, municipal officials should consult personnel within the Community Planning Services Branch of the Ontario Ministry of Housing and the Foodland Development Branch of the Ontario Ministry of Agriculture and Food.

APPLICATION OF THE AGRICULTURAL CODE OF PRACTICE

AGRICULTURAL

Livestock Buildings and Production Facilities and Associated Buildings

New Buildings

All the requirements of the Code apply to new livestock units. The required separation distance will be determined by using M.D.S. Formula 11 where appropriate.

Renovation and Expansion of Existing Facilities

All the requirements of the Code apply to changes to existing facilities. The required separation distance will be determined by using M.D.S. Formula 11 where appropriate. If the expansion involves a new structure not attached to existing buildings, the modified distances apply. However, if the expansion is an extension of an existing building and the separation distance to non-compatible land uses is less than the allowable distance, then satisfactory alternatives will have to be arranged with the Agricultural Engineer of the Ontario Ministry of Agriculture and Food.

Existing Livestock Operations not Contemplating Change

All the Code requirements must be met if a Certificate of Compliance is desired. Separation distances will be determined by M.D.S. Formula III "A guide for use by Agricultural Engineers of the Ontario Ministry of Agriculture and Food." Farmers are encouraged to apply for a certificate.

Farm Residences

The M.D.S. Formulas do not apply to the siting of additional houses on farms, e.g. house for hired help. However, at a later date when a severance is requested for this residence, M.D.S. Formula I will apply and be used as a criterion to determine if the severance should be granted.

NON AGRICULTURAL

The Establishment, Renovation or Expansion of Non-Agricultural Buildings or Facilities Including Residences

In all cases, M.D.S. Formula I will apply.

MINIMUM DISTANCE SEPARATION FORMULAS (M.D.S.)

Separation Distances

The purpose of the separation distance is to reduce potential environmental conflicts between non-compatible uses.

Objectionable odours can be reduced if livestock buildings and rural residences are constructed at reasonable distances from each other. Separation distances can be determined only once - before the new building is erected. Careful site planning is necessary to suit both present and future requirements.

The intensity of odour from a livestock building or manure storage relates closely to separation distance. Odour intensity is affected by the kind of livestock, the feeding program, the moisture content of the manure and the atmospheric conditions. Odour levels are difficult to measure because they affect different people in different ways.

The distance calculations are for untreated manure. When satisfactory treatment is involved, these distances may be modified. (See page 21 for manure treatment).

Application of M.D.S. Formulas

The M.D.S. Formulas have been developed to provide a consistent and fair technique to determine separation distances between non-compatible land uses. The formulas assess the environmental impact of establishing the proposed buildings, and evaluate existing commitment as compared to other alternatives.

The complete M.D.S. Formulas are printed on pages 27 in the Appendix. For assistance in using the Formulas, please contact the local Agricultural Engineer of the Ontario Ministry of Agriculture and Food. The Formulas may appear complicated but a little experience will indicate they are easy to use.

M.D.S. Formula I is used to determine the minimum separation distance between other land uses such as residences establishing or expanding in close proximity to a livestock operation.

M.D.S. Formula II is used to determine the setback and separation distance between a new, enlarged or remodelled livestock facility and other non-compatible uses.

M.D.S. Formula III is used by Agricultural Engineers to determine the minimum distance separation requirements for existing livestock setups not contemplating change where a Certificate of Compliance is requested.

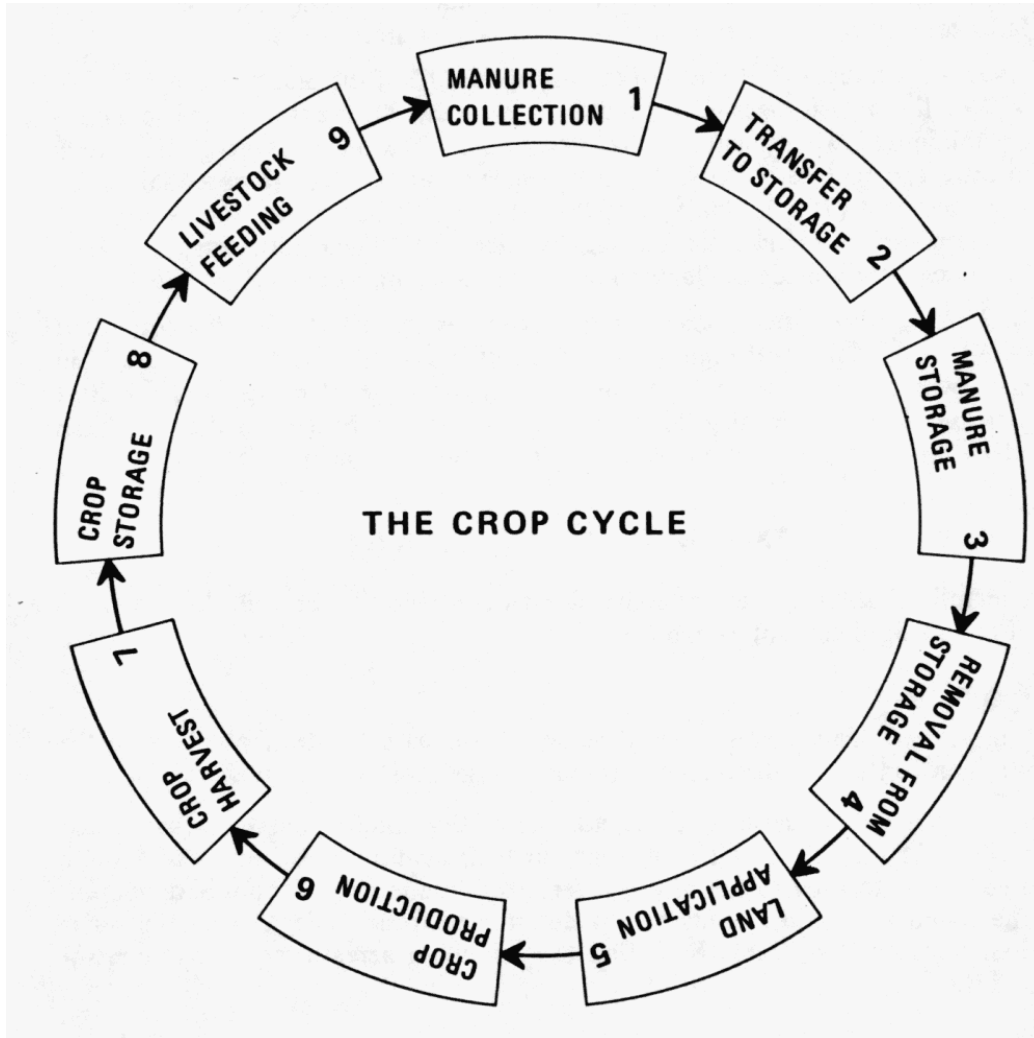
How the M.D.S. Formulas Work

The calculations are designed to reflect the odour potential of well-managed livestock operations. Included in the calculations is a factor to allow for reasonable future expansion of the livestock facility.

The following factors are the basis for the calculations:

1. Kind of livestock
2. Number of livestock
3. Degree of change
4. Manure system
5. Manure storage
6. Type of encroachment (in M.D.S. Formula I)

RECOMMENDED LAND AREA



The Agricultural Code of Practice is based on the concept that all livestock manure should be returned to the soil to grow crops. However, it must be emphasized that land can safely accept only a limited amount of manure without increasing the potential for water pollution and reduction in crop yields.

There is considerable variation in manure quantity and quality because of kind of livestock, type of feed and the manure management system used. Farmers are encouraged to have manure from their livestock operation analyzed at the Department of Land Resource Science, University of Guelph. More specific recommendation for utilization in crop production can be made with this analysis.

THE VALUE OF LIVESTOCK MANURE

Livestock manure is an excellent source of essential plant nutrients and organic matter necessary for good soil management.

Until recently, the high cost of labour and the low cost of commercial fertilizer encouraged many farmers to regard livestock manure as a waste product to be disposed of rather than utilized in crop production. Today the rising cost of fertilizer warrants another look at the value of manure.

Livestock excrete 60% to 80% of the nitrogen, 70% of the phosphate and 75% to 90% of the potash ingested as feed. Nutrient losses during storage and spreading are minimized when manure is handled as described on pages 17-21. Livestock manure can replace a crop's fertilizer needs without affecting potential yields. Fifty per cent (75% in poultry) of the nitrogen, 40% of the phosphate and 90% of the potash in manure can replace commercial fertilizer in the first crop year. The remainder is made available to fertilize succeeding crops.

At 1975 fertilizer prices, one dairy cow produces manure which is the equivalent of 60 to 75 dollars of commercial fertilizer per year. Livestock manure is an asset which will increase in dollar value as the price of energy and fertilizer increase. Ontario Ministry of Agriculture and Food Extension Personnel can advise farmers interested in making maximum use of manure.

EXPLANATION OF TABLES A AND B

The following tables were established with consideration of pollution potential of the nitrogen content of manure.

Animal Units

The Animal Unit System was developed to equate livestock numbers to the nitrogen content of the manure produced while those animals were on the farm.

An animal unit is defined as the number of that kind of livestock that would produce 150 - 170 pounds of nitrogen in their manure. This amount of manure is sufficient to provide the nitrogen fertilizer requirements for one acre of corn. The number of animal units can be determined from Table A. This number is then transferred to Table B to find the minimum acreage required to control pollution.

Usable Acreage

Recommended acreages refer to land available for crop production that can be used for spreading of manure.

Pollution Prevention

Acreages shown in Table B are the minimum necessary to avoid ground-water pollution by nitrogen compounds caused by excess manure application. When more efficient use of manure is desired, greater acreages should be considered. The Ontario Ministry of Agriculture and Food can provide information on this subject. The best recommendation is made when a manure analysis is available and consideration is given to the crops grown and the soil type.

Livestock Numbers

All calculations for animal units should be based on *total* livestock numbers for one complete year.

Limited Acreage

For new livestock operations, a minimum of 30 acres at the farm building site is recommended. On acreages less than this, minimum distance separation may be difficult to meet, and compensating alternatives must be considered. These include a dry manure system, covered manure storage, or manure spreading at another site. These alternatives should be checked by the Agricultural Engineer of the Ontario Ministry of Agriculture and Food.

Leased Land

Manure may be spread on leased land or on neighbouring farmland. Comprehensive agreements are necessary to assure that the land is available when required for the spreading of manure. This is for the protection of the livestock producer.

Design Information

Complete design information is not given in the Code of Practice. The following publications are suggested as sources of information:

- Canadian Code for Farm Buildings
- Livestock Waste Management and Pollution Abatement, 1971, A.S.A.E.
- Canada Animal Waste Management Guide, 1974, Publication 1534
- Agricultural Waste Management, Dr. Ray Loehr, Cornell University

TABLE A ANIMAL UNITS OF MANURE PRODUCTION (IN TERMS OF NITROGEN) AS BASIS FOR ACREAGE REQUIREMENTS

Type of Livestock or Poultry	Annual Basis (365 Days)
1 dairy cow (plus calf)	1 animal unit
1 beef cow (plus calf)	1 animal unit
1 bull	1 animal unit
1 horse	1 animal unit
4 sheep (plus lambs)	1 animal unit
4 sows (plus litter to weaning)	1 animal unit
125 laying hens	1 animal unit
100 female mink (plus associated males & kits)	1 animal unit
	Market Basis (as marketed)
2 beef feeders (gain 400-1100 lb)	1 animal unit
4 beef feeders (gain 400-750 lb)	1 animal unit
4 beef feeders (gain 750-1100 lb)	1 animal unit
15 hogs (gain 40-200 lb)	1 animal unit
1000 broiler chickens or roasters (4-5 lb)	1 animal unit
300 turkey broilers (11-12 lb)	1 animal unit
150 heavy turkey hens (19-20 lb)	1 animal unit
100 heavy turkey toms (30-32 lb)	1 animal unit
40 veal calves (gain 90-300 lb)	1 animal unit
1000 pullets	1 animal unit

TABLE B MAXIMUM RATE* OF LIVESTOCK MANURE APPLICATION

Manure From Number of Animal Units	Minimum Acres	
	Loam to Clay Soil	Sandy Soil
30 - 40 animal units	20 acres	30 acres
41 - 60 animal units	30 acres	45 acres
61 - 80 animal units	40 acres	60 acres
81 - 100 animal units	50 acres	75 acres
101 - 120 animal units	60 acres	90 acres
121 - 140 animal units	70 acres	105 acres
141 - 160 animal units	80 acres	120 acres
161 - 180 animal units	90 acres	135 acres
181 - 200 animal units	100 acres	150 acres
201 - 220 animal units	110 acres	165 acres
221 - 240 animal units	120 acres	180 acres
241 - 260 animal units	130 acres	195 acres
261 - 280 animal units	140 acres	210 acres
281 - 300 animal units	150 acres	225 acres
301 - 320 animal units	160 acres	240 acres
321 - 340 animal units	170 acres	255 acres
341 - 360 animal units	180 acres	270 acres
361 - 380 animal units	190 acres	285 acres
381 - 400 animal units	200 acres	300 acres

SAMPLE PROBLEM

A farmer on loam soil proposes to build a new 80 sow-to-finish operation with liquid manure. Assume 20 hogs marketed per sow per year.

Solution

Step I Calculate animal units in breeding herd (Table A)

80 sows = $80/4 = 20$ animal units

4 boars = $4/4 = 1$ animal unit

Total 21 animal units

Step II Calculate animal units in market hogs

Annual marketing - $80 \times 20 = 1,600$ hogs

Animal units - $1,600/15 = 107$ animal units

Step III Total animal units = $21 + 107 = 128$ animal units

Step IV Calculate minimum acreage required (Table B)

- 128 animal units require 70 acres of land on which to spread the manure.

Supplementary Information

1. Total manure production during year would be approximately 375,000 gallons including some wash water. This would mean an application rate of 5,350 gallons per acre if spread on 70 acres.
2. For the most economical use of manure in crop production, this amount of manure should be spread on 140 acres.

* Maximum Rate of Manure Application

This is the rate at which the nitrogen in manure may be applied to soils without causing ground-water pollution problems or reduced crop yields. This rate represents twice the amount of nitrogen (300 - 340 lb. nitrogen application) required for an acre of corn.

For optimum utilization of the nutrient content of manure for crop production, the application rate should be the manure from one "animal unit" spread on one acre. This approximates an application rate of 150 - 170 lbs. of nitrogen per acre.

MANURE MANAGEMENT

MANAGEMENT SYSTEMS

Management is the most important factor in the operation of any manure system. A properly designed system which is poorly managed will frequently be a failure. A very ordinary system which is well managed will likely be acceptable.

Good public relations with, neighbours is a valuable asset. Manure should be stored and spread in such a way as to cause the least inconvenience to neighbours and be of most value as a fertilizer. Where possible the farmer is encouraged to take advantage of atmospheric conditions which will minimize potential odour problems. General farmstead appearance has a bearing on the attitude of the community. Visual screening of manure storage has positive results. Good sanitation and fly control around buildings and manure storage are important. When transporting manure on public roads, proper equipment should be used to prevent spillage and leakage.

Reduction of odour levels can be accomplished by the proper design and management of the ventilation system in the building. In-barn drying of poultry manure should be considered to keep odour levels acceptable.

The siting of the new buildings should take maximum advantage of local climate and topographic conditions. Agricultural Engineers of the Ontario Ministry of Agriculture and Food are prepared to offer advice or information in this regard.

MANURE HANDLING SYSTEMS

Manure systems should be chosen wisely, planned carefully and then managed well. The key to success is management. The building is often designed around the manure system.

The manure system chosen should be able to provide:

1. Protection for ground and surface water
2. Minimum odour levels
3. Six months minimum storage capacity to hold the manure until it can be efficiently used on the land.
4. Safety and security
5. Minimum nutrient losses during storage
6. Prevention and control of disease in the building
7. Minimum storage within the building

CHOOSING THE TYPE OF MANURE HANDLING SYSTEM

Good planning involves a comparison of all possible alternatives, and the choice of the one best suited to the specific requirements of the individual farm. When making this decision, the following points should be considered:

1. The moisture content of the manure as it relates to the odour level.
2. Labour efficiencies and costs of complete systems which are quite variable.
3. The quality and adaptability of equipment and systems to meet the needs of the future.
4. The amount of odour and effluent produced.
5. The location of storages in relation to streams, water courses, wells, etc.
6. Complaints about odours can be minimized if the farmer uses discretion when spreading manure and takes advantage of special atmospheric conditions, e.g. favourable wind. Neighbours appreciate it when the spreading is completed in as few days as possible.

Recommendations

Note: These recommendations do not apply to

1. Dry, relatively non-odorous, manure applied as a mulch and fertilizer at the base of fruit trees.
2. Manure that has been sufficiently aerated or treated to reduce odours to an acceptable level.

The following recommendations should provide reasonable background for decision making.

Solid Manure System

Solid manure is manure which has had sufficient bedding added to restrict flow, and to absorb most of the liquid, e.g. in a tie stall dairy barn with bedding.

The following guidelines should be adhered to as closely as possible:

1. Solid manure should be spread when the ground is not frozen. It should be incorporated into the soil within 24 hours if it is applied closer than 600 feet from a non-compatible use (such as a building for human occupancy or food preparation).

2. *Minimum storage capacity should be at least 6 months.*
3. Feedlots and paved yards should be designed to retain near the site all the liquid effluent. The following procedures should minimize the volume and strength of the effluent:
 - (a) install eaves trough on all barns to keep roof water from yards.
 - (b) keep paved area per animal to a minimum - e.g. 25 sq. ft. per 1,000 lb. steer.
 - (c) divert all outside drainage away from feedlot and yards by installing dykes, ditches and drains.
 - (d) keep yards scraped as often as possible to reduce amount of manure available for runoff.
 - (e) consider roofing in a portion of the lot to keep out rainfall - e.g. installing a roof over outside feeder.

The yard scrapings will be either liquid or semi-solid, and must be handled as such.

Semi-Solid Manure System

A typical example is the manure as it is removed from a dairy free stall barn. Some bedding has been added, but not enough to prevent it from flowing. It will stack during freezing weather, but will flow like lava during the spring when it thaws.

Semi-solid manure is difficult to handle because it is neither, a solid nor a liquid. If it is stored above ground, then it must be contained by retaining walls or earth dykes. Stable cleaners and hydraulic pumps can efficiently remove the manure from the collection area to the storage. However, it must be recognized that, when semi-solid manure is retained, the liquids (urine and rainfall) are also retained. A system must be developed to remove these liquids first. For most semi-solid storages, a concrete ramp is required for entry of equipment. Conventional manure spreaders require an endgate attachment to prevent leakage during transport on public roads.

If semi-solid manure is spread within 800 feet of a neighbouring house or other non-compatible use, then it should be incorporated into the soil within 24 hours.

Safety Note

Semi-solid manure storages require safety fences to protect humans and livestock.

Liquid Manure System

Because liquid manure is likely to be more odourous than dry manure, the requirements for this system are more restrictive. However, many farmers appreciate the major advantage of more complete mechanization.

The following guidelines should be adhered to as closely as possible:

1. Sufficient storage capacity for at least 6 months should be provided. On many farms it is necessary to store manure from December until May, especially if the manure is to be applied after corn is planted. Any reduction from this capacity must be evaluated by the Agricultural Engineer or the Soils and Crops Specialist, considering factors such as geographic area, climate, cropping program and manure spreading schedule. When calculating storage requirements, include water used during clean-up, water spillage from drinking devices and water added for dilution.

2. Untreated liquid manure should be spread when the ground is not frozen. It should be incorporated into the soil within 24 hours if it is applied closer than 1,000 feet from a non-compatible use (such as a building for human occupancy or food preparation). The timing requirement depends on factors such as weather conditions, actual distances to neighbours or intensity of odour.

Incorporation can be accomplished by:

- (a) plow-down
- (b) discing
- (c) soil injection

The liquid manure must be completely covered by soil, and not left in open furrows.

3. Because reinforced concrete liquid manure storages are expensive, a number of farmers are considering the building of excavated basins with earth sides. It is important to recognize all the possible problems which can result from such a storage. The following should be considered:

- (a) is there sufficient clay content to prevent seepage of nutrients into ground-water supplies?
- (b) can erosion of banks by rainfall and during agitation be prevented? A concrete floor and stub wall will minimize this problem.
- (c) can a safe pumping platform be constructed?
- (d) a safety fence is imperative.
- (e) is a dyke or ditch around storage needed to prevent entry of surface water?

4. It is extremely important that everyone appreciate the potential safety hazards associated with liquid manure storages.

- (a) all accessible liquid manure storages must be protected by either a permanent top or at least a safety fence.
- (b) Liquid manure, that has not been aerated, generates a number of gases such as methane (no odour), hydrogen sulphide (rotten egg smell), ammonia (pungent smell) and carbon dioxide (no odour). Specific concentrations of these gases can present a hazard to both human and animal life either because of amount of gas present or the exclusion of oxygen. **Complete ventilation of buildings and manure tanks is a must when pumping. Never enter a liquid manure tank unless you are sure there is sufficient oxygen present and you have a helper outside the tank.**
- (c) Methane is highly explosive in concentrations of 5 - 15%. Open flame should not be tolerated near a liquid manure tank.

Liquid Manure Storage Facilities

In-Ground Tanks

These may be rectangular tanks or large diameter circular tanks.

Advantages

- 1. Gravity flow from collection area to storage possible.
- 2. Aesthetically acceptable if a top is provided.

Disadvantages

- 1. Very expensive
- 2. Requires a safety top or safety fence
- 3. Shortage of available qualified contractors
- 4. High ground-water table is a problem.

Above-Ground Tanks

These are usually concrete silos 20 - 30 feet in diameter.

Advantages

- 1. Liquid usually crusts over, and so odour production is minimized until liquid is pumped.
- 2. Very acceptable aesthetically
- 3. Relatively safe
- 4. Many silo contractors are interested in off-season construction.
- 5. High ground-water table not a problem
- 6. No excavation necessary although a good foundation is required.

Disadvantages

1. Requires pumping into storage every few days from sump
2. Requires elaborate agitation equipment. This is especially true for beef and dairy manure which separates into a thick floating layer which is difficult to homogenize.
3. Getting a plumber to provide service is difficult.

Operation of a Liquid Manure Tank

1. Because liquid manure must be pumped either into storage or out of storage, it is necessary that it be sufficiently diluted for efficient pumping. Swine manure normally does not require further dilution. The pump should be selected to suit the system chosen. Experience will indicate the capabilities of your pump. It is better to err on the wet side for the first year. Additional water requires more storage capacity, and should be kept at a minimum.
2. Because liquid manure separates into 3 distinct areas during storage - floating solids, liquid area and settled solids, it is necessary to agitate sufficiently to homogenize the complete contents of the tank before pumping.
3. Where possible, it is advisable to disturb the liquid manure in storage as little as possible until it is ready for pumping. Crusting will help considerably to contain some of the odours during the storage period.
4. Avoid additions of hay and other products which could create pumping problems.
5. Drain all surface water away from storage.

MANURE TREATMENT

Experience has indicated that methods used to treat human sewage have limited relevance to treatment of livestock manure. This is because costs are prohibitive, and because of differences in the material to be treated. Also, the accepted concept for manure use is conservation and utilization, and not disposal.

Treatment methods for manure should be as simple as possible, and should be designed to allow maximum utilization. Usually the objective of manure treatment is odour control. However, there may be circumstances when the sale of the manure is planned, and so reduction of bulk and other improvements in marketability will be necessary.

The unpleasant odour of stored manure results from the activity of bacteria and other micro-organisms in the absence of oxygen. If a low concentration of oxygen is maintained in the stored manure, almost all odour will be prevented. Another possibility is the elimination of all microbial activity by chemical treatment. Both these odour control methods are being actively researched at the present time.

Aeration

Pumping air into stored liquid manure by a compressor or by mechanical agitation either reduces or eliminates odour. Mechanical devices are available and, if carefully managed, can be quite effective. Capital costs of aerators are relatively high (approximately \$5,000 for an aerator for a 100,000-gallon tank), and operating costs may be about \$1 per pig marketed. Farmers whose operations are threatened by complaints about nuisance of odour should obtain advice about aeration equipment from an Agricultural Engineer of the Ontario Ministry of Agriculture and Food.

Chemical Treatment

Proprietary chemicals are frequently advertised for use in odour control of manure. Farmers should exercise extreme caution about purchasing such chemicals. Many of these chemicals have been tested in independent laboratories, and found to have little or no effect on odour. Recently some chemicals designed to sterilize manure have been tested. These treatments are still in the experimental stage, and, while promising, are not recommended yet. They are likely to be expensive. Farmers interested in chemical treatment should always seek advice from Extension staff of the Ontario Ministry of Agriculture and Food before investing.

Special Treatment Methods Composting and Drying

Where markets exist and land is not immediately available for manure utilization, livestock producers may wish to explore the sale of composted or dried manure. Composting and drying are proven techniques for treating manure, but require substantial capital investment and should be undertaken only where a proven market for the product exists. Advice about these special treatment processes is not readily available in Ontario, and may require considerable investigation on the part of interested livestock producers.

Methane Production

In recent years, there has been a great deal of interest in the production of methane gas from manure. This is technically feasible, but almost all informed authorities are convinced that it is not economical at this time in our climate. As the cost of other energy sources increases, so will the relevance of this process. Plans for methane generators are available, but publications on the subject do not always point out the economic factors.

It should be remembered that digestion of manure for methane production does not enhance the fertilizer value of manure, nor is the bulk of material to be handled reduced significantly by the process. Land for utilization of digested manure is required in the same proportion as for untreated manure.

Manure Lagoons

For the purposes of the Agricultural Code of Practice, a lagoon is defined as a permanent liquid manure storage facility designed to provide a specific treatment for the manure. Pumping is only planned to prevent overflow. Acceptable disposal methods should be considered.

Lagoons are *not acceptable* for agricultural use under Ontario conditions.

PROTECTION OF WATER QUALITY

A continued supply of good quality water is the responsibility of all of society. Ontario farmers must recognize how poor manure management can affect water quality. Coliform bacteria and nitrate nitrogen from manure can contaminate both surface and ground-water supplies. Farm drinking water should be checked annually to assure adequate quality.

As the intensity of livestock production increase, the chance for contamination of surface and ground water also increases. Runoff from manure spread on sloping frozen soil, physical soil erosion and direct runoff from feedlots and poorly constructed manure storages may affect surface water quality. When high rates of manure are applied, ground-water quality may be affected by leaching of nitrate nitrogen through the soil profile.

The quality of water can be satisfactorily preserved on most farms by following recommended manure handling practices:

1. Spread manure at rates according to Tables A and B. (Page 14)
2. Work manure into the soil within 24 hours when possible.
3. Practice good land use by reducing stream bank erosion, constructing grassed waterways, and plowing across slopes wherever practical.
4. Do not spread manure on steeply sloping land, particularly during winter or early spring, when there is essentially no crop cover.
5. Prevent runoff from feedlots and manure piles.
6. Construct concrete holding tanks and retaining walls.
7. Prevent silage juices from reaching water supplies.

Manure Spreading During Winter and Spring

All farmers should be particularly concerned about the pollution potential of indiscriminate spreading of manure. The greatest fertility value for manure is realized when the manure is stored properly, spread in the spring and then incorporated into the soil soon after spreading.

This practice reduces odours, reduces nitrogen losses, improves crop responses and guards against runoff.

Runoff Control

The amount of manure runoff and resulting water pollution depends on many factors such as:

1. Whether the ground was frozen and/or snow covered when the manure was applied.
2. The slope of the land
3. The amount and type of crop cover
4. The soil type
5. The amount of rainfall
6. Proximity of watercourses and streams to spreading area.

The decision on where and when to spread manure should be made wisely. Experience indicates to the farmer which fields are subject to runoff, and these should be left until after spring melt occurs. Relatively flat fields not subject to runoff or flooding should be chosen for spreading manure during the winter or early spring. When manure is piled for future spreading, select sites that are reasonably level, away from watercourses and not subject to flooding.

The importance of a properly designed and properly constructed manure storage with at least six-months winter capacity cannot be overemphasized for the proper handling of manure. This capacity allows the farmer to spread the manure when and where it is most beneficial for crop production, and is less apt to create environmental problems.

Pasturing Livestock Beside Streams and Lakes

For years, farmers have appreciated the advantages of being able to water livestock directly from lakes and streams adjacent to pastures. However, in many cases, farmers did little to control the pollution associated with this practice. Livestock cause erosion of the banks of the watercourse. The livestock defecate and urinate in the water as they drink.

The only solution is to fence the livestock from the water and pump the water to them. This is expensive because of cost of fencing and pumps and the need to bring electricity to the site.

Where problems have been identified, the farmer should limit watering to one location. If possible, the water should be diverted to a holding pond. Nose pumps can be of value if electricity is not available.

DEAD ANIMAL DISPOSAL

Recent economic conditions have dictated some changes in the systems available for the disposal of dead animals. The disposal of dead animals is covered by the Dead Animal Disposal Act and is administered by the Veterinary Services Branch of the Ontario Ministry of Agriculture and Food.

There are five basic systems in use in Ontario:

1. Pickup by a licensed dead stock carrier. This service is not available in all areas of Ontario. Generally it is not available for small animals and poultry. If present trends continue, there may be a service charge.
2. Storage of small animals or poultry in a freezer until numbers are sufficient to warrant delivery to a rendering plant. (Only one plant accepted delivery in 1975)
3. Disposal site on the farm. There are basically two types available:
 - (a) *Disposal Tank (for poultry)*

The concrete tank should have a concrete top with a reasonably tight opening device for deposit of the birds. The device should be child proof. The tank should be located at least 150 feet from any well or spring.

Size suggestions:
Broilers - 20 cu.ft./1,000 birds
Layers - 100 cu.ft./1,000 birds

Many farmers build two, and when one is filled, they start filling the second tank. When it is nearly filled, the contents of the first tank are spread on the ground, and incorporated into the soil immediately.

(b) *Temporary Trenches or Pits (summer use only)*

A minimum of 2 feet of soil should be placed over the carcasses. Earth should be backfilled each time additions are made.

4. Sanitary Land-fill Sites - very few sanitary land-fill sites will accept dead animals.
5. Incineration - dead animals can be adequately disposed of in properly designed incinerators. A Certificate of Approval from the Ministry of the Environment is required for all new installations. Applications and advice are available from any office of the Ministry of the Environment. (See page 00) A properly designed incinerator will have sufficient capacity so that all odour levels will be within tolerable standards. Incinerators will usually have two burners, and require pre-heating before usage, otherwise odour levels may be too high.

SUMMARY

The Agricultural Code of Practice provides practical guidance on a number of different subject areas:

- site planning for livestock buildings with respect to non-compatible land uses
- site planning for dwellings with respect to livestock buildings - management information on manure systems
- recommended land areas for manure utilization
- how the Code can complement good land planning

Adoption of the requirements and guidelines in the Agricultural Code of Practice, together with careful planning, good manure management practices and consideration for neighbours should considerably reduce the rise of environmental problems and complaints. Experience with the Agricultural Code of Practice has shown that this combination will work, and will maintain an acceptable environment. Management, however, is the key ingredient in making the whole system work.

Before beginning construction, the owner should ensure that he has satisfied the requirements of all other jurisdictions, e.g. Health Units, Building Permits, etc.

APPENDIX I

MDS FORMULA CALCULATIONS

MDS FORMULA ONE

I USE - To determine the minimum separation distance requirements for non-agricultural uses (Table 6) establishing or expanding in close proximity to existing livestock buildings

APPLICATION - as a guideline for land use planning

1. To evaluate severance applications
2. To evaluate building permit applications
3. To evaluate plans of subdivision

PURPOSE -

1. To reduce fragmentation and attrition of land as an agricultural resource and to enhance its future development for agricultural purposes.
2. To reduce the potential for environmental conflicts between livestock operations and incompatible neighbouring land uses-

METHOD - Involves assessment of the livestock operation, the selection of factors from tables, the calculation of the minimum acceptable distance and evaluation.

II Assessment of Livestock Operation and Selection of Factors (complete only this section if calculations are to be made by central computer)

Type of livestock, housing capacity and calculation of animal units (Table 2)

Type of Livestock	Existing Housing Capacity Number Per Year	Animal Units
Total Animal Units		

Selection of Factors

1. Calculate animal units factor 'B' - Table 3 using the greater of:
 - (a) existing housing capacity
 - OR
 - (b) basic quota of 2 times the number of tillable acres under single ownership at this site
(up to a maximum of 150 animal units)
2. Factor for type of livestock 'A' - Table 1
 - If there are more than one type of livestock use average of factors weighted according to number of animal units in each category
3. Factor 'D' for type of manure system - Table 5
4. Encroachment factor 'E' for siting of land uses, or change in land use designation, or zoning (Table 6)

III Calculation of Minimum Acceptable Distance (Complete this section only if central computer is not to be used for calculations)

1. Distance coef. $H = A \times B \times D \times E = \text{---} \times \text{---} \times \text{---} \times \text{---} =$
2. Minimum acceptable distance to nearest part of the livestock operation (e.g. building, silo, manure storage tank, concrete pad or stacker, but not including milkhous, implement shed or dry food storage buildings)
 $= H \times 1000 \text{ ft.} = \text{---} \times 1000 \text{ ft.} = \text{---} \text{ ft.}$
3. Actual distance

Evaluation: Application above criteria

Application reference _____ Date of Evaluation _____
 By _____

NOTE:
 Official Form and Wording of MDS Formulas and their use in Municipal Planning programs will be determined by Ontario Municipal Board.

12-75

MDS FORMULA TWO

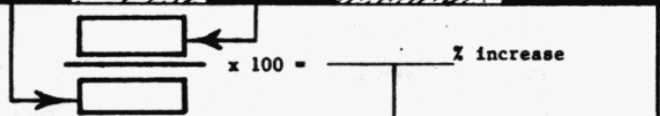
- I** USE - To determine the set-backs and separation distance requirements for new, enlarged or remodelled livestock facilities within agricultural areas.
- APPLICATION - In concert with MDS FORMULA ONE
1. As a guideline for rural land use planning.
 2. As a guideline for certification of proposed changes to livestock facilities under the Ontario Certificate of Compliance program.
 3. As a method of control of the siting of new, enlarged or remodelled livestock housing and manure storage facilities when desired by the municipality by incorporation into by-laws as authorized by Section 35 of the Ontario Planning Act.
- PURPOSE
1. To permit the orderly development of livestock operations within agricultural areas.
 2. To reduce the potential for environmental conflicts between livestock operations and incompatible neighbouring land uses.
- METHOD - Involves assessment of the proposed change in the livestock operation, the selection of factors from tables, the performance of test one (calculation of acceptable distances and comparison with actual distances) and, if required, performance of test two (calculation of performance index and total performance, and comparison to minimum accepted values), and performance of test three (siting of manure storage).

II Assessment of the Proposed Change in the Livestock Program (complete only this section if calculations are to be made by central computer)

1. Types of livestock, housing capacity and calculation of animal units (Table 2)

Type of Livestock	Existing Housing Capacity Number/Year	Animal Units (Table 2)	Additional Capacity Number/Year	Animal Units (Table 2)	Total Housing Capacity Number/Year	Animal Units (Table 2)
Total Animal Units						

2. Calculation of percentage increase in animal units



Selection of Factors

1. Factor for livestock to be added (Table 1)
2. Factor for total number of animal units (Table 3)
3. Factor for new operations, or rebuilding, remodelling or enlarging (Table 4)
4. Factor for manure system (Table 5)

	Factor A
	Factor B
	Factor C
	Factor D

III Calculation of Distance Coefficient for Livestock Housing (complete this section only if central computer is not to be used for calculation)

Distance Coef. F = A x B x C x D = _____ x _____ x _____ x _____ =

	Coef. F
--	---------

Calculation of Distance Coefficient for Siting of Manure Storage

1. Selection of Factor for manure storage (Table 7)
2. Distance Coefficient S (Table 7)

	Factor M
--	----------

	Coef. S
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MDS FORMULA TWO (continued)

TEST ONE Calculation of acceptable distance (Col.C) between the subject structure and neighbouring uses, and comparison with actual distances (Col.D). Multiply basic distances (Col.A) times distance coefficient F. (Col.B)					TEST TWO (To be used when application fails to meet all criteria in Test One). 1. To be acceptable, application must meet both of the following (a) each value in Col.E must equal or exceed the value in Col.F, (b) the total values in Col.E must equal or exceed 7.40 except as provided in the footnotes.* 2. Enter a figure not greater than 1.50 in Col.E		TEST THREE (Siting of manure storage). Multiply the basic distances (col.A) by the storage distance coefficient S to determine acceptable distance (Col.G) and compare with actual distances (Col.H)	
Neighbouring Land Use	Column A Basic Distance	Column B Distance Coef. F	Column C Acceptable Distance	Column D Actual Distance	Column E Col. D Col. C	Column F Minimum Index	Column G Acceptable Distance =Coef. S x Basic Distance	Column H Actual Distance
1. Area zoned or designated residential *	2000' x		=			0.90		
2. Area zoned or designated commercial **	1000' x		=		insert lowest value of items 2, 3, 4, 5 & 6			
3. Area zoned or designated industrial **	1000' x		=					
4. Area zoned or designated recreational **	2000' x		=					
5. Area zoned or designated institutional **	2000' x		=					
6. Non-conforming uses	1000' x		=				0.90	
7. Nearest neighbour's residence	1000' x		=			0.90 **		
8. Next nearest neighbour's residence	1000' x		=			0.90 **		
9. Middle of the road allowance	300' x		=			0.90		
10. Nearest lot line	200' x		=			0.70		
11. Intersection of road allowance and lot line	600' x		=			0.60		
NOTES * Applies to subdivisions, hamlets, towns and cities but does not apply to lots created by consent, unless such lots are located in a hamlet, village, town or city. ** Items 2, 3, 4 and 5 apply to areas zoned commercial, industrial, recreational and institutional or designated for such use in the official plan.					TOTAL * *Total values in Col.E shall equal or exceed 7.40 except where the below mentioned provision is invoked, the values in Column E shall equal or exceed 7.20 or 7.00 as applicable. **If the neighbour's dwelling is an accessory to a similar livestock facility, the indicated value in Column E shall equal or exceed 0.70			

AS A GUIDE FOR USE BY AGRICULTURAL ENGINEERS OF ONTARIO MINISTRY OF AGRICULTURE AND FOOD

I

- USE** - To determine the set-backs and separation distance requirements for existing livestock buildings and manure storage facilities within agricultural areas.
- APPLICATION** - 1. As a guideline for land use planning.
2. As a guideline to determine minimum acceptable separation distances for existing livestock buildings and manure storage facilities for purposes of distance certification under the Ontario Certificate of Compliance program.
- PURPOSE** - To provide a standard for certification of the siting of existing buildings and manure storage facilities, which, with good management of the livestock operation, may be considered as environmentally acceptable to the community in which it is situated, having regard for specified neighbouring land uses.
- METHOD** - Involves assessment of the existing livestock operation, the selection of factors from tables, the performance of test one (calculation of acceptable distances and comparison with actual distances) and, if required, performance of test two (calculation of performance index and total performance, and comparison to minimum accepted values), and performance of test three (siting of manure storage).

II

Assessment of Livestock Operation

1. Types of livestock and housing capacity

2. Calculation of Animal Units (Table 2)

Type of Livestock	Existing Housing Capacity Number Per Year	Animal Units
Total Existing Housing Capacity, Animal Units		

Selection of Factors

1. Factor for total number of animal units (Table 3).....

	B
--	---

2. Factor for type of livestock (Table 1). If there are more than one type of livestock, use average of factors weighted according to animal units.....

	A
--	---

3. Factor for manure system (Table 5).....

	D
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III

Calculation of Distance Coefficient for Livestock Housing

Distance Coef. $F = .70 \times A \times B \times D = .70 \times \text{ } \times \text{ } \times \text{ } =$

	F
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Calculation of Distance Coefficient for Siting of Manure Storage

1. Selection of Factor for manure storage (Table 7).....

	M
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2. Distance Coefficient S.....

	S
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MDS FORMULA THREE (continued)

TEST ONE Calculation of acceptable distance (Col.C) between the subject structure and neighbouring uses, and comparison with actual distances (Col.D). Multiply basic distances (Col.A) times distance coefficient F. (Col.B)					TEST TWO (To be used when application fails to meet all criteria in Test One). 1. To be acceptable, application must meet both of the following (a) each value in Col.E must equal or exceed the value in Col.F, (b) the total values in Col.E must equal or exceed 7.40 except as provided in the footnotes.* 2. Enter a figure not greater than 1.50 in Col.E		TEST THREE (Siting of manure storage). Multiply the basic distances (col.A) by the storage distance coefficient S to determine acceptable distance (Col.G) and compare with actual distances (Col.H)	
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15 hogs (gain 40-200 lb.)	1 animal unit																																																									
1000 broiler chickens or roasters (4-5 lb.)	1 animal unit																																																									
300 turkey broilers (11-12 lb.)	1 animal unit																																																									
150 heavy turkey hens (19-20 lb.)	1 animal unit																																																									
100 heavy turkey toms (30-32 lb.)	1 animal unit																																																									
40 veal calves (gain 20-300 lb.)	1 animal unit																																																									
1000 pullets	1 animal unit																																																									
	<p>Notes:</p> <ol style="list-style-type: none"> 1. <u>Dairy</u> - A dairy farm usually has milking cows, dry cows, heifers and calves. e.g. a herd of 50 milking cows is usually considered 75 animal units. 2. <u>Feeder Hogs</u> - a feeder hog operation will market annually 2 to 3 times (average 2.5 times) the number of feeder hogs housed at one time. 3. <u>Chicken Broilers</u> - usually 4 batches per year. 4. <u>Turkey Broilers</u> - usually 3 batches per year. 5. <u>Heavy Turkeys</u> (confinement) - usually 1 or 2 batches per year. 6. <u>Veal Calves</u> - usually 4 batches per year. 																																																									

Table 3 - Animal Units Factor B

Animal Units	Animal Units Factor B	Animal Units	Animal Units Factor B	Animal Units	Animal Units Factor B	Animal Units	Animal Units Factor B
2	.151	72	.950	320	1.455	1650.....	2.195
3	.238	74	.958	340	1.480	1700.....	2.345
4	.301	76	.965	360	1.505	1750.....	2.364
5	.349	78	.972	380	1.528	1800.....	2.383
6	.399	80	.979	400	1.551	1850.....	2.402
7	.423	82	.986	420	1.573	1900.....	2.420
8	.452	84	.993	440	1.594	1950.....	2.438
9	.477	86	1.000	460	1.614	2000....	2.456
10	.500	88	1.006	480	1.634	2100....	2.491
12	.540	90	1.012	500	1.653	2200.....	2.524
14	.573	92	1.019	520	1.672	2300.....	2.556
16	.602	94	1.025	540	1.690	2400.....	2.588
18	.628	96	1.031	560	1.707	2500.....	2.618
20	.651	98	1.038	580	1.724	2600.....	2.647
22	.671	100	1.044	600	1.741	2700.....	2.676
24	.690	105	1.058	620	1.758	2800.....	2.704
26	.707	110	1.072	640	1.774	2900.....	2.731
28	.724	115	1.086	660	1.789	3000.....	2.758
30	.739	120	1.099	680	1.805	3200.....	2.809
32	.754	125	1.112	700	1.820	3400.....	2.858
34	.767	130	1.125	730	1.842	3600.....	2.905
36	.779	135	1.137	760	1.863	3800.....	2.951
38	.792	140	1.149	800	1.890	4000.....	2.994
40	.803	150	1.172	850	1.924	4200.....	3.036
42	.815	160	1.194	900	1.955	4400.....	3.077
44	.825	170	1.214	950	1.986	4600.....	3.116
46	.836	180	1.234	1000	2.015	4800.....	3.154
48	.846	190	1.254	1050	2.043	5000.....	3.191
50	.856	200	1.272	1100	2.071	5500.....	3.279
52	.866	210	1.290	1150	2.097	6000.....	3.362
54	.875	220	1.307	1200	2.123	6500.....	3.440
56	.884	230	1.324	1250	2.148	7000.....	3.513
58	.893	240	1.340	1300	2.172	7500....	3.583
60	.902	250	1.356	1350	2.195	8000.....	3.650
62	.910	260	1.371	1400	2.218	8500.....	3.714
64	.919	270	1.386	1450	2.241	9000.....	3.775
66	.927	280	1.401	1500	2.262	9500.....	3.833
68	.935	290	1.415	1550	2.284	10000....	3.890
70	.943	300	1.428	1600	2.304		

Table 4. Operations Increase Factor C

Percent Increase	Factor C	Percent Increase	Factor C	Percent Increase	Factor C	Percent Increase	Factor C
0	.55	48.0	.70	111.0	.85	232	1.00
3.1	.56	51.5	.71	116.4	.86	246	1.01
6.1	.57	55.0	.72	122.1	.87	260	1.02
9.2	.58	58.7	.73	128.0	.88	276	1.03
12.3	.59	62.4	.74	134.1	.89	294	1.04
13.4	.60	66.2	.75	140.6	.90	314	1.05
18.5	.61	70.1	.76	147.5	.91	336	1.06
21.6	.62	74.1	.77	154.7	.92	361	1.07
24.8	.63	78.3	.76	162.3	.93	390	1.08
28.0	.64	82.5	.79	170.3	.94	423	1.09
31.2	.55	86.9	.80	179.0	.95	461	1.10
34.5	.66	91.4	.81	188.1	.96	506	1.11
37.8	.67	96.0	.82	197.9	.97	560	1.12
41.1	.68	100.8	.83	208.4	.98	628	1.13
44.5	.69	105.8	.84	220	.99	700	1.14

Over 700% increase 1.14

NEW Operation 1.14

Notes to Table 4.

Note 1 - where there are no livestock or livestock buildings on the farm now, but would be after construction, use factor for "new" livestock enterprise, 1.14.

Note 2 - where the barn is being remodelled or rebuilt (such as after a fire) representing substantial capital investment, but with no increase in A.U. and no change in kind of livestock, use 0.70.

Note 3 - where the barn is being remodelled or rebuilt (such as after a fire) representing substantial capital investment, and with increase in A.U., and with or without change in kind of livestock, increase the factor from table 4 by 0.10, but in no case enter less than 0.70.

Note 4 - whether the additional housing is annexed to or separate from the eking housing, in either case enter the factor for increase from table 4.

Table 5. Type of Manure System and Factor D

Type of Manure System	Examples	Factor D
1. Wet and anaerobic within the barn, (stored wet in the barn more than 14 days).	1. Total Confinement barns for cattle or hogs on slate. 2. Caged laying barn with wet droppings stored under the cages.	0.82
2. Wet or semi-solid, removed from the barn frequently (stored in the barn 14 days or less).	1. Free-stall dairy barn, alleys scraped frequently. 2. Piggeries with deep, narrow gutter system. 3. Caged laying barn with set droppings, mechanical scraper.	0.78
3. Semi-solid, using bedding or air-drying of the manure.	1. Cattle and pigs, partially bedded. 2. Beef cattle and pigs bedded and high density housing. 3. Caged laying barns with air-dried droppings stored under the cages. 4. Mink	0.75
4. Solid or dry-bedded manure system within the barn.	1. Poultry on dry bedding. 2. Cattle or sows, heavily bedded, housed loose in low density, or stabled. 3. Horse and sheep barns.	0.7

Table 6. Encroachment Factor E for Specific Uses Adjacent to Livestock Buildings in an Agricultural Zone

Condition prevailing at time of application Applicant requests:	Encroachment Factor E
1. Permit to build dwelling on lot already severed	0.8
2. Consent to allow severance of lot on which a dwelling will be erected	0.8
3. Permit to build new dwelling on rural parcel of land (over 2 acres)	0.75
4. Permit to build dwelling on adjacent farm (no severance involved)	0.7
5. Permit to replace or relocate dwelling on rural parcel of land (over 2 acres)	0.6
6. Rezoning of land from agricultural to recreational, institutional or residential for orderly enlargement of an urban area	0.75
7. Rezoning of land in pockets such as for estate residential	1.5

Table 7. Type of Manure Storage and Factor N

Type of Manure Storage	Factor M										
Open pile	$0.9F^* + 0.06$										
Covered concrete tank	$0.6F^* + 0.2$										
Anaerobic, open concrete tank or silo	$0.7F^* + 0.3$										
Above grade or partially above grade storage with concrete or clay are side wall and concrete floor - for semi-solid manure	$0.8F^* + 0.25$										
Anaerobic, open earth-sided pit, pond or lagoon	$0.5F^* + 1.0$										
FOR NEW MANURE STORAGE											
* When calculating the acceptable distance, use MDS Formula II											
Values of 'C' in the formula F-ABCD should never be less than following minimums:											
- open concrete tank, silo, or pile	0.8										
- covered concrete tank	0.6										
- open earth-aided pit, pond, or lagoon	1.0										
EVALUATION OF EXISTING MANURE STORAGE											
When determining if an existing manure storage is satisfactory, use MDS III.											
COEFFICIENT S											
F*	.9F*+.06	.6F*+.2	.7F*+.3	.8F*+.23	.5F*+1	F*	.9F*+.06	.6F*+.2	.7F*+.3	.8F*+.25	.5F*+
.02	.078	.212	.314	.266	1.010	1.02	.978	.812	1.014	1.066	1.510
.04	.096	.224	.328	.282	1.020	1.04	.996	.824	1.028	1.082	1.520
.06	.114	.236	.342	.298	1.030	1.06	1.014	.836	1.042	1.098	1.530
.08	.132	.248	.356	.314	1.040	1.08	1.032	.848	1.056	1.114	1.540
.10	.150	.260	.370	.330	1.050	1.10	1.050	.860	1.070	1.130	1.550
.12	.168	.272	.384	.346	1.060	1.12	1.068	.872	1.084	1.146	1.560
.14	.186	.284	.398	.362	1.070	1.14	1.086	.884	1.098	1.162	1.570
.16	.204	.296	.412	.378	1.080	1.16	1.104	.896	1.112	1.176	1.580
.18	.222	.308	.426	.394	1.090	1.18	1.122	.908	1.126	1.194	1.590
.20	.240	.320	.440	.410	1.100	1.20	1.140	.920	1.140	1.210	1.600
.22	.258	.332	.454	.426	1.110	1.22	1.158	.932	1.154	1.226	1.610
.24	.276	.344	.468	.442	1.120	1.24	1.176	.944	1.168	1.242	1.620
.26	.294	.356	.482	.458	1.130	1.26	1.194	.956	1.182	1.258	1.630
.28	.312	.368	.496	.474	1.140	1.28	1.212	.968	1.196	1.274	1.640
.30	.330	.380	.510	.490	1.150	1.30	1.230	.980	1.210	1.290	1.650
.32	.348	.392	.524	.506	1.160	1.32	1.248	.992	1.224	1.306	1.660
.34	.366	.404	.538	.522	1.170	1.34	1.266	1.004	1.238	1.322	1.670
.36	.384	.416	.552	.538	1.180	1.36	1.284	1.016	1.252	1.338	1.680
.38	.402	.428	.566	.554	1.190	1.38	1.302	1.028	1.266	1.354	1.690
.40	.420	.440	.580	.570	1.200	1.40	1.320	1.040	1.280	1.370	1.700
.42	.438	.452	.594	.586	1.210	1.42	1.338	1.052	1.294	1.386	1.710
.44	.456	.464	.608	.602	1.220	1.44	1.356	1.064	1.308	1.402	1.720
.46	.474	.476	.622	.618	1.230	1.46	1.374	1.076	1.322	1.418	1.730
.48	.492	.488	.636	.634	1.240	1.48	1.392	1.088	1.336	1.434	1.740
.50	.510	.500	.650	.650	1.250	1.50	1.410	1.100	1.350	1.450	1.750
.52	.528	.512	.664	.666	1.260	1.52	1.428	1.112	1.364	1.466	1.760
.54	.546	.524	.678	.682	1.270	1.54	1.446	1.124	1.378	1.482	1.770
.56	.564	.536	.692	.698	1.280	1.56	1.464	1.136	1.392	1.498	1.780
.58	.582	.548	.706	.714	1.290	1.58	1.482	1.148	1.406	1.514	1.790
.60	.600	.560	.720	.730	1.300	1.60	1.500	1.160	1.420	1.530	1.800
.62	.618	.572	.734	.746	1.310	1.62	1.518	1.172	1.434	1.546	1.810
.64	.636	.584	.748	.752	1.320	1.64	1.536	1.184	1.448	1.562	1.820
.66	.654	.596	.762	.778	1.330	1.66	1.554	1.196	1.462	1.578	1.830
.68	.672	.608	.776	.794	1.340	1.68	1.572	1.208	1.476	1.594	1.840
.70	.690	.620	.790	.810	1.350	1.70	1.590	1.220	1.490	1.610	1.850
.72	.708	.632	.804	.826	1.360	1.72	1.608	1.232	1.504	1.626	1.860
.74	.726	.644	.818	.842	1.370	1.74	1.626	1.244	1.518	1.642	1.870
.76	.744	.656	.832	.858	1.380	1.76	1.644	1.256	1.532	1.658	1.880
.78	.762	.668	.846	.874	1.390	1.78	1.662	1.268	1.546	1.674	1.890
.80	.780	.680	.860	.890	1.400	1.80	1.680	1.280	1.560	1.690	1.900
.82	.798	.692	.874	.906	1.410	1.85	1.725	1.310	1.595	1.730	1.925
.84	.816	.704	.888	.922	1.420	1.90	1.770	1.340	1.630	1.770	1.950
.86	.834	.716	.902	.938	1.430	1.95	1.815	1.370	1.665	1.810	1.975
.88	.852	.728	.916	.954	1.440	2.00	1.910	1.400	1.700	1.850	2.000
.90	.870	.740	.930	.970	1.430	2.10	1.950	1.460	1.770	1.930	2.025
.92	.888	.752	.944	.986	1.460	2.20	1.990	1.520	1.840	2.010	2.050
.94	.906	.764	.958	1.002	1.470	2.30	2.030	1.580	1.910	2.090	2.075
.96	.924	.776	.972	1.018	1.480	2.40	2.070	1.610	1.980	2.170	2.200
.98	.942	.788	.986	1.034	1.490	2.50	2.110	1.700	2.050	2.250	2.250
1.00	.960	.800	1.000	1.050	1.500						

APPENDIX 11

RELEVANT LEGISLATION

The Ontario Water Resources Act

Provides for the control and protection of quality and quantity of surface and ground waters administered by the Ministry of the Environment.

The Environmental Protection Act

Prohibits the contamination of the natural environment and provides for its preservation and improvement. Administered by the Ministry of the Environment.

The Dead Animals Disposal Act

Provides for the safe and sanitary disposal of dead animals. Administered by the Ministry of Agriculture and Food.

The Planning Act

Provides for orderly planning of the development and use of lands in the province. Administered by the Ministry of Treasury, Economics and Intergovernmental Affairs.

APPENDIX III

AGRICULTURAL OFFICES

County/District	Area Code	Telephone	Address
ALGOMA	705	253-1941	1496 Wellington St. E., Sault Ste. Marie P6A 2R1
BRANT	519	759-4190	207 Greenwich St., Brantford N3S 2X7
BRUCE	519	881-3301	Box 1330, Walkerton N0G 2V0
CARLETON	613	828-9167	26 Thorncliffe Pl., Ottawa K2H 6L2
COCHRANE N.	705	335-5828	Experimental Farm, Kapusasing P5N 2X9
COCHRANE S.	705	273-2509	Box 608, Matheson P0K 1N0
DUFFERIN	519	941-3830	Box 100, Orangeville L9W 2Z5
DUNDAS	613	774-2313	Box 488, Winchester K0C 2K0

DURHAM	416	623-3348	234 King St. E., Bowmanville L1C 1P5
ELGIN	519	631-4700	594 Talbot St., St. Thomas N5P 1C7
ESSEX	519	776-7361	Essex N0R 1E0
FRONTENAC	613	544-1995	Box 651, 1055 Princess St., Kingston K7L 1H3
GLENGARRY	613	525-1046	Box 579, Alexandria K0C 1 A0
GRENVILLE	613	258-3411	Box 2004, Kemptville K0G 1J0
GREY	519	986-2040	181 Toronto St. S., Markdale N0C 1H0
HALDIMAND	416	772-3381	Cayuga N0A 1E0
HALTON	416	878-2314	181 Main St., Milton L9T 1N7
HASTINGS	613	395-3393	Box 340, Stirling K0K 3E0
HURON	519	482-3428	Box 159, Clinton NOM 1 L0
KENORA	807	223-2415	70 Van Horne Ave., Dryden
KENT	519	354-2150	Box 726, 435 Grand Ave. W., Chatham N7M 51-1
LAMBTON	519	882-0180	Box 730, Petrolia N0N 1R0
LANARK	613	267-1063	10 Sunset Blvd., Perth K7H 2Y2
LEEDS	613	342-2124	Box 635, Brockville K6V 5V8
LENNOX & ADD.	613	354-3371	41 Dundas St. W., Napanee K0K 2R0
MANITOULIN	705	282-2043	Box 328, Gore Bay POP 1H0
MIDDLESEX	519	434-6811	195 Dufferin Ave., London N6A 1K7
MUSKOKA & P.S.	705	789-5491	Box 130, Huntsville P0A 1K0
NIAGARA N.	416	562-4142	Vineland Station L0R 2E0
NIAGARA S.	416	732-7552	574 South Pelham St., Welland L3C 3C6
NIPISSING	705	474-3050	222 McIntyre St. W., North Bay P1B 2Y8
NORFOLK	519	426-0680	19 Kent St. S., Simcoe N3Y 4K7
NORTHUMBERLAND	613	475-1630	Box 820, Brighton K0K 1H0
ONTARIO	416	852-3132	Box 309, Uxbridge L0C 1K0
OXFORD	519	537-6621	Box 666, 954 Dundas St. E., Woodstock N4S 7Z5
PEEL	416	451-5474	3 Elizabeth St. S., Brampton L6Y 1P7
PERTH	519	271-0280	Box 398, 478 Huron St., Stratford N5A 6T3
PETERBOROUGH	705	745-2403	55 George St. N., Peterborough K9J 3G2
PRESCOTT	613	673-5115	Box 110, Plantagenet K0B 1 L0
PRINCE EDWARD	613	476-3224	Box 470, Picton K0K 2T0

RAINY RIVER	807	482-2310	Front St., Emo POW 1E0
RENFREW	613	432-4841	315 Raglan St. S., Renfrew K7V 1R6
RUSSELL	613	443-3391	666 Notre Dame Embrun Box 540
SIMCOE N.	705	322-2231	Box 340, Elmvale L0L 1P0
SIMCOE S.	705	435-5521	Box 370, Alliston L0M 1A0
STORMONT	613	933-1581	Box 655, 109-111th St. W., Cornwall K6H 5T3
SUDBURY	705	566-1630	1414 LaSalle Blvd., Sudbury P3A 1Z0
TEMISKAMING	705	647-6701	Box "G", New Liskeard P0J 1 P0
THUNDER BAY	807	475-1631	Ont. Government Building 435 James St. S., Thunder Bay F.
VICTORIA	705	324-6125	322 Kent St. W., Lindsay K9V 2Z9
WATERLOO	519	744-5294	824 King St. W., Kitchener N2G 1G1
WELLINGTON	519	848-2447	Box 370, Arthur N0G 1A0
WENTWORTH	416	527-2995	R.R. 1, Ancaster L9G 3K9
YORK	416	895-4519	Newmarket Plaza, Newmarket L3Y 2N1

***Direct Line from Parliament Bldgs.

APPENDIX IV

REGION 1 - Southwestern

LONDON (681-3600)
985 Adelaide St. South N6E 1 V3

WINDSOR (253-4615)

1922 Wyandotte St. E., N8Y 1 E4

SARNIA (344-7409)

242A Indian Road S. #209 N7T 3W4

OWEN SOUND (371-2901)

1131 Second Ave. E. N4K 4N2

CHATHAM (352-5107)

435 Grand Ave. W. N7L 3Z4

CLINTON (482-3428)

Ministry of Agric. & Food
PO Box 688, M0N 1 L0

REGION 2 - West Central**STONEY CREEK (561-7410)**

140 Centennial Parkway No,
Stoney Creek

CAMBRIDGE (623-2080)

P.O. Box 219,
400 Clyde Road, N1 K 5W6

WELLAND (735-0431)

123 Victoria St. L3B 4L9

REGION 3 - Central**DON MILLS (424-3000)**

150 Ferrand Dr.

MISSISSAUGA (270-1451)

2575 Haines Road L4Y 1Y7

BARRIE (726-1730)

12 Fairview Rd., L4N 4P3

OAKVILLE (822-2566)

125 Cross St.,
Oak Green Mall L6J 2W7

MUSKOKA-HALIBURTON (687-3408)

Gravenhurst Shopping Centre,
RR#1

PETERBOROUGH (745-4601)

139 George St. N. K9J 3G6

REGION 4 - Southeastern Region**KINGSTON (549-4000)**

133 Dalton St., Kingston K7L 4X6

CORNWALL (933-7402)

408 Pitt Street, Box 1479

BELLEVILLE (962-9208)

15 Victoria Avenue

OTTAWA (521-3450)

2378 Holly Lane

PERTH (267-1063)

10 Sunset Blvd., K7H 2Y2

PEMBROKE (732-3646)

Riverside Drive, K8A 6X4

REGION 5 - Northeastern Region**SUDBURY (522-8282)**

469 Bouchard St.,
Regency Mall P3E 2K8

NORTH BAY (476-1001)

1500 Fisher Street,
Northgate Shopping Centre
P1B 2H1

SAULT STE. MARIE (949-4640)

445 Albert St. P6A 1C4

PARRY SOUND (746-2139)

74 Church Street P2S 1Z1

TIMMINS (264-9474)

83 Algonquin Blvd. W. PN4 2R4

REGION 6 - Northwestern Region**THUNDER BAY (623-5591)**

435 James St. S., P7E 6E3

KENORA (468-5578)

203 First Street S., P9N 1C2

APPENDIX V

CONVERSION FACTORS FOR METRIC SYSTEM

Imperial units	Approximate conversion factor		Results in:
LINEAR			
inch	x 25	millimetre	(mm)
foot	x 30	centimetre	(cm)
yard	x 0.9	metre	(m)
mile	x 1.6	kilometre	(km)
AREA			
square inch	x 6.5	square centimetre	(cm ²)
square foot	x 0.09	square metre	(m ²)
acre	x 0.40	hectare	(ha)
VOLUME			
cubic inch	x 16	cubic centimetre	(cm ³)
cubic foot	x 28	cubic decimetre	(dm ³)
cubic yard	x 0.8	cubic metre	(m ³)
fluid ounce	x 28	millilitre	(mL)
pint	x 0.57	litre	(L)
quart	x 1.1	litre	(L)
gallon	x 4.5	litre	(L)
bushel	x 0.36	hectolitre	(hL)
WEIGHT			
ounce	x 28	gram	(g)
pound	x 0.45	kilogram	(kg)
short ton (2000 lb)	x 0.9	tonne	(t)
TEMPERATURE			
degree fahrenheit	°F-32 x 0.56		
	or °F-32 x 5/9	degree Celsius	(°C)
PRESSURE			
pounds per square inch x	x 6.9	kilopascal	(kPa)
POWER			
horsepower*	x 746	watt	(W)
	x 0.75	kilowatt	(kW)
SPEED			
feet per second	x 0.30	metres per second	(m/s)
miles per hour	x 1.6	kilometres per hour	(km/h)
AGRICULTURE			
bushels per acre	x 0.90	hectolitres per hectare	(hL/ha)
gallons per acre	x 11.23	litres per hectare	(L/ha)
quarts per acre	x 2.8	litres per hectare	(L/ha)
pints per acre	x 1.4	litres per hectare	(L/ha)
fluid ounces per acre	x 70	millilitres per hectare	(mL/ha)
tons per acre	x 2.24	tonnes per hectare	(t/ha)
pounds per acre	x 1.12	kilograms per hectare	(kg/ha)
ounces per acre	x 70	grams per hectare	(g/ha)
plants per acre	x 2.47	plants per hectare	(plants/ha)

Examples: 2 miles x 1.6 = 32 km; 15 bu/ac x 0.90 = 13.5 hL/ha