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SUSTAINABILITY OF LAND USE
FOR FUTURE INTENSIVE HOG OPERATIONS
IN THE CENTRAL REGION OF MANITOBA

BY

JEFF H. PRICE

A Thesis
Submitted to the faculty of Graduate Studies
in Partial Fulfilment of the Requirements
for the Degree of

MASTER OF CITY PLANNING

Department of City Planning
University of Manitoba
Winnipeg, Manitoba

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**Sustainability of Land use for Future Intensive Hog Operations
in the Central Region of Manitoba**

BY

Jeff H. Price

**A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University
of Manitoba in partial fulfillment of the requirements of the degree
of
Master of City Planning**

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Abstract

Sustainability of Land Use for Future Intensive Hog Operations in the Central Region of Manitoba examines the three aspects of sustainability, namely environmental, economic, and social, as they relate to land use for the proposed expansion of the hog industry in Manitoba . Proposed growth of the hog industry can conflict with ex-urban residents, therefore land use in the Central Region must be thoroughly reviewed to resolve this potential problem. The literature on the subject is compared to views of rural councils (there are 24 in the Central Region) based on a largely self-administered survey conducted in June and July 1999. Comparison in the literature with views of rural councils in the Central Region will provide insight into how the hog industry might develop in this Region.

Survey results seem to indicate that while rural councils are non-committal in establishing their views on environmental sustainability, they have some difficulty with economic and social aspects. This is somewhat contrary to the literature, which argues for environmental and economic sustainability, but indicates a lack of social sustainability research.

Conclusions state that environmental sustainability is possible with adequate legislative enforcement, but that time must be spent in ongoing evaluation of social and economic issues particular to the Central Region as the proposed expansion of the hog industry takes place. The findings in this thesis could be of interest to local and provincial governments, and will hopefully lead to further research into the social and economic issues that are important to the Central Region.

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CHAPTER ONE

Introduction

1.0 Purpose of the Thesis– The purpose of this thesis is to establish the land use sustainability of the intensive hog farming industry in the Central Region of Manitoba. An examination of the literature on hog farming sustainability in an environmental, economic, and social sense is combined with a hog operations survey of local government in the region. As local government in Manitoba makes land use decisions, their view of sustainability is highly relevant in determining how or if the hog industry will progress. Recommendations for implementation strategies for the hog industry in the region are proposed. Conclusions are then drawn as to the sustainability of Land Use for future Hog Operations in the Region

1.1 Intensive Hog Operations Within Sustainable Agriculture

There are many changes occurring in society today, such as technological advances, demographic shifts (rural to urban among others), and more competitive business practices, all of which are having a profound effect on agriculture. Many, even most, of the Municipalities in the Central Region rely heavily on agriculture as an important factor in the future, and have begun to feel the impact these changes are having. It is no longer sustainable for the farmer to harvest a single crop, feed some to his few animals, and bring the rest to market. Hog operations have, to an extent, come about as farmers react to the need to diversify a business that has been forced to become far more efficient than it has ever been before. The changes mentioned above will force farmers and rural

elected officials to rethink how agricultural practices fit into a sustainable future not just for the benefit of agriculture itself, but also for the benefit of a rural way of life.

Sustainable agriculture then does not mean agriculture 'without change'. Rather, it means adapting to, and perhaps even predicting upcoming change, and reacting accordingly. This philosophy of adaptation is reflected somewhat in the Manitoba Agriculture definition that follows.

A number of definitions of sustainability were encountered in the literature, however this definition best applied to agriculture, and is perhaps most instructive to examine. The provincial government view is very important, as it is this level of government that is responsible for the regulatory conditions to encourage sustainability in this province.

Sustainable Agriculture refers to farming practices that meet three essential needs of society: 1) creation of a healthy environment, 2) production of an ever-increasing food supply, and 3) an economically viable farming industry. (Manitoba Agriculture, undated)

Although the term 'ever-increasing' does not necessarily equate to sustainability, and healthy environments are not so much created as facilitated, this is hopefully only a problem of semantics. In any event, the shortcomings of this definition will not be further considered, since more importantly the definition does demonstrate that agriculture is very much at the core of the sustainable development strategy developed by the province. The relationship of the three aspects of sustainability to sustainable development is portrayed in figure 1.1:

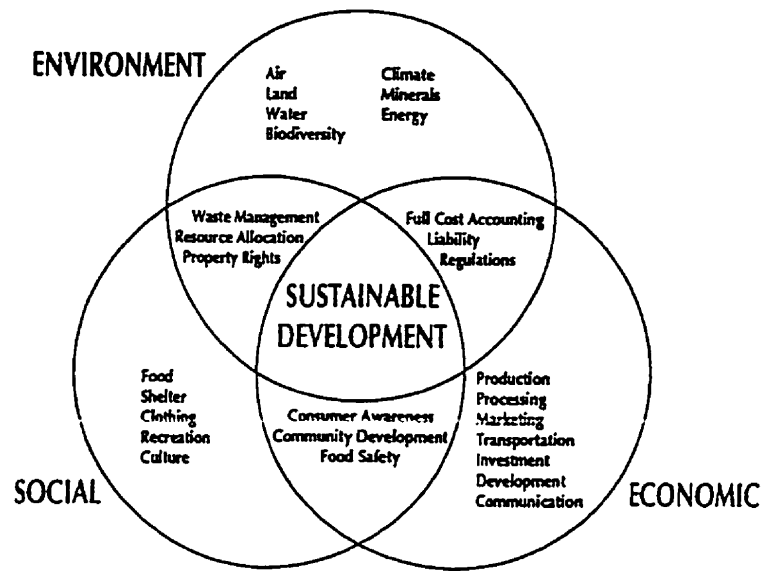


Figure 1.1 Overlapping Aspects of Sustainability (Manitoba Agriculture, undated)

Defining a sustainable strategy for agriculture therefore has direct implications for the hog industry. Raising of hogs takes place on agricultural land, they consume agricultural products, their waste is spread on agricultural land, and agricultural practices are utilized. Defining a sustainable strategy for agriculture therefore has direct implications for the hog industry.

1.2 Intensification and Impacts

Hog farming is of course not new in Manitoba. What is new is the significant reduction in the number of family farming operations in favour of more intensive production of hogs in confinement. For example in Alberta, hog farms have been reduced from 26,000 in 1971 to 3,000 today (Serecon, June 1998, p.1). For Canada as a whole, hog farms have decreased in number from 36,472 in 1986 to 21,105 in 1996 while the number of animals per farm increased from 268 per farm to 523 in the same period (Chenard et al,

April 1998, p.1). There are a number of reasons why such intensification has taken place in Canada, not the least of which is the elimination, in 1995, of the Western Grain Transportation Act (also known as the Crow subsidy) by the Federal Government. The removal of this subsidy has made shipment of grain less economically viable. The cost to ship grain from this province has increased by a factor of over 250% as a result of the elimination of the Crow subsidy (Martin et al, 1998, p. 11). Trade agreements entered into by Canada, such as the North American Free Trade Agreement (NAFTA) and General Agreement on Tariffs and Trade (GATT) have very much reduced the government's ability to continue these subsidies without fear of trade reprisals, thereby encouraging local use of the grain as feed for livestock. These same trade agreements have, on the other hand, opened up markets for Canadian Pork, especially in the U.S. and Far East. Other factors include dramatic advances in technology in the field of Confined Animal Feeding Operations (CAFO). The shift in scale of operations, coupled with a marked increase in ex-urban development (this is particularly true in rural areas surrounding Winnipeg) has given rise to new land use and environmental conflicts. High-density hog farms create the potential of concentrated, point sources of soil, water, and air pollution. Coupled with the move of city dwellers to the country, the impact of hog farming is being felt like never before.

The Industry - Briefly, the hog industry comprises two primary elements, these are:

- Production, and
- Processing.

Production is the raising, feeding, waste-disposal, and delivery to a processing facility of hogs. Processing is the slaughter, packaging, and delivery of hogs to a market. In

recent years, the hog production industry has undergone significant change, in that family operated farms with a few animals have made way for much larger and intensive facilities, with thousands of animals. Similar increases in scale have occurred in hog processing, where there has been a trend towards plants capable of processing many millions of animals in a year. The move to more value driven approaches in production and processing will have significant impact on both the industry and the rural and urban fringe landscape.

Area of study - The Central Region comprises 24 Rural Municipalities (RMs) over a roughly 19,000 square kilometre area, southwest of Winnipeg (See figure 1.2).

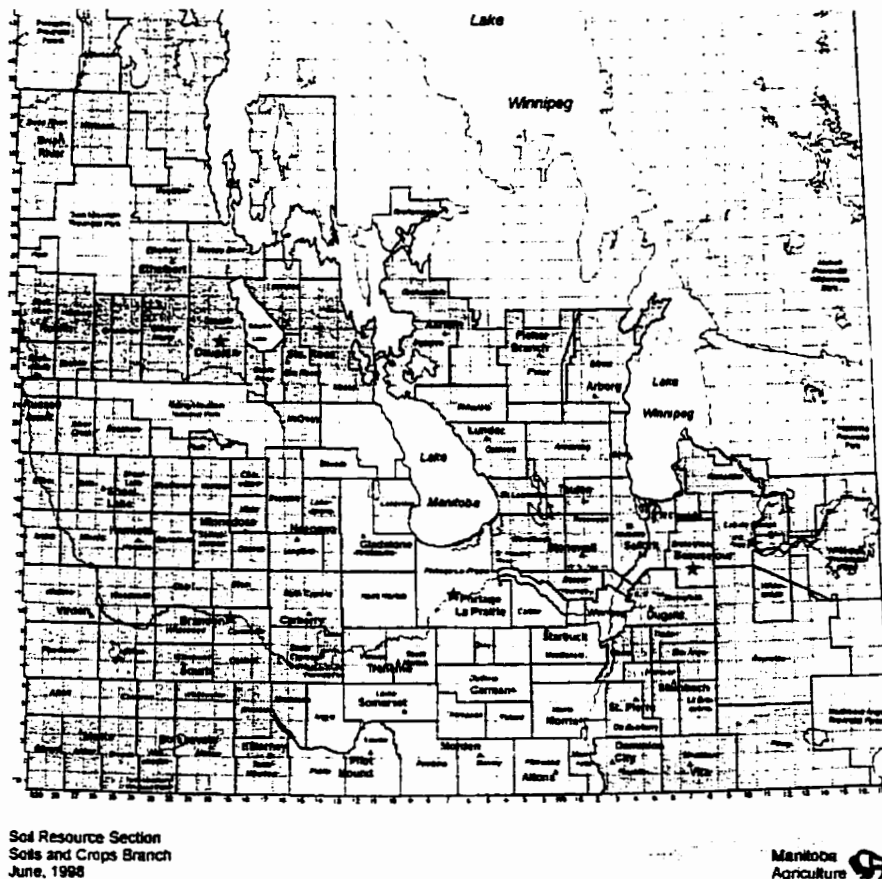


Figure 1.2 The Central Agricultural Region – outlined (Manitoba Rural Development, 1997)

The Central Region is one of the four agricultural regions in the province, and was chosen as being representative due to the degree of existing intensive hog operations, as well as there being a likelihood for expansion of the industry in the area. This Region is generally typical of the southern portion of the province in geography, settlement patterns, soil conditions, climate, and availability of water.

CHAPTER TWO

Research Objectives

2.0 Introduction to Research Objectives

Before beginning a literature review, a survey, or any other investigation into the subject of sustainability of land use for future intensive hog operations in the Central Region of Manitoba, the objectives of the research must be clearly understood. An understanding of the range of problems in hog operations reveals many areas that can be studied, while caveats to research indicate areas that will not be studied. The research question to be addressed in the thesis dictated what kind of research was undertaken, having taken problems and caveats into account. This chapter identifies the problems faced by the hog industry, caveats to research that ensure a manageable subject area, leading to the research question, which is the basis for inquiry in this thesis.

2.1 Problems

The hog production industry in Manitoba is expected to increase from current numbers of approximately four million animals to eight or nine million in the next five to seven years. Agriculture Manitoba estimates suggest that as a result of this expansion of hog production, most or even all Rural Municipalities with sufficient arable land will face requests for hog barn development (McGill, 1999, p. 2). The projected growth in the provinces' hog industry represents both the challenge and the necessity of taking action to ensure this growth is achieved in a sustainable manner. Although local councils in the Central Region arguably are not equipped to deal effectively with the increase in applications for hog barn development,

they nevertheless represent the approval authority for these developments and therefore are very important to the future of the hog industry. A study of the relation between local councils, the hog production industry, in a context of sustainability would be valuable in determining how the hog industry might develop in the next few years.

The central problem of this thesis then is to determine the view of local municipal councils in the Central Region regarding hog operations, and ascertain how that view compares with the literature on the sustainability of hog operations. Sub problems linked to this involve the three aspects of sustainability. These aspects are:

- Environmental – how hog operations impact on the land, water, and air.
- Social – how hog operations impact neighbours, and
- Economic – how hog operations impact local and regional economic development.

Current Provincial Government policy supports the economics of the industry, however less well understood are the environmental, and particularly social impacts, and how local governments (the land use decision makers) will ensure responsible land use.

2.2 Caveats

Although the two elements of the hog industry, namely production and processing, are inextricably linked, the sustainability issues they raise are sufficiently different to warrant individual study. In addition, the land use issues surrounding hog production are arguably more compelling, and far reaching for the land use planner than those issues pertaining to processing. For these reasons the production function in the hog industry will be examined in this thesis, with the sustainability of processing recommended as a subject for further study.

Also, the thesis will not focus on the entire province, however the Rural Municipalities of the Central Region can be considered as representative of the hog industry for reasons previously discussed. This also simplifies the conduct of a survey and compilation/analysis of survey data. Inevitably, the value of statistical data is reduced with this small sample size, therefore a more complete sampling of the entire province is also recommended for further study.

As this thesis is intended to address future sustainability issues, the survey outlined for Chapter 6 will not involve current or established producers. It is not the objective of this thesis to attempt to change what has already happened (i.e. many hog barns are currently in operation), but to assess the sustainability of the industry prior to the anticipated increase in hog population. Finally, the survey is proposed for only local governments, as it is level of government that will ultimately decide whether hog farming is sustainable or not by approving or rejecting applications for hog barn development. While the provincial officials obviously have a stake in this matter, they are not included in the survey since for the most part land use decisions are not made at provincial level.

2.3 Research Question

A thorough knowledge of the considered and rational thought provided on the subject by environmentalists, social scientists, and economists is very important in comprehending the issue of growth in the hog industry. Sustainability of land use will not be measured by the mass of literature on the subject however, but by the decisions and actions of people. Specifically, decisions and subsequent action in the Central Region of Manitoba will be taken by rural councils as a result of applications for hog farm development. In

determining the sustainability of hog operations in the Central Region of Manitoba, it becomes necessary to relate academic thought to the will of elected officials on rural councils in the Region. The research question following from this relationship is:

"How does local government in the Central Agricultural Region of Manitoba view the sustainability of land use for hog barn development, and how does this view compare with findings in the literature."

Related but secondary areas of inquiry, such as the potential for G.I.S. to inform siting decisions, may be discussed, however the above question will remain the primary focus of this work.

CHAPTER THREE

The Hog Production Industry in Manitoba

3.0 An overview for Manitoba and the Central Region

This chapter begins by relating the context within which the hog industry exists. Basics of the nutrient cycle are then discussed, given that manure has been called a valuable potential resource opportunity, as opposed to a liability that requires disposal. Stakeholders in this issue are then generally examined, with their direct or indirect environmental, economic, and social concerns considered. Discussion of current government direction, and existing legislation in this province is followed by a examination of particular resource conditions in the Central Region.

3.1 Context for Industry Growth

A number of contextual issues exist. Critically important is the fact that the hog population in the province is expected to grow by over 200% from roughly four million to nine million animals by the year 2005. Although the land base to support this increase is reported to exist (McGill, 1999, p. 3), the potential for environmental and social impact remains high. The issue of water availability may also present problems to the industry over the next few years.

The general public perception of hog farms is poor, due to three important factors:

- Odour problems,
- Concern about environmental degradation, and
- Lack of knowledge of the hog industry.

Rapid growth in hog production operations may well worsen public perception unless effective mitigating action is taken. The situation is complicated by the increase in residential (ex-urban) development in many rural areas of the province. These more recent rural residents do not mix well with hog farms and their by-products.

Farm Practice Guidelines for Hog Producers in Manitoba, written by the Provincial Department of Agriculture, establish for proponents and local government, the characteristics of a 'normal' hog operation. Provincial regulators consult these guidelines to determine environmental and nuisance compliance standards for new and existing hog barns.

The Association of Manitoba Municipalities, urged in its 1998 annual report that more municipalities enact:

"...planning policies and zoning by-laws to ensure that proper procedures are used when approving or rejecting operations." (AMM, 1998, p.12)

Department of Rural Development Manitoba estimates¹ indicate that almost one half of the Manitoba's 117 RMs, and two local government districts, do not have planning guidelines that would permit them to adequately assess an application for a Confined Animal Feeding Operation (CAFO). The survey portion of this thesis identifies those RMs in the Central Region that have adopted guidelines, or specific by-laws, and to what extent guidelines or by-laws are both relevant and understood.

3.2 Stakeholders

Land Use Planning can be defined as an attempt at resolution of land use conflicts in a multi-stakeholder environment. Stakeholders are individuals or groups with a direct or

¹ Conversation with Ed Sawatzky, Manitoba Rural Development, Nov 98

indirect interest in any or all of the economic, social, and environmental impacts of the hog production industry. As there are many industry impacts, likewise there are many stakeholders. Without meaning to ignore potential groups or individuals, the principal stakeholders, namely producers, government, processors, and the community, are described in further detail as follows:

I) Hog Producers - Hog producers must be included, as all three aspects of sustainability directly effect them, although economics is seen as foremost, as this is their source of income. To argue that the social and environmental aspects are not important to producers, would not necessarily be a reasonable position. As producers often live in proximity to the hog barns, any deleterious environmental effects would probably impact them equally or even more than their neighbours. Also, as members of the community they are not likely to upset or provoke other members of their community unnecessarily. Difficulties may arise, however, when hog barns are operated by large corporations, as is the case in many U.S. states. These corporations have been accused of being more interested in profit than in environmental preservation and social responsibility (Henderson, 1998, p.6). Large-scale corporate operation of hog barns has not yet occurred to a great extent here in Manitoba, but this phenomenon should be closely monitored.

II) Government - Both local and provincial governments are stakeholders, in that local government approves the land use for hog barns, and provincial government enables and enforces the environmental and agricultural statutes that regulate the industry. Some problems with this dual responsibility will be discussed later.

III) Processors - Hog processors are also stakeholders, particularly in an economic sense, since they require the product that the hog industry produces. This requirement for product is important in all agricultural regions of Manitoba in light of the recently completed Maple Leaf Hog Processing Plant in Brandon. An increase in provincial hog production has de facto been made necessary in order that the large capacity of this plant be fully utilized. The economic imperative of achieving the plant's full potential will play an important role in the proposed growth of the hog production industry in this province.

IV) The Community - The final group of stakeholders to be considered here, are citizens at large, particularly those who live in relatively close proximity to a hog operation. Many citizens can be impacted by the economics of hog production, if for example taxes are lowered by a successful, tax contributing industry. However, those who live close to a hog barn are clearly most impacted in a social and environmental sense. These 'neighbours' are impacted in an economic respect quite differently than those who profit from the industry, but do not live near it. The perceived risk of reduced property values is probably of most concern for neighbours of hog operations. Environmental, economic, and socio-political concerns of the general community with regard to large livestock barns have been identified, and are shown in figure 3.1 (Caldwell, 1999). An increase in the number of hog barns, coupled with continued ex-urban growth, will increase the number of these 'affected' neighbours, thereby accentuating the sensitive nature of this issue.

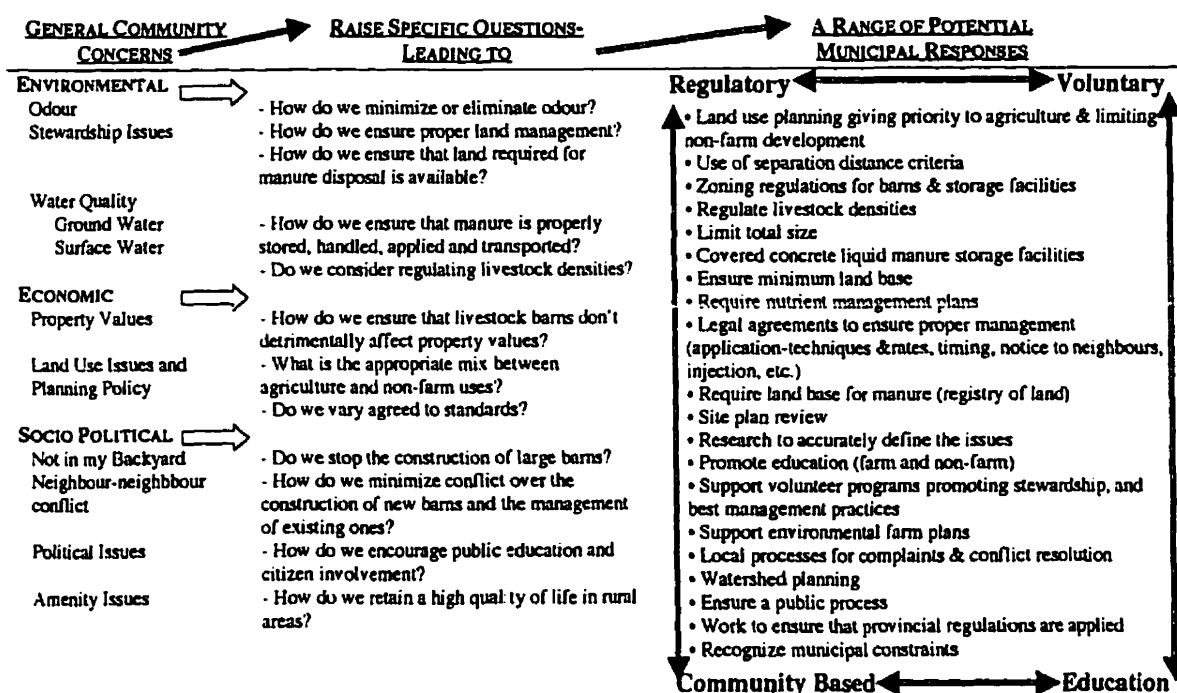


Figure 3.1 Large Livestock Barns, Community Issues and Municipal Response (Caldwell, 1999, p.4).

3.3 Trends and Current Government Direction

There are at least six important trends that are adding to the land use controversy surrounding hog production in Manitoba. These are:

- Provincial Government desire that the industry grow,
- Relative inexperience of many local councils in dealing with this industry,
- Increase in ex-urban growth,
- Intensification of hog production,
- Favourable market conditions,
- Improved technology in farming.

The provincial government has made it clear that it expects the hog industry to play a major role in the economic development of Manitoba. The elimination of the grain transportation subsidy, a general decline in the agricultural sector due to low commodity prices, and the need to create jobs in rural areas has likely given rise to this provincial outlook.

With the approval of what ultimately will be a three million hogs per year processing plant in Brandon, the province has positioned itself for parallel gains in the production of hogs. For this reason the influence of the province will be felt by rural municipalities as they weigh the pros and cons of land use for hog barns.

While it is difficult to deny the agricultural sector the chance to exploit this growth opportunity, there are two factors at the local level that may give pause to unfettered expansion.

- Inexperience of many rural councils in dealing with highly contentious and emotional issues, and the mechanics of this technologically advanced agricultural process.
- Increase in ex-urban residential development. While this is particularly true in the Capital Region surrounding Winnipeg, it is also the case in many urbanized areas in the rural municipalities of the Central Agricultural Region.

While these two factors are not directly related, each increases the pressure on local government to make the 'right' decision, although what council considers to be the 'right' decision is rarely the 'best' decision for all concerned. This polarized concept of a right and a wrong decision, or a best and a worst outcome, is what makes this, as with most emotional debates, a difficult issue for local government.

As with many facets of modern life, technology has had a profound effect on agriculture, and particularly hog farming. Technological development in hog operations has led to a phenomenon known as intensification, which allows a greater number of hogs to be raised in a smaller area, with less workers, than was previously possible. While reducing costs to raise hogs (impacting the economic sustainability of hog farming), environmental and social factors have become increasingly of concern. Instead of a dispersed, 'free range' type of operation, hogs are increasingly being raised in climate controlled barns. The result is a far more concentrated, or point source of environmental (from manure) and social (from odour and associated vehicle traffic) pollution.

Similar to other resource-based industries, the hog market is subject to the cyclical gains and losses of the national and even global economy. Following a dramatic downturn in the global demand (especially the Asian market), the prospects for Manitoba pork have risen considerably, and are expected to remain good for years to come. Although the economics of the industry is considered in more detail in Chapter 3, it is sufficient at this point to note the high current and projected demand for Manitoba pork will ensure that any land use pressures exerted by hog operations will continue for the foreseeable future.

3.4 Soil and Water Requirements

Appropriate cropland, both for spreading manure fertilizer and possibly for containing manure in earthen storage, is essential for the efficient operation of a hog farm. In addition, an adequate supply of clean, affordable water is required for drinking and maintenance purposes. These are the two primary land requirements for siting a hog operation. Impact (especially environmental) of hog production on land and water

resources is discussed in detail in Chapter 4. The availability of land having adequate soil types, and the availability of water of sufficient quantity, quality, and cost efficiency to support a hog operation, will be addressed next.

3.4.1 Soil Structure of the Central Agricultural Region

There are two important requirements of the soil to support an intensive hog operation, those being suitability for spreading, and storage of manure. Most important of these is the need for cropland to support the application of manure. This requirement is tied to water supply, as the soil must be able to take up the nutrients in manure, without those nutrients leaching into groundwater. In addition to the land being arable, the topsoil must be sufficiently separated from the water table (usually by distance, but also by soil type) such that the threat of contamination is minimized. Types of soil generally found on the Manitoba prairie ranges from sand deposits to loams to hard pack clay, and various combinations in between as shown in figure 3.2. Sandy soils provide the easiest path for surface water to enter the groundwater (mainly through the infiltration of runoff), while clays provide the most difficult path. A good location for application of manure would then combine the necessity of arable land, with a groundwater table relatively inaccessible to manure nutrients. As can be seen from the from the soil landscape map for Manitoba (Figure 3.2) referred to previously, the Central Agricultural Region on the whole contains a good base of arable land, composed largely of clay and clay/loam soils with a generally deep water table. The Central Region is outlined and soil types are indicated on the attached legend.

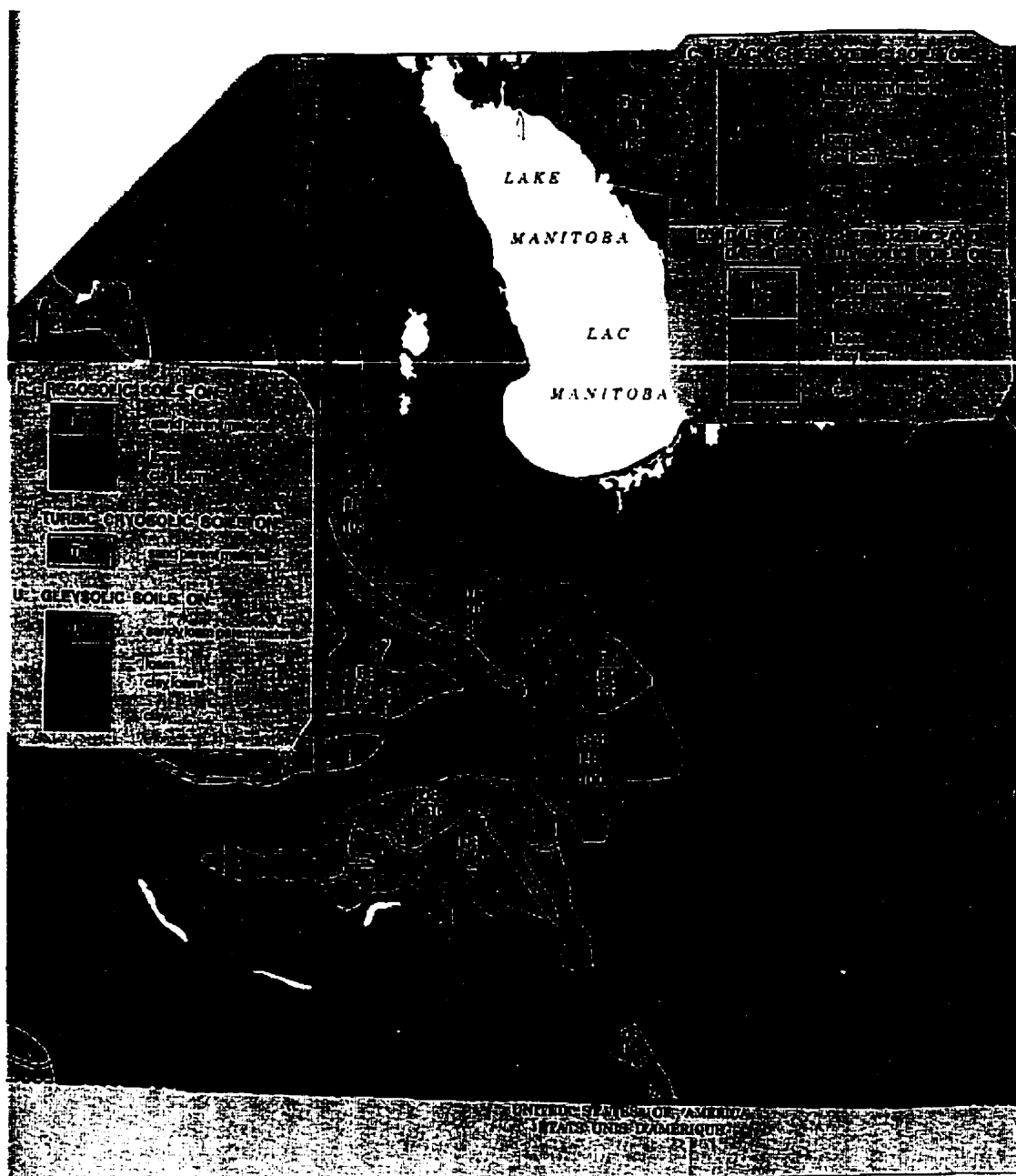
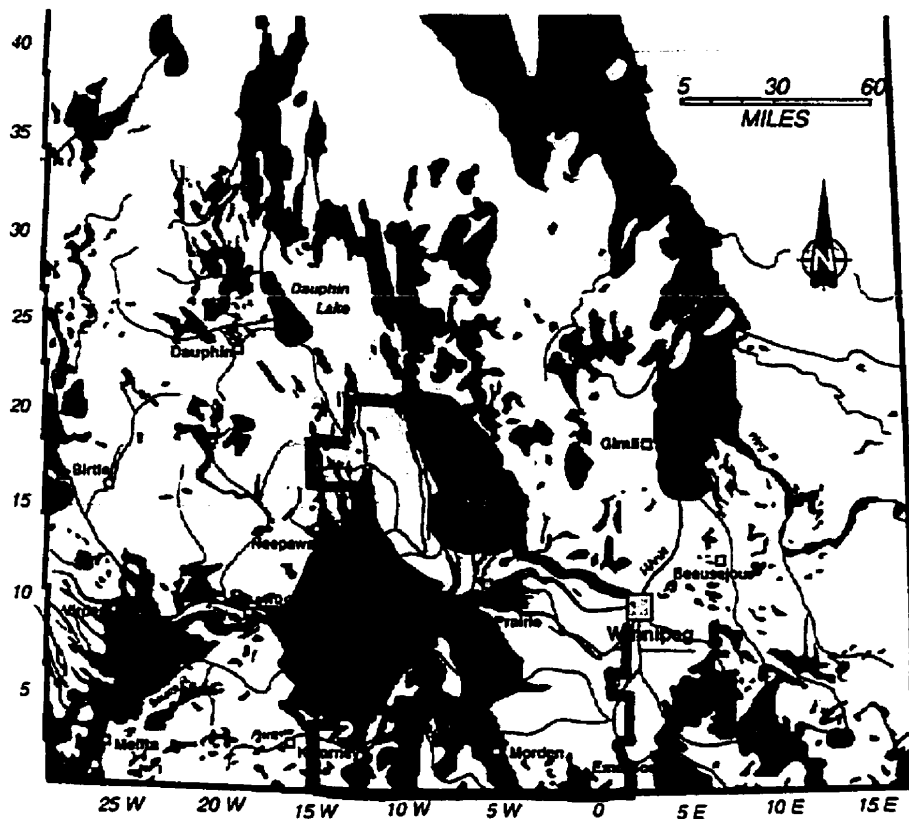


Figure 3.2 Soil Structure of the Central Agricultural Region (Canada Soil Inventory, 1989)

There are areas however in the western portion of the Central Region (outlined) where groundwater is susceptible to contamination due to the presence of covering soils of high permeability as indicated by dark area in figure 3.3:



Groundwater areas susceptible to pollution

Figure 3.3 Groundwater Areas Susceptible to Pollution (Manitoba Natural Resources, 1999)

In cases where a threat of contamination exists a number of mitigating measures are necessary:

- For manure application, detailed soil sampling for all operations over 400 A.U. is soon to be required by the Provincial Environment Ministry in a Manure Management Plan. This sampling is intended to ensure that there is no build-up of nutrients

resulting from over-application of manure. The Manure Management Plan will be related further in Chapter 5.

- In areas susceptible to groundwater contamination, manure storage must be designed to avoid seepage of nutrients into the groundwater. It may even be preferable to construct an above ground storage structure, such as a glass lined, steel tank.

This regional analysis is cursory and general in nature, therefore can not be applied to any specific location. Soil composition and water table information for a specific site would need to be gathered to confirm the general observations made above for the Central Region. The regional analysis confirms that there are many areas in the Central Region that have land characteristics suitable for hog operations.

3.4.2 Water Availability in the Central Agricultural Region

The farm Practices Guidelines for Hog Producers in Manitoba indicate that any withdrawal of ground or surface water exceeding 25,000 litres per day for other than domestic use requires a water rights license (Water Rights Act, 1996). Current Water Branch information shows that few hog operations have surpassed this limit to date² therefore it appears that hog barns are not large water users insofar as the Water Branch is concerned. There are two factors however, that should be further investigated to ensure future water availability:

- The impact of hundreds of future operations on water availability,
- The impact of the extremely large barns, while currently more common in the U.S., may appear in Canada, and more specifically the Central Region.

² Conversation with Sherry Romano, Manitoba Natural Resources, May 99

Although fairly detailed ground and surface water maps for Manitoba are available, they are of such large scale that feasibility of a particular location is not generally possible. In most, or even all cases, application for development must be accompanied by a water availability study to confirm an adequate supply. This could include test drilling for water wells. Generally there are two sources of water available to a hog operation, both governed by the Water Rights Act: surface water and groundwater. Surface water is not a major contributor to the supply for agriculture (including hog farming) as indicated in the Water Use and Allocation Review done by Manitoba Natural Resources:

"On average, Manitoba has an abundant supply of water. The province is located at the downstream end of large river systems which drain the area between the Alberta-British Columbia boundary and Lake Superior. However, less than 5% of the water draining into Manitoba passes through agro Manitoba where most of the demand is." (Manitoba Natural Resources, 1999, p.2)

The major source of surface water for the Central Region is the Assiniboine River, and water use on this river has largely been allocated (Manitoba Natural Resources, 1999).

Groundwater therefore supplies the bulk of the requirement for potential hog barn development. Again as indicated in the Water Use and Allocation Review:

"Much of southern Manitoba is underlain by large quantities of groundwater. These aquifers range in size from sand and gravel deposits of a few acres up to the 30,000 square mile Carbonate Aquifer which underlies much of south central Manitoba." (Manitoba Natural Resources, 1999).

The Carbonate Aquifer is very significant for the Central Agricultural Region, as it lies beneath much of the region. As is shown on the Water Resources Bedrock and Sand and Gravel aquifer Maps (See figure 3.4), a portion of the Central Region immediately south and west of Winnipeg consists of highly saline groundwater. Although in many cases this water is not suitable for consumption, it can be considered for some livestock

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CHAPTER FOUR

Previous Research on Sustainability of Hog Operations

4.0 Introduction to Sustainability

This chapter focuses on the issue of sustainability as related in previous research. Sections 4.1, 4.2, and 4.3 discuss the three aspects of sustainability (environmental, economic, and social) as presented in the literature, particularly as they may pertain to the Central Region. A synopsis of a poll of rural Canadian residents regarding hog operations is included, as the views expressed could be indicative of sentiments in this region. The next to last section deals with Geographic information Systems (G.I.S.) as a tool for siting hog operations. The increasing complexity involved in siting of intensive hog operations has made the data organizing capability of G.I.S. an indispensable tool.

4.1 Environmental Sustainability

There is no question that the hog industry evokes disturbing environmental images for many people.

During the 1980's the public was bombarded with pictures of dark clouds of soil blowing in hot dry winds, of lakes polluted and too foul for use, leaving an image of an [the hog] industry running into the ground. (Dickson, 1996, p.34)

Preserving the environment for future generations requires that the potential for environmental damage due to hog operations be taken seriously. For ease of examination, the environmental impact of hogs has been divided into three components, these are soil, water (both surface and groundwater), and air.

As hog manure, and its management, has been identified as the primary source of concern, the constituents of manure and their potentially deleterious impacts if improperly managed will be focussed on. A detailed scientific account of the chemical and bio-chemical reactions that take place when hog manure is introduced into the environment is not central to the topic of this thesis. Therefore, only a general overview of the processes that occur will be discussed, insofar as the processes are relevant to the subject at hand.

4.1.1 The Nutrient Cycle

Key to understanding how intensive hog farming can become a more sustainable activity is to understand the nutrient cycle or process. Important to this cycle is the concept of manure as a valuable nutrient. This was outlined by Dr. David Burton, who stated that of 16 million tonnes of livestock manure produced in Manitoba in 1995, 130 million kg of nitrogen, 20 million kg of Phosphorus, and 45 million kg of Potassium with a total estimated value of \$130 million as fertilizer is produced (Dickson, 1996, p.22). The nutrient process can be described by beginning at any point, but for the purposes of this research we will begin with the crops in the field, as shown in figure 4.1:

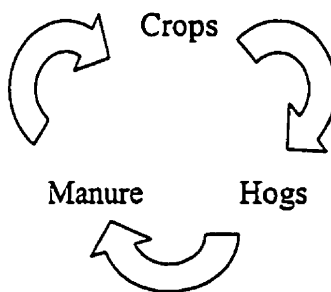


Figure 4.1 The Nutrient Cycle

Field crops are grown and fed to hogs, which in turn produce manure, which is then applied to fertilize the following years crops. This cycle is repeated each year, with hog operators monitoring the levels of the various nutrients in the soil where spreading has occurred on a schedule recently mandated by provincial legislation for large (greater than 400 A.U.³ operations). In addition, valuable organic materials in the manure, not found in artificial fertilizers, serve to bind the soil, hold moisture, and thereby reduce erosion. Although manure contains valuable soil nutrients (particularly nitrogen and phosphorus), if applied excessively, there is a risk of soil and water pollution. In other words, the old adage 'too much of a good thing' can apply to indiscriminate application of manure. There is a discrete utilization rate for nutrients by various crops, and this rate must be closely adhered to, or there is a risk of a build-up to toxic levels, or leaching to groundwater. Nitrogen is more mobile in soil and water than is phosphorus, and poses a serious health problem in public water supplies and the food chain. Nitrogen or nitrates, which in reasonable quantities are highly bio-available to crops, will, in excessive amounts, leach beyond the root zone of the crop, and into underlying groundwater or aquifers. Without getting into the medical conditions that can result from nitrate contaminated water, suffice to say that it can pose a serious health problem. In addition, bacteria such as coliforms can be similarly detrimental to water quality. Of the seven types of surface water pollution described by Marsh, two can be related to intensive livestock farming, those being oxygen-demanding wastes and plant nutrients (Marsh, 1997, p.136). Accelerated growth of aquatic plants, as a result of nutrient availability (nitrogen and phosphorus), leads to increased Biochemical Oxygen Demand

³ One animal unit (A.U.) is that number of animals required to produce 73 Kg of Nitrogen annually

(B.O.D.) which further reduces the quality of the aquatic animal environment. One of the end results of this degradation is eutrophication, or the choking off of the surface water body by organic matter.

The final threat to the environment, considered here, is odour. Curiously, this is the least hazardous aspect of hog farming (as far as actual health concerns are involved) and yet it draws the most attention in terms of public perception. The stress created by odour perceptions might be seen as more injurious than any real health impacts (Barrington, 1996, p.149). The subject of odour is not specifically reviewed by Marsh, but his assessment of the prime tool of land use planning in avoiding groundwater pollution applies equally to odour problems in hog farming operations:

“the first line of defence in groundwater [odour] protection is judicious site selection for land uses with high impact potentiality”. (Marsh, 1997, p.128)

In the case of odour abatement, site selection involves separation of hog farms from non-compatible uses by the greatest possible distance.

4.1.2 Hogs and their impact on Soil

Manure is the by-product of digestion in hogs and other livestock animals. It is of course the biological outcome of food intake for all living things, but with hogs it has acquired a unique stigma. As was briefly described in Chapter 1, hogs, crops, manure, and soil, form a nutrient cycle. The manure in this cycle contains nitrogen, phosphorus and pathogens (such as E. Coli). These elements are considered separately as follows:

Pathogens – Pathogens have the potential to cause serious illness in humans and other animals, and/or contamination of surface and groundwater if manure is not properly disposed of. With appropriate application of manure to farmland however, pathogens are

destroyed by natural action. Pathogens can have harmful effects in soil, particularly where they are taken up through plant roots, and introduced into the food chain. The impact of this uptake, however is not as serious a problem as pathogen loading of water bodies, as will be discussed later.

Phosphorus –Phosphorus is a critical element to the growth of crops. In manure it is found mostly in organic form (i.e. associated with carbon), but also in inorganic form. It is the inorganic form that is immediately required by the plant, while organic phosphorus is mineralized over time to the inorganic form by soil bacteria. Manure is sometimes referred to as an ‘imperfect fertilizer’, meaning that the ratio of Nitrogen to Phosphorus present in manure is not as it is required for uptake by the plant (Bailey et al, 1998, p.24). When manure is applied to fields to meet nitrogen requirements, an excess of phosphorus usually results. This is not normally problematic in the Central Region for two important reasons:

- The soil in this area is normally deficient in phosphorus, and
- Inorganic phosphorus attaches to soil particles, and is largely immobile. This trait is accentuated by the calcareous (alkaline) nature of the region’s soils (After Bailey et al, 1998, p.22).

Phosphorus can become a problem in conditions of soil erosion. This situation leads to the possibility of phosphorus migrating to bodies of water, resulting in conditions that will be discussed in the next section. This is not to say that phosphorus in excess quantities might not present problems. In fact Manure Management Plans discussed in the next chapter have been developed to mitigate the possibility of over-application of manure nutrient.

Nitrogen – Along with phosphorus, nitrogen is also a significant component of hog manure, and a vital plant nutrient. The difference between the two elements lies in the reactivity of nitrogen once it has been introduced into the soil. The nitrogen process is best demonstrated in figure 4.2.

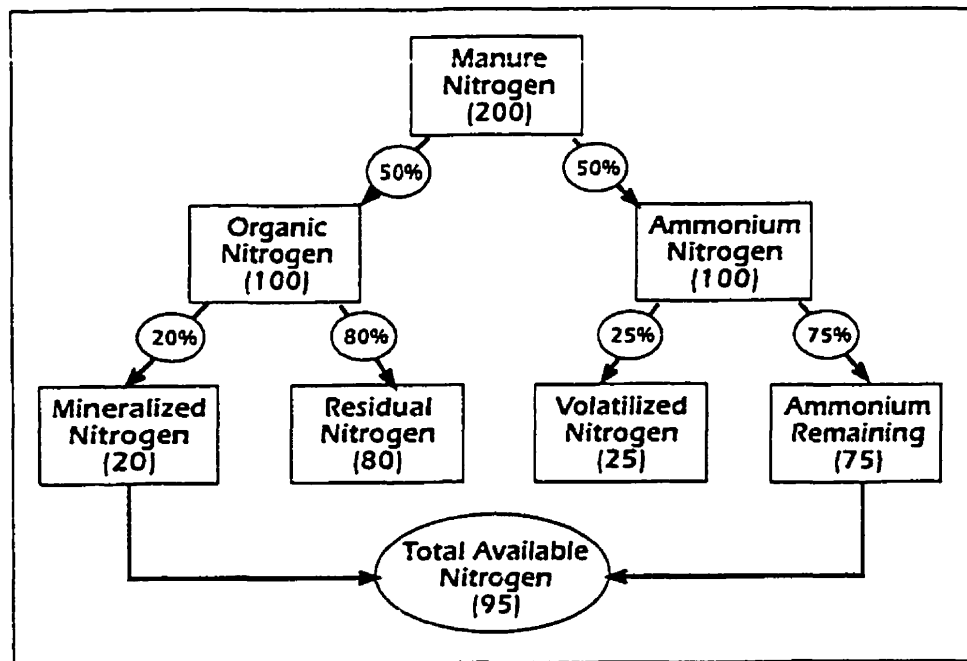


Figure 4.2 The Nitrogen Process (Ewanek, 1996, p.97)

Of the initial 200 parts of nitrogen in the manure, only 95 parts are immediately available to crops. Of course these numbers are dependant on variables such as moisture content, incorporation methods, soil conditions, and others, but can be considered 'typical'. As can be seen from figure 4.2, a significant amount of ammonium nitrogen is made available for crop uptake. This is not problematic so long as the ammonium is present in quantities not in excess of crop needs. Ammonium in greater supply than can be used by the plant can be converted to ammonia and volatilized, or converted to nitrate (through a

process called nitrification) and represents a potential leaching problem. In addition, organic nitrogen not used by crops is mineralized over time, and can add to nitrogen loads on the soil a year and more in the future. It is therefore critical that manure applied to fields be managed to achieve sustainable nitrogen use. Concerns in nitrogen management are:

- Application methods designed to minimize volatilization of ammonia (i.e. direct injection into the soil, or broadcast and incorporation within 24 hours),
- Careful soil sampling to ensure application quantities are not greater than can be utilized by the crop. This of course must include organic nitrogen residual in the soil that eventually will be mineralized to the inorganic form, and
- Attention paid to spreading in areas where leaching of nitrates could cause serious groundwater contamination.

Recent manure management plans to be required by Manitoba Environment are intended to ensure compliance with these requirements (see appendix B). Finally, organic matter in cow manure has been shown to improve soil physical properties, such as improved aggregation, lower bulk densities, and improved structure and water holding capacity (Bailey et al, 1998, p.24).

While data for hogs could not been identified, there is no reason to believe this situation would not be similar for hog manure.

As a final note regarding land application of manure, one might wonder whether farmers will over-apply the nutrients found in manure. Not only are they prohibited from doing so in accordance with provincial legislation, it has been shown that excess of nutrients, particularly phosphorus, can "interfere with proper nutrition of crops" (Bailey and

Buckley, 1998, p. 27). It is hopefully reassuring to those who doubt the safety of manure as a fertilizer, that the right thing to do (protect the environment) is also the best thing to do (maximize crop yield).

4.1.3 Hogs and their impact on Water

The impact of hog manure on surface and ground water is perhaps the most pressing environmental problem, as concern with water quality is the most frequently mentioned major issue related to swine manure in all regions of Canada (AAFC, 1998). Whether the problem is leaching of nitrogen or accumulation of phosphorus, B.O.D., bacteria, or any other of dozens of lesser contaminants, water concerns are fundamental. Leaching of nitrates, soil erosion of phosphates, and build up of B.O.D. surface water are direct contributors to a process called eutrophication. Excess nutrients in groundwater is similarly dangerous for many reasons, not the least of which is that groundwater often recharges surface water supplies. The requirements of manure management plans, designed to mitigate these negative outcomes were briefly discussed in section 4.1.1 and are also discussed in the section on legislation in Manitoba in Chapter 5.

4.1.4 Hogs and their impact on Air

Odour is often the first concern that comes to mind when considering the impact of hogs on air quality. Odour has been dismissed in the past as a subjective complaint of neighbours unaccustomed to agricultural operations. This subjectivity is disputed by Schiffman, who demonstrated that people exposed to hog odours had “significantly more tension, more depression, more anger, less vigor, more fatigue, and more confusion than

control subjects” (reported in Henderson, 1998, p.7). There are research projects now underway to determine how best to reduce or control odour emissions. Swine odour emanates from one or more of three primary sources, namely barns, application of manure to fields, and manure storage structures (earthen storage, or above ground concrete and steel tanks), in the following approximate percentages:

- Barn – 20%
- Storage – 35%
- Spreading – 45% (Barrington, 1996, p.149)

There are no significant land use planning strategies in this province other than spatial separation to deal with the odours from the above sources, with distances regulated by the provincial, and local, governments. For example, separation distances from neighbouring residences are suggested in the farm Practices Guidelines for Hog Producers in Manitoba. The Livestock Manure and Mortalities Management Regulation specifies minimum setbacks from watercourse and wells, etc. However municipal zoning by-laws are the only means to regulate physical barriers, such as trees, to better mix and dilute hog odours carried by wind. Other potential methods to reduce odour, such as barn bio-filters do not directly involve land use, but have indirect impact on surrounding use of land, particularly for residential use, by reducing nuisance odour. Suggestions for setback, have strong social links, therefore they will be presented in the section on social aspects of sustainability. As far as air contaminants are concerned, hogs produce more than just a bad smell. Oxidation of ammonium nitrogen generates ammonia, (NH_3) a compound known to cause acid rain. In addition, anaerobic decomposition of manure releases methane and hydrogen sulphide, known to contribute to the ‘greenhouse’ effect. Both of

these unwanted side effects can be mitigated. In the first case minimizing volatilization can be achieved by improved application techniques such as injection or immediate incorporation. Installing an impermeable cover on top of manure storage can dramatically reduce methane and hydrogen sulphide emissions, while having the added potential bonus of harvesting methane as a fuel source. There are no legislative requirements for Manitoba farmers to use either of the two preceding techniques to reduce harmful air emissions. Although there have been definitive studies on the subject of air emissions in countries such as Holland where there have been serious problems (Burton, 1996, pp. 27-38) there are no equivalent studies in Manitoba to suggest emissions are causing irreparable negative effects.

4.2 Economic Sustainability

There are a number of economic factors that have contributed to the expansion of the hog industry, linked to the basics of supply and demand. If there is no demand for a product, then that product will not be produced in any quantity, or at all. This was demonstrated recently when Asian economies suffered a serious downturn, with the demand for pork (and therefore prices) diminishing as well. Not only is this trend not expected to continue, quite the opposite has been predicted, as will be explained in the next section.

4.2.1 Global Demand

Global demand for pork is expected to increase dramatically in the next 5 – 8 years as can be seen in figure 4.3:

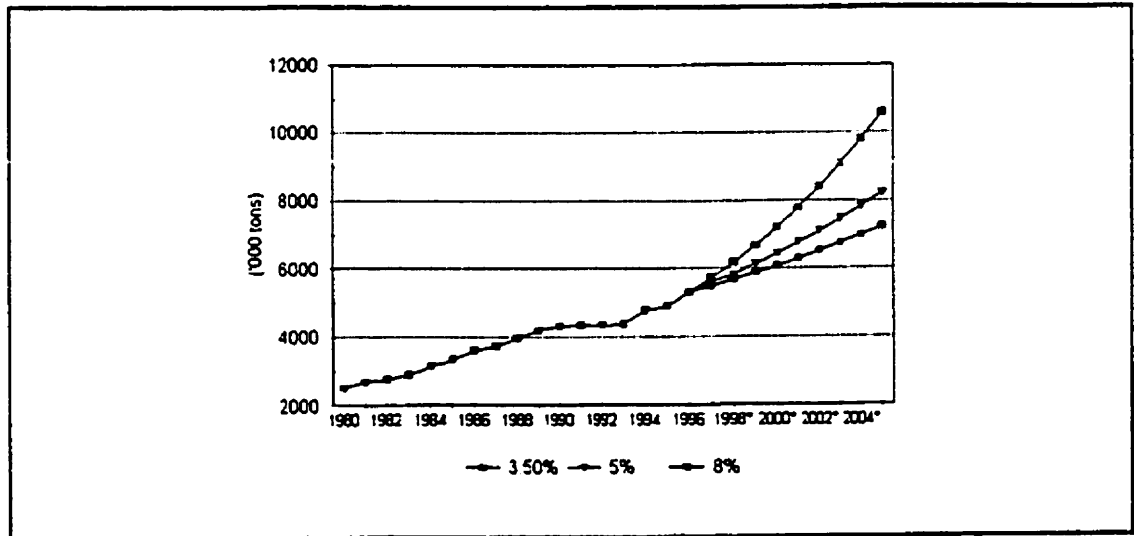


Figure 4.3 World Import Projections (Martin, 1998, p.5)

This graph shows that even with a conservative estimate of 3.5% growth in demand over the next few years, imports by 2005 will increase 36% over figures for 1996. At 8% growth, exports will increase by 100% in the period 1996 to 2005. This world demand will likely spur growth in the hog industry in many other countries as well, although many of the major producing countries are at the point where substantial increases in the hog population will not, or cannot be entertained (such as Holland, Denmark, Taiwan, and some states in the U.S.).

4.2.2 Large Scale Supply Issues

While the George Morris Centre (Martin, L. et al, 1998) and others expect demand for pork to increase, supply conditions must also be favourable if a country or region hopes to satisfy this

increase. As a part of the prairies, the Central Region and its hog industry enjoys the dramatically cheaper feed grain brought about through the elimination of the Grain Transportation Subsidy in 1995. In addition, the George Morris Centre study related a change in farming culture on the prairies from one of wheat/barley production to one of value adding, especially in the export market (Martin, 1998, p.11). Including costs for labour, feed, depreciation, and bank interest charges, the eastern prairies of Canada has been assessed as the cheapest location in the world to produce hogs, as shown in figure 4.4. The marketing edge created is obvious.

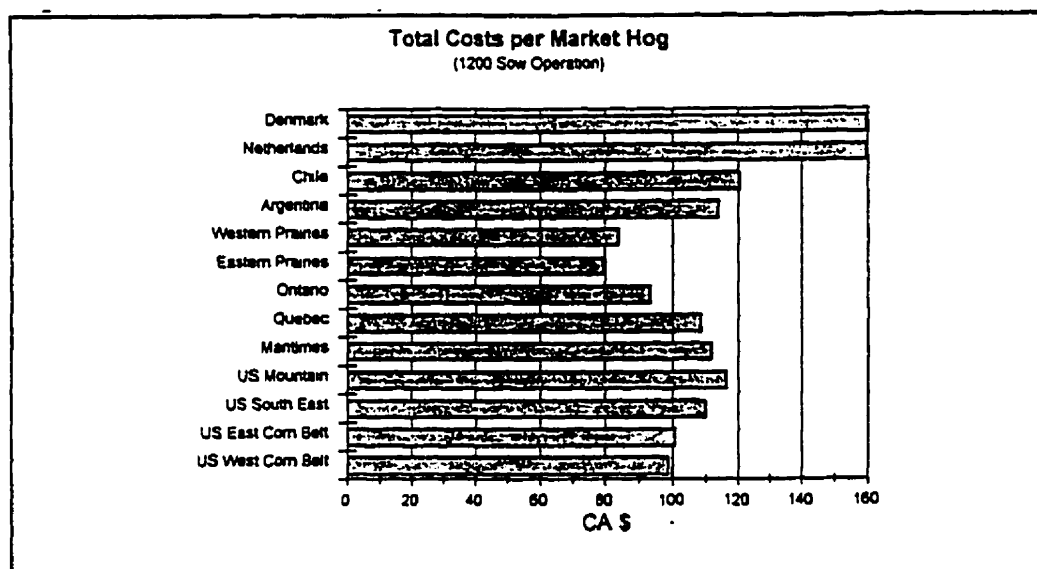


Figure 4.4 Global Costs to Produce Hogs (Martin, 1998, p.20).

The supply conditions mentioned previously occur at a national, or regional scale, and on this large scale the supply conditions do appear to be favourable. It is on a much different level or scale that decisions on individual hog operations are made however.

4.2.3 Small Scale Issues

As has been discussed, it is the purview of municipal governments to make decisions on land use at the local level. A major factor in the decision of municipal governments to favour approval of hog operations will likely be the perceived economic benefits to the municipality of such approvals. Although at a large-scale (i.e. province level) there appear to be economic benefits of hog production, where those benefits appear at a local level is not so clear. A detailed economic evaluation of the hog industry in Alberta was completed by Serecon Management Consulting Inc. in June of 1998. They determined that hog employees, operators, and businesses tended to spend their income within the local area of the barn. (Serecon, 1998, p.10) Thu and Donham, organizers of the Scientific Workshop called “Understanding the Impacts of Large Scale Swine Production”, tend to agree with this assessment with some reservation. Two factors are not included in the general assertion that hog operations benefit the local economy, these are:

- Proximity and size of the nearest service centre, and
- Size of the operation

The shopping patterns of hog barn employees are included at figure 4.5 and the table at figure 4.6 is taken from Serecon, and outlines the different service centres.

Area of spending - employee

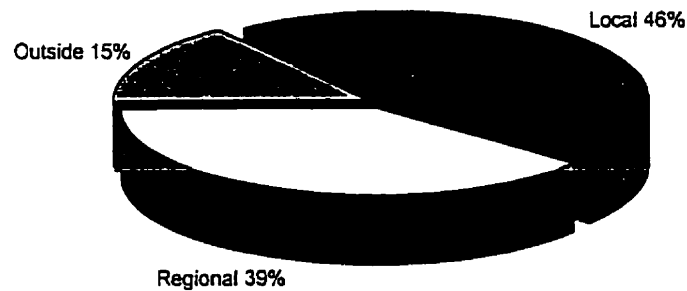


Figure 4.5 Hog Operation Employee Spending Patterns (Serecon, 1998, p.10)

Shopping Patterns of Paid Employees by Functional Classification of Centre

	% Local (<10 km)	% Regional (10-50 km)	% Other Provincial
Minimum Convenience Centre	5.0	62.9	32.1
Full Convenience Centre	50.4	20.3	29.3
Partial Shopping Centre	84.6	13.9	1.5
Complete Shopping Centre	90.5	4.0	5.5
Secondary/Primary Wholesale-Retail	96.5	2.20	1.3

Those located close to a secondary/primary wholesale-retail area do the bulk of their spending locally (96.5%), due to the full complement of services. Those located near Minimum Convenience Centres (MCC's) purchase very little locally (5%) as MCC's generally provide only the most basic of services, e.g., groceries and gasoline. Smaller centres are often bypassed for larger centres which offer a full complement of services.

Figure 4.6 Definition of Service Centres (Serecon, 1998, p.10)

Service centres - As can be seen, the smaller the service centre, the less local purchasing will or can be done. This may be of interest to RMs in the Central Region as they consider accepting the environmental and social risks, but do not have a service centre to take advantage of the economic multiplier.

Size of operation - The other factor to consider is the size of the operation. The economy of scale afforded larger operators (i.e. larger barns) are such that they can go further to find the 'right' economic deal. The economic necessity of smaller operators dealing with local business does not limit large operators to the same extent. This might mean that the economic boom expected by a municipality considering a large barn may not materialize. This was documented in discussion at the Thu and Donham workshop (Lasley, 1995, p.127). Although a large sized operation in proximity to a large service centre might be an ideal economic situation, this clearly cannot extend to where the operation is so large, and the service centre so close, that the impact of the barn is felt directly in the large centre.

In addition to the concept of service centres, the Serecon report discusses economic multipliers when considering the impact of a new or expanded hog operation. They explain:

"If used properly, estimates of multiplier effects are a valuable tool for assessing the merits of economic impacts." (Serecon, 1998, p.22). The report goes on to explain that economic multipliers define an increase (in local dollars) in non-hog industry dollars generated for every one dollar of hog production wages. Their figures range from a low of \$1.09 near minimum convenience centres to a high of \$2.87 near secondary and primary wholesale-retail centres (Serecon, 1998, p.22).

Although numbers for the Central Region are not known, the hog industry in Manitoba is dominated by the Hutterite Brethren. According to industry figures, the Hutterites account for

over 40% of hogs produced in the province (Manitoba Pork, 1996). The local economic and employment impact of hog farming is not clear when new construction or expansion takes place within the somewhat isolated confines of a Hutterite colony.

4.2.3.1 Economic downside

As with most development there is a good side, and a not so good side. Two particularly important issues on the downside are impact on property values, and impact on rural infrastructure (i.e. roads).

As reported by Lasley in 'Understanding the Impacts of Large-Scale Swine Production', both an increase and a decrease in property values is possible when a large hog operation moves into the neighbourhood, farm property values may marginally increase, due to the potential access to a source of fertilizer, but residential property values can decrease, perhaps significantly depending on proximity to, and the size of, the operation. Lasley reported on a study in North Carolina where residential property values were generally found to decrease in the area around a hog facility (Lasley, 1995, p. 145). Barette (1996, p. 3) and Henderson (1998, p. 6) both report on the strain resulting from increased truck traffic on rural roads. Barette also cites cases of rural counties in the U.S. that have, essentially, wasted considerable sums of money in upgraded roads and bridges in preparation for the economic boom that was not realized.

4.3 Social Sustainability

This aspect of overall sustainability is often neglected, yet it is the area that generates the most controversy, an area of conflict largely left to ill-prepared municipal governments to resolve.

Henderson sums up the U.S. experience:

"The objectors are a diverse lot. One thing is clear: They don't fit the convenient stereotype of nouvelle exurbanites who are surprised to discover that farms sometimes smell bad. Farmers themselves are split on the issue." (Henderson, 1998, p.6)

The issue of ex-urban growth has heightened concerns that separation distances are becoming increasingly difficult to satisfy, and that merely reducing odour through using trees and other buffers to dilute odours might not be enough. A report by a Manitoba Pork study committee submitted to the provincial government in 1994 (Manitoba's Pork Industry: Building for the 21st Century-Prospects and Challenges) relates the outstanding economic opportunities, and acceptable environmental standards, but unfortunately is silent on the social consequences of growth in the industry (Gilson, 1994, p.iv). This oversight may not be entirely surprising from the marketing agency for the pork industry in Manitoba, especially when their mission statement reads as follows:

"The mission of Manitoba Pork is to sustain and enhance the economic well-being of Manitoba's hog producers and foster the continued growth and development of the province's pork industry" (Manitoba Pork Annual Report, 1998)

Although more work is now being done in the field of social impact of intensive livestock, there is little precedent for this effort, a situation decried by Thu and Donham, who assembled a field of experts for perhaps the most important workshop on the subject in this decade (Thu, 1995, p.72). It is clear that there is a lack of understanding on the part of both the industry and society at large. The risks of this polarization between society and the hog industry are great:

“At one extreme, if there is a failure to recognize legitimate community interests, intensive livestock operations will be established with a minimum of community involvement and regulation. The result is that over time farmers are likely to face increasing harassment, and corresponding legal action over issues related to air and water contamination. At the other extreme, if society is over zealous in regulating the livestock sector there is a risk of a stifled and non-competitive agricultural industry resulting in shifts in production from one geographic area to another (with a corresponding shift in employment and economic activity).” (Caldwell, 1996, p.139)

Although economic considerations are important, the economy does not exist in a social vacuum (Thu, 1995, p.109) therefore it is critical to understand that perceived opportunities for a prosperous industry must be very carefully weighed with actions that pit neighbour against neighbour. The Manitoba Pork Council has to an extent recognized that doing it right involves a commitment to the highest environmental standards, and solving disputes with neighbours before they become contentious. Much of the Manitoba Pork campaign has been aimed at producers, and not enough at municipal councils and citizens-at-large. While the ‘Peer Advisor Program’ and brochures on ‘Living in harmony with Neighbours’ (Manitoba Pork, various dates) are a good start, there remains much to be done.

4.4 Canadian Populations View of the Hog Industry – a Poll

A contributor to the Joint Canadian Pork Council/Agriculture Agri-Food Canada workshop titled “Hogs and the Environment”, presented the results of an April 1998 national survey on the “View of Canadian Citizens regarding the Hog Industry”. The survey results, while not focussed on local government, could represent the views of constituents to whom local elected officials must answer. Important findings of the survey include:

- Use of chemical fertilizers is the largest concern regarding agricultural impact outweighing livestock waste related water pollution by 3 to 1.

- Odours from livestock operations were regarded as the concern requiring the least time (less than five years) to address
- Hog farming was seen as having the most negative environmental impact compared to other forms of farming (cattle, dairy, grain, etc)
- Large (corporate farms) are the least preferred hog farm size, by almost 3 to 1 over medium sized operations.
- The family owned farm is seen as the most environmentally friendly, by 10 to 1 over non-local (corporate) firms. (Miller, 1998)

This work provides important background to considering local government views on the sustainability of the hog industry, and could be incorporated into an educational package for local politicians. See appendix A for the complete results of this poll.

4.5 Geographic Information Systems

A land use planning approach that reduces conflict is necessary in order to achieve sustainability in the hog production industry. Relatively recent advances in computer technology have given us Geographic Information Systems, a technology that should be used, as suggested earlier, to locate areas both suitable and not suitable for expansion. To assume that G.I.S. will address any and all current and future problems would be to put too much faith in what really is only one of a number of tools available to the land use planner. But the potential for this tool to play a vital role is undeniable. What is G.I.S. and how can it address these complicated issues? Hanna and Culpepper (1998, p.7) describe G.I.S. as 'smart' maps, using relational databases and state of the art technology to computerize the acetate map overlay system devised by Ian McHarg of the University of Pennsylvania in the 1960s

(Hanna, 1998, p.14). G.I.S. has revolutionized the ability to use computer database maps representing such variables as soil conditions, water table depth, location of urban areas, and many others, to perform suitability mapping at a scale and speed completely impossible with conventional maps. When one understands the power of G.I.S. techniques, opportunities to resolve land use conflicts involving hog barns becomes clear. For example, hog barns might best be located in areas with the following characteristics:

- Suitable distance from built up areas (to prevent odours)
- Adequate water supply
- Abundant arable land for manure spreading
- Clay type soil to impede leaching nutrients
- Access to transportation routes

These characteristics or 'layers' can be represented by databases that could be superimposed on a digital map of the study area. Parameters could be indicated on these map 'layers' that for example exclude hog barn development within one kilometre of a large housing development. It might also mean for example, areas with less than one litre per second capacity for potable water would not be chosen. The result of this technique would be to systematically identify areas that, within stated parameters, represent the best areas for hog barn development. Most parameters would be regulated by the provincial government, but local governments may feel it necessary to demand more strict limitations in some areas.

4.5.1 G.I.S. Project for the Manitoba Livestock Industry

Keystone Agricultural Producers (K.A.P.), a farmers advocacy agency in Manitoba, along with the Prairie farm Rehabilitation Agency (P.F.R.A.), has initiated a G.I.S. project, called 'A

Specialized Decision Support System for the Manitoba Livestock Industry' to aid local government decision making in rural Manitoba. P.F.R.A. recognizes that the hog production industry is poised for substantial growth in the next five to seven years, and that decision-making support for rural governments will be crucial to ensure a sustainable industry. This project claims that the majority of siting, development, and operation of hog barns will be accomplished in the next two to three years. G.I.S. technology is being used by P.F.R.A. to assist rural governments in making informed development decisions regarding the livestock industry. A lack of skills with the software and data interpretation at the local level, coupled with shortfalls in funding, time, and personnel have prevented local governments from taking advantage of this technology, a fact this study proposes to address. The results of the study are intended to:

"Develop a process to identify key resource based issues and data requirements, develop and conduct analytical procedures, prepare products and results of the analysis in support of local discussion and decision making." (Keystone Agricultural Producers, 1998, p.2)

While this project is a noteworthy first step in helping to gauge the imminent growth of the hog industry, much more needs to be done. Due to delays, the project completion date of April 2000 may not be realized, leaving many rural governments awaiting results of the project, with little basis for important land use decisions. Instead of waiting for the results of this study, RMs where growth in hog population is anticipated should begin a G.I.S. analysis of their own in the very near future. These RMs might insist that hog barn developments incorporate in their development proposal, a G.I.S. study of the area in which they plan to locate.

4.6 Important Findings From Previous Work

In this chapter, sustainability of hog operations identified in the literature was examined. Also, a section relating a poll of Canadians views regarding the hog industry was discussed. Finally, strategies in other jurisdictions, and a brief look at G.I.S. as a siting tool were related.

Important findings of these investigations are summarized as follows:

- When closely monitored to ensure compliance with regulations, there is a clear scientific basis for nutrient cycling (i.e. incorporation of manure into cropland) as an environmentally sustainable process.
- Excess of nutrients, particularly nitrogen and phosphorus, can be very damaging to the environment, particularly if these nutrients are permitted to enter ground or surface water through infiltration (nitrogen) or runoff and erosion (nitrogen and phosphorus).
- Neither research nor legislation in the province of Manitoba has adequately addressed the issue of odours and odour related compounds from hog operations. Detrimental effects of methane, ammonia, and hydrogen sulphide have not been examined in a Manitoba context. Spatial separation as a land use planning fundamental in Manitoba has not been entirely successful. An increase in population of hogs and ex-urban residents in rural areas will only exacerbate the odour problem.
- International (i.e. global) demand for pork has been established, however regional economic issues as they pertain to Manitoba and the Central Region have not been resolved. The service centre concept does not directly address how rural economies, driven by hog operations, might fare when these operations are located in proximity to comparatively large centres such as Winnipeg and Portage la Prairie.

- The conflict between rural residents and hog operators is not one between established farmers and new ex-urban residents. A land use problem exists, and will likely continue, between established rural homeowners and recent or soon to be constructed hog operations.
- Current conflict resolution methods for the siting of hog operations (i.e. the conditional use hearing) are inadequate to address this very emotional issue. The win-lose philosophy inherent in these hearings presupposes and even fosters conflict.
- The hog industry (particularly large corporate operations) is unfavourably viewed by the Canadian population.
- G.I.S. technology as a land use planning tool will become essential in siting proposed hog operations. Efforts are being made in Manitoba to utilize the technology, but progress is slow.

Addressing the preceding points, issues, and problems will be critical in advancing the hog industry as a sustainable contributor to the Central Region, and the province.

CHAPTER FIVE

Practice and Legal Issues

5.0 Introduction to Legal Issues and Current Practice

The chapter begins with an overview of legislative requirements of the hog industry in Manitoba, current practice in the industry, as well as zoning issues in the Central Region. Legislation and practice in other Canadian provinces, and also outside of Canada are examined with a view to determining how they compare with Manitoba, and how their experiences can inform the hog industry in this province.

5.1 Planning Strategies Outside Manitoba

The object of this section is to review the legislative approach to land use planning for hog operations in other Canadian provinces, as well as regulations outside Canada. This could help identify positive contributions to sustainability achieved by other governments, and discuss how and if they could be applied in the province of Manitoba.

5.1.1 Canada – Caldwell and Toombs completed a thorough cross Canada identification of provincial planning strategies with regard to livestock operations. Their work eliminates the need to undertake a similar study in this research. Instead, the following comments on observations made by the researchers are provided (Caldwell, 1999, p.11/12). See appendix C for a copy of the Table used in the study.

- *Legislation* – Only three provinces, New Brunswick, Quebec, and Saskatchewan have enacted specific legislation to deal with hog intensification. Manitoba relies primarily on

hog producer guidelines, the Environment Act (Livestock Manure and Mortalities Regulation), and the farm Practices Protection Act to regulate the industry. Taking this set of statutes and guidelines into account, local councils must make land use decisions.

Given the stated importance of hog industry to Manitoba, and the controversy that is sure to occur, perhaps a more specific piece of legislation would be desirable.

- *Farm Practices* – ‘Right to farm’ legislation is prevalent throughout the country (with the exception of Newfoundland). A significant step has been taken in two provinces, namely Ontario and B.C., to ensure the protection of farming from municipal by-laws that attempt to restrict what is commonly held as ‘normal’ farming practice. Although it is advisable to protect and encourage agriculture in rural areas, this additional protection is not required in Manitoba due to the subordinate nature of municipalities in accordance with the Municipal Act. ,
- *Provincial Leadership* – In most provinces the Department of Agriculture regulates of the hog industry. Manitoba’s shared responsibility by the Departments of Agriculture and Environment recognizes the importance of the relation between agriculture and the environment.
- *Regulatory Tools and the Role of the Municipality* – In some provinces, notably the two largest hog producers Ontario and Quebec, the provincial government takes direct control of the approval process, leaving the municipality as more of an implementation agency. This policy may well fly in the face of the current management principle of delegating decision making authority to the lowest feasible level. There is a good chance that social sustainability might suffer from this ‘centrist’ approach. Although the Province of Manitoba delegates local decisions to local government, perhaps an examination of local

government authority in some areas may be necessary and desirable. For example, watershed impacts, air contamination effects and other trans-jurisdictional issues should not be at the discretion of a local government.

- *Environment Studies and Nutrient Management Plans (NMP)* – In P.E.I., Quebec, and Alberta, environmental studies beyond a NMP are required by provincial legislation. In contrast, some municipalities in Manitoba require this study, although the apparent discord with provincial right to farm legislation is difficult to rationalize. A provincial perspective on environmental impact is desirable, if for no other reason that most local governments in Manitoba do not have the knowledge or the resources to make their own assessment. Similarly provincial standards in nutrient management are preferable due to the geographically wide-ranging impacts of field application of hog manure. Administration of N.M.P.s are the responsibility of Manitoba Environment.
- *Role of the Public* – In this area of social sustainability, all provinces are (unfortunately) essentially the same. Manitoba is the only province where public hearings are mandatory, but only in cases involving conditional uses. Where intensive hog production is a permitted use, little or no public scrutiny is required. It has been suggested however that conditional use hearings are not the best avenue to public participation. Some other, less acrimonious forum for public debate, could become a worthwhile provincial initiative.

5.1.2 Outside North America

As can be seen in figure 5.1 and 5.2, a number of countries are much greater players in global hog supply, but Canada is among the largest exporters of hogs.

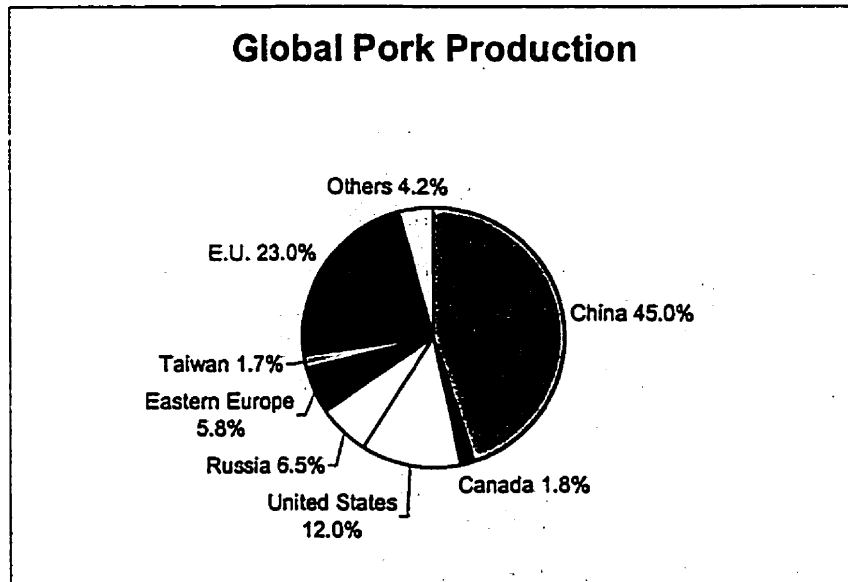


Figure 5.1 Global Pork Production (CSALE, 1996, p.3)

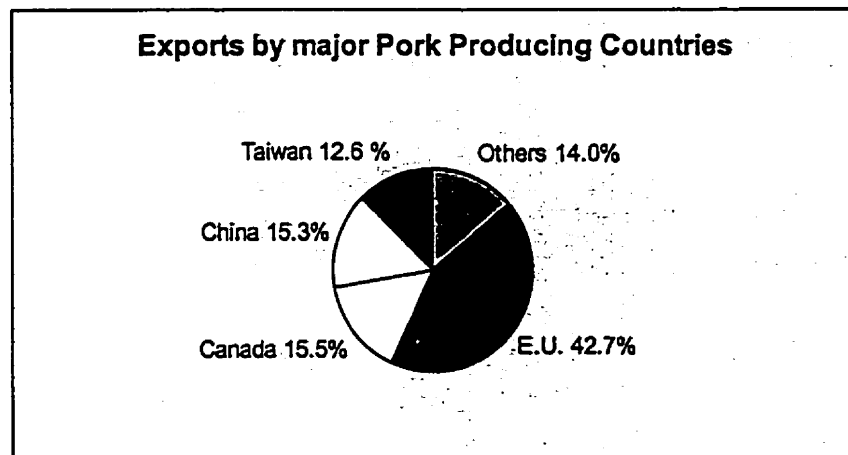


Figure 5.2 Global Pork Exports (CSALE, 1996, p.3)

The Canadian contribution to world production is only 1.8%, but represents 15.5% of world exports. This indicates that the great majority of world production is intended for internal consumption and not export (certainly the case in China which has 20 times the production of Canada, but whose exports are smaller).

There are several factors that differentiate the Canadian industry from many other world players, particularly the desire of national governments to enact and enforce internationally recognized environmental guidelines. In addition, major producing and exporting countries such as Taiwan, Holland, and Denmark have much higher hog densities and show indications that production and export have peaked, and may reduce in the next few years (Martin, 1998, p.7). High hog densities in Holland, Denmark, and Taiwan have necessitated strict industry regulation of the industry not only to maintain, but also to improve environmental and social conditions. As societal and environmental neglect of this magnitude has not occurred in Manitoba, comparison of these countries with Canada and Manitoba is not highly relevant. Growing competition in the world hog market is more likely to come from South America, particularly Argentina and Chile. As the industry in these countries is in its infancy, comparison of standards is not useful. More relevant for comparison purposes is the hog industry in the United States, where many of the same pressures of ex-urban development, increasing intensification and heightened environmental and social standards, exist. Due to the growth in the U.S., conflicts resulting from environmental and social pressures can serve as test cases for events that have not yet occurred in Canada.

5.1.3 The U.S. Experience

Many U.S. State governments have been accused of neglecting environmental protection and social concerns. Some states (for example North Carolina) were essentially caught off guard by the rapid expansion in intensive farming operations. Others, such as Illinois have been overly lenient towards the hog production industry, with “laws drawn up with an eye to maintaining the state’s substantial share of U.S. hog production” (Henderson, 1998, p.8).

There are three important facts⁴ that differentiate many U.S. states from this country however.

These are:

- Major U.S. hog producing states have a far greater hog population density than this province
- Major U.S. hog producing states have a much higher human population density than this province
- Major U.S. hog producing states have far less access to arable land than does this province.

In addition, many U.S. states producing hogs (for example North Carolina) rely on feed imported from outside of the state, an inherently unsustainable situation. Even with these differences, there are still many similarities, however an overview of all hog producing states in the U.S. is beyond the scope of this thesis.

The state of Minnesota is referred to here for two important reasons. First, Minnesota borders Manitoba and shares many geographic, climatic, agricultural, cultural and other features with Manitoba. The second reason for examining this state is that Minnesota has “taken the U.S. lead in allowing counties to grapple with the planning questions [regarding hog barns]

⁴ Conversation with Sylvio Tessier, Manitoba Department of Agriculture, Aug 99

themselves.” (Henderson, 1998, p.9).

5.1.3.1 Land Use Planning for Hog Operations in Minnesota

In 1996 the state of Minnesota produced a two-volume planning guidance manual for agriculture (Minnesota Department of Agriculture, 1996). One of the manuals discusses preservation of agricultural land, designed to protect the states agriculture roots from urban sprawl. While this volume is a useful reference, it will not be examined in this thesis. The second volume deals with Planning and Zoning for Animal Agriculture. The volume is intended as a handbook for local government, as it is the county (equivalent to the R.M. in Manitoba) that regulates land use. The handbook is not formal legislation, but design guidelines and recommended processes whereby counties, citizens, and hog operators come together on a shared vision of animal agriculture and rural development. Part of the process involves scenario building with citizen participation included at the initial stages. Questions include: ‘How and what work will be done?’ (a potential oversight or afterthought in many well meaning community plans) and, ‘Who will be responsible?’ are recommended as a critical portions of the plan. An overview of pertinent legislation and legal precedent is included as a means to learn from previous planning attempts, and finally implementation options are presented. One of the key features in implementation is to differentiate between separation and mitigation strategies. The option of performance based zoning is offered, an option that may well be relevant for hog operations seeking to move closer to the convenience centres (urban areas) to reduce travel related expense. One observation made in the handbook

relates to the inadvisability of conditional use hearings (currently used in much of Manitoba) as a public input tool in intensive livestock operation development. The handbook quotes the old legal saying that ‘hard cases make bad law’, which is an indirect criticism of the confrontation of conditional use hearings.

The message sent to local government to outline their most basic duty sounds similar to a planner’s responsibility:

“...to balance competing interests and to provide a reasonable set of rules to protect all interests.” (Minnesota Department of Agriculture, 1996, p.1-5)

The need is identified in the handbook to collect information on existing conditions in order to identify areas suitable (and conversely areas not suitable) for animal agriculture. What information to collect (i.e. location of floodplains, groundwater, soil conditions, etc), where to find it, and how to present it, are questions and steps in determining how the existing land and its uses can be portrayed.

5.2 Legislation and Zoning Criteria in the Central Region

The Livestock Manure and Mortalities Management Regulation for Manitoba (MR 42/98, 1998), part of the Environment Act, is the key document in ensuring sound environmental practices in the livestock industry. These regulations are designed to: “prescribe requirements for the use, management and storage of livestock manure and mortalities in agricultural operations so that livestock manure and mortalities are handled in an environmentally sound manner.” (Manitoba Regulation 42/98, p.449) The regulation outlines requirements for the storage, transportation, and application of livestock manure. It also specifies siting and construction requirements for manure storage facilities, both above and below ground level, and their minimum distances from

watercourses, springs, or wells. These details are elaborated upon, but do not conflict with, the farm Practices Guidelines for Hog Producers in Manitoba produced by Manitoba Agriculture, and the Canadian Code of Practice for Environmentally Sound Hog Production produced by the Canadian Pork Council. While the last two publications are not legally binding, they are intended to foster a kind of self-regulating approach that makes adherence to provincial environment regulations easier.

In addition, the Farm Practices Protection Act ensures that nuisance claims cannot proceed against farmers so long as they operate within the scope of 'normal farming practice'. Some may view this form of legislation as problematic in regard to the environment, however the legislation is designed to protect farmers in particular and the agricultural sector in general. These normal farming practices are in fact laid out in the guidelines and codes mentioned previously, and are practices that are expected of a reasonably prudent operator. MR 42/98 will, later this year, introduce the requirement for hog operations of greater than 400 animal units, to prepare and carry out a Nutrient (manure) Management Plan. The Nutrient Management Plan stipulates mandatory soil testing schedules, application methods, and necessary land base requirements for spreading of manure (see appendix B). Of particular concern are nitrogen/nitrate concentrations to ensure manure is spread to meet the needs of the crop. The legislation in place in Manitoba appears to be fairly rigorous in addressing the potential environmental problems posed by manure application on cropland. Management Plans represent only one part of the solution however. There is also a requirement for enforcement. Although goals set out by legislation should not be difficult to attain, there are concerns that despite good intentions, the legislation will suffer from a lack of

resources dedicated to enforcement. Unfortunately, it is not possible at this early date to assess whether or not the recent addition of Manure Management Plans will be effective.

Other possible problems with current practice in the hog industry include:

- **Manure storage** - There are two methods of storing manure, the first, most common, and least expensive is earthen manure storage. What separates these facilities from sewage lagoons for treatment of human wastes is that animal wastes are not treated for release into an adjacent water body, but remain in place under largely septic conditions. The manure is contained within the lagoon by means of carefully compacted local clay, or by an impervious liner. The installation of the more expensive liner is dependent on permeability of local soils and depth of the water table (if less than 2.0m). Only in the cases of highly permeable soils is there a current requirement for a groundwater-monitoring plan. In other words if a failure were to take place (i.e. drying cracks of clay base) constituents of concern in manure could leach into underlying groundwater. The second method of manure storage is above ground, engineered storage. The legislation addresses minimum setback of these facilities from watercourses in the same manner as for earthen lagoons. No other construction details are provided for in the Environment Act. Particularly there is no requirement to address potential large-scale failures by diking or berming of the tank. Should a failure occur with a full tank (capacities of 36+ million litres have been observed) a significant spill could result.
- **Local council inexperience** - The provincial government has delegated all local land use jurisdiction to local government. This means that applications for construction of new, or expansion of existing hog barns are ultimately decided upon by rural

councils. Although these councils have access to a technical review team provided by the provincial government, the expected lack of expertise of government in dealing with issues with this degree of technical and social complexity could present future difficulties. A recommended approach to improving this situation is a comprehensive guideline to land use planning and livestock operations for local government.

- **Education** - Fundamental to understanding both the advantages and disadvantages of hog farming is education. If, as was stressed by the Minister of Agriculture⁵, the hog industry is so important to the future economic success of this province, surely it is the responsibility of the province to educate its citizens about the reasons for this position. Similarly, it is in the hog industry's interest to advertise the benefits and safety of hog operations. Given the planned expansion of the industry, it would seem very much in the interests of government and industry to ensure that the general public does not harbour any negative perceptions. These perceptions could very much hinder the orderly growth desired by the industry (Manitoba Pork Council, 1999, p.1).
- **Limits to growth** - The goal of doubling the size of the hog population in Manitoba was discussed with the Provincial Minister of Agriculture and other provincial officials in the Departments of Agriculture and Rural Development. From what could be determined from these conversations, it is this authors opinion that targets for hog production numbers in this province have been established primarily by economic calculations. Environmental and social perspective must carry equal weight in determining what number of hogs can be sustained. Another factor in assessing a

⁵ Conversation with Harry Enns, Manitoba Department of Agriculture, Nov 98

sustainable number of hogs in production is an assessment of how many can be sustained in processing. The details of sustainable processing are not the subject of this work, therefore will not be discussed further.

5.2.1 Conditional Use Permits/Hearings

These are commonly the method by which hog producers request and then publicly defend their operations in this province. Often, in rural municipalities, hog operations are permitted in areas zoned 'agricultural', as a conditional use. It is this 'conditional use' clause that triggers the public hearing process, and where those speaking for and against the 'use' in question have the opportunity to convince the municipal council of the validity of their views. The question of whether or not conditional use approval is the method of choice for the Central Region is one that this thesis endeavours to address. It has been argued in the literature that considering hog barn development applications through a conditional use hearing is not the best solution:

"To be frank, the Conditional Use hearing process was never intended to deal with issues which generate such negative reactions in a community."
(Dickson, 1996, p.23)

Conditional Use hearings by their nature generate opposing views that either win or lose an argument arbitrated by the local council. Manitoba Pork has suggested a very scientific approach where a Technical Review Committee, comprised of 'experts' determines the feasibility of the development request. But it can be argued that objective science, and subjective social conflict cannot easily be linked. As Caldwell and Toombs write:

"Perceptual issues may not have any real or scientific basis but are perceived as real by the public and in turn may generate political support leading to political action." (Caldwell, 1999, p.3)

These difficulties notwithstanding, a solution must be found that allows both sides to 'win'. Suggestions as to how this process might unfold will be discussed later in this thesis.

5.3 Summary of Practice and Legislation

It was the objective of this chapter to review practice and legislation in Canada, in North America, and around the world and either compare it to Manitoba or discuss how legislation or practice in other jurisdictions might be used in this province. Important points in practice and legislation in Manitoba were also discussed. The following key points were noted:

- The state of the hog industry internationally is difficult to compare with Manitoba due to either scaling back or recent development in hog producers around the world.
- Manitoba compares favourably with other Canadian provinces in regard to protecting the environment from the potential deleterious effects of hog operations. Although more could be done, Manitoba is the only province where there is an attempt made to involve the public in siting of hog operations through the conditional use public hearing.
- While some U.S. States do not seem to have effective hog operation legislation, the State of Minnesota has developed comprehensive land use planning guidelines for livestock that should be studied for use here in Manitoba.
- Legislation in Manitoba appears adequate to protect the environment, however it is not possible at this time to determine if this legislation will receive adequate resources for enforcement. Areas of practice that require study include manure

storage, council inexperience, education of councils and the public with regard to the hog industry, and determination of limits to growth in the number of hogs.

- The conditional use public hearing in Manitoba is unique in Canada, however it is not adequate to deal with siting of hog operations. A less confrontational method should be determined.

CHAPTER SIX

Survey of Local Councils in the Central Region: Methodology

6.0 Rationale for Survey

The decision to undertake a survey of rural councils in the study region in this thesis arose from the research question. The related sub-problems of environmental, economic, and social sustainability at the local level formed the area of enquiry into the views of rural councils in the study region. Important questions and problems arising from the literature review are included here for consideration in the survey.

Important questions and problems are:

- Is hog development a priority for local governments?
- How the can damaging potential of manure be mitigated?
- Are local economies developed by the hog industry?
- Are conflict resolution mechanisms in place and effective?
- Are effective legislative standards in place?
- How will legislative standards be enforced?

Addressing these questions in the survey (assuming they are adequately answered) is expected to provide valuable insight into hog operation sustainability from perspective of the land use decision-makers (rural councils).

Sub problems – As described previously, sub problems in assessing rural councils' interpretation of sustainability involved asking general questions related to environmental, economic, and social indicators. Themes for each sub problem are as follows:

- Environment
 - What level of government is responsible for environment
 - Concerns with existing environmental legislation
 - Concerns with potential future hog operations in general (could be environmental)
- Economic
 - Importance of hog barns in development
 - Awareness of provincial strategy for hog industry development
- Social
 - Current hog operation approval process
 - Role of RM in disputes
 - Rural residents 'living' with the odour

These themes were used to address particular questions in the questionnaire. A copy of the questionnaire and introductory letter are in appendix D.

6.1 Survey Methodology

The antecedents of successful research indicated by Robson (1993, p.26) formed the basis for beginning this work, specifically where the importance and timeliness of this research subject was concerned. As previously indicated, the same rural councils that were surveyed are expected to confront difficult issues from hog producers and rural residents in the upcoming years. The purpose of the survey was to obtain council opinions on the general nature of hog operations and sustainability. Some interpretation of these responses was expected to be necessary in order to relate council responses to concepts of sustainability found in the literature.

Format of Analysis - The analysis of questionnaires consisted of:

- Charting of RM responses, to include: did they respond, response (yes or no) to each question, and indication if they gave a long answer to questions 3, 12, 13, 14, 15, and 16.
- Analysis of regional view of sustainability for all three aspects.
- Analysis of divergence from regional view of individual councils (although name of R.M. will not be specified as promised in introductory letter).
- Analysis of tendency to support or oppose growth based on location
- Statistical analysis of question 6 on a regional scale to include mean (average), mode (most common), and range of high and low rating, Significant variation will be briefly examined.

Advantages/disadvantages of survey methods – The decision was made to administer a primarily close-ended self-administered questionnaire. This was done for a number of reasons, particularly related to time. Many of the councils have their meetings on the same night, therefore waiting to have the opportunity to address each would have involved many months. It was possible however, to personally administer the survey to two of the councils (Cartier and St Francois Xavier). This was done to see in what way, if any, personal questioning might affect the results. Other councils approached for permission to administer the survey in person were not able to accommodate this request, for undisclosed reasons. The advantages of a postal survey included reduced questioning time, while disadvantages included the potential for ambiguity that could not be immediately cleared up. Response rates, normally a disadvantage of postal surveys, was not expected to be, nor was it a major problem in this case, as low number of respondents (24) allowed for phone calls to request completion.

Sampling –sampling design was not an issue, as the questionnaire was sent to all 24 rural councils in the Central Agricultural Region.

Closed/Open-ended questions – The decision to incorporate both types of questions was made to provide some leeway to councils in following their own line of thinking on some of the issues. Closed-ended questions began opened the questionnaire to give the respondent councils the opportunity to ‘warm up’ to the survey. Closed-ended questions at the beginning also allowed for councils that did not want to take time to complete the survey (particularly open-ended questions) to take only a few minutes to respond to yes/no questions at the beginning of the survey. The format and order of questions was designed with recommendations from Robson on design of self-completed questionnaires in mind (Robson, 1993, p.134).

Limitations - The questionnaire does not assume a great degree of sophistication at the local government level regarding the issue of sustainability. While this could be interpreted as a limitation to the survey, this impact is hopefully mitigated by having the questions posed such that the opinion of local councils is obtained with regard to more general impacts of hog barns on the environment, development/economics, and the local social structure. The survey does not purport to represent the likely decision of local councils when faced with an actual request, rather a general indication of what might constitute council intentions and attitudes.

Quantitative versus Qualitative - As quantitative and qualitative data are defined by Robson (1993, p.307) quantitative (numbers) data can be found only in Q6, where councils rate on a scale of 1-5, how important hog operations are to development in the R.M. The remainder of the survey provides qualitative data, whether simply a ‘yes’ or ‘no’ response, or a more in-

depth comment. As related in Chapter 2, the intent of the data analysis was not to create graphs, bar charts and statistical analysis, but more to ascertain the thoughts of each council on very general sustainability issues. Some statistical analysis of Q6 however, is presented as this response may be perhaps one of the most informative indicators of future hog operation development potential. Certainly, if hog operations are not important for the development (in all aspects) of a RM, council is less likely to approve them, and vice versa if they are important.

Influence of location – Relative tendency to support or oppose the sustainability of hog operations related to geographic location (for example near the new packing plant in Brandon) will be discussed in the next chapter.

6.2 Rationale for Questions

Questions in the survey were deliberately constructed to be very general in nature. This was done during pre-survey discussion in response to the predominant feeling on councils that they would be reluctant to answer specific inquiries. Hog operations are obviously such an emotional issue that councils were hesitant to ‘show their hand’ so to speak, even though, as promised in the introductory letter, the identity of individual municipal councils would not be revealed. Grouping according to theme for each question asked is as follows:

- Environmental – question 9
- Social – questions 7, 10, 11, 14, 15
- Economic – questions 6, 8
- Combination – questions 2, 3, 4, 5, 12, 13, 16

Social issues can be simultaneously the greatest challenge, and the area of most influence for local governments as they assess hog development proposals, thus the prevalence of social inquiries in the questionnaire. Environmental and economic issues are adequately addressed in either the question focussing on that aspect, or in the combination questions requiring general comments.

6.3 Summary of Survey Method

The research question asked what council's opinion regarding the sustainability of hog operations was, and this led to the survey described in this Chapter. Questions that arose from the literature review were categorized in environmental, social, and economic terms for questions in the survey. Closed ended (yes and no) questions were asked in the survey in order to obtain an overall sense of council's opinions in the Region. Open ended questions were included so that individual councils could add comments that were important to that municipality. Except for one quantitative question, all questions were qualitative, since it was felt that the issue of hog operations is highly subjective. Results of the survey are analysed in the next Chapter.

CHAPTER SEVEN

Survey of Local Councils in the Central Region: Results

7.0 General Observations

The objective of this Chapter is to analyse the results of the survey described in the previous Chapter. The final response rate of 75% (two surveys were personally administered, therefore 15/22 were received) is quite acceptable for a mailed out survey. In addition, one RM indicated an unwillingness to respond to the survey as that council was in the process of amending their livestock operations by-law. Of the two surveys personally administered (St Francois Xavier and Cartier), advantages and disadvantages of personal contact were apparent:

Advantages of personal survey

- It was clear that responses were from the council and not prepared by council staff and submitted as council opinion.
- Some clarification of areas of ambiguity was possible.
- Importance of the subject to the survey administrator was stressed
- Probing for more detailed responses was possible.
- Assurance of obtaining results (provided time was granted with council).

Disadvantages of personal survey

- Many council meetings held on the same night. Personal contact not possible unless months of survey time scheduled.
- Council may have been 'put off' by perceived aggressive approach.
- Widespread region demands lengthy travel time.

- Elaboration on responses may make data analysis more complex, and less comparable than originally intended.
- Council may have been given more information to answer than those that completed self-administered surveys. This might make comparison of results more difficult.

Advantages and disadvantages of mailed out surveys are essentially reversed from personal administration of surveys. As indicated in Chapter 6, specifics of response rates will be dealt with first.

7.1 Chart of responses

As a condition of participating in the survey, municipalities were assured anonymity. While this presents some problems in data analysis, the response chart is very much simplified. As was indicated in the covering letter, it was never intended to identify individual RMs, but examine the Central Region as a whole. Analysis may point out that some RMs differ from the general consensus of the rest, however this will not be attributed to particular jurisdictions, but the divergence of one or more RMs will be pointed out.

A summary of responses to 'yes' and 'no' questions (short responses) is included in figure 7.1. In addition, the long answer responses (questions 3 and 12-16) are included, with an indication of how common that general response was in the region.

RM	Q1	Q2	Q3	Q4a	Q4b	Q5	Q7a	Q7b	Q8a	Q8b	Q9	Q10	Q11	Q12	Q13	Q14	Q15
1	Y	N	Y	Y	x	Y	Y	Y	Y	N	Y	N	Y	Y	N	Y	x
2	Y	Y	Y	Y	x	Y	N	x	Y	N	N	Y	Y	Y	N	Y	N
3	Y	Y	Y	Y	x	Y	Y	Y	Y	Y	N	N	Y	Y	x	Y	Y
4	N	N	Y	N	Y	N	Y	Y	N	x	N	N	Y	N	N	N	N
5	Y	Y	Y	Y	x	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
6	Y	Y	Y	N	Y	Y	Y	N	Y	N	Y	Y	Y	N	N	N	x
7	Y	Y	Y	N	x	x	N	x	Y	N	N	x	N	Y	Y	N	N
8	Y	Y	N	Y	x	Y	N	x	Y	Y	N	N	Y	Y	Y	N	Y
9	Y	N	Y	Y	x	Y	N	x	Y	Y	Y	N	Y	Y	Y	Y	N
10	Y	N	N	Y	x	Y	N	x	N	x	N	N	N	Y	N	N	N
11	Y	N	Y	Y	N	Y	Y	Y	Y	N	Y	x	Y	Y	N	Y	N
12	Y	Y	Y	Y	x	Y	N	x	N	x	Y	N	N	N	N	Y	Y
13	Y	Y	Y	Y	x	Y	N	N	Y	Y	N	Y	x	Y	N	Y	N
14	Y	N	Y	Y	x	Y	N	x	Y	x	x	Y	Y	Y	N	Y	x
15	Y	N	N	Y	x	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	N
16	Y	N	Y	Y	x	Y	Y	Y	Y	Y	Y	x	Y	Y	Y	N	x
17	Y	Y	Y	N	Y	N	N	x	Y	N	N	x	Y	N	N	Y	Y
18	Y	N	Y	Y	x	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N	x
yes	17	9	16	14	3	15	9	8	15	8	8	5	13	14	6	11	5
no	1	9	3	4	1	2	9	2	3	6	9	9	4	4	11	7	8

Figure 7.1 Short Answer Response Chart

Note: Y=yes, N=no, x=no response

Long Answer Results**(Q3) List of concerns for potential future hog operations (# of times mentioned)**

Odour (8)

Size of operation (4)

Waste management (5)

Impact on roads (4)

Location (4)

Ground water pollution (3)

Environmental (2)

Soil Type (1)

Management of the operation (1)

(Q12) Methods of approving hog operations (# of times mentioned)

Conditional use of agricultural land (13)

No hog operations permitted (1)

No zoning (2)

Specific livestock by-law (1)

(Q13) Areas of concern with existing legislation (# of times mentioned)

None (11)

Difficulty in enforcement (3)

Areas of jurisdiction between municipality and province (2)

Yes – no clarification (1)

(Q14) How difficulties between hog producers/rural residents handled (# of times mentioned)

No problems (6)

Problems identified at conditional use hearings (5)

Discussion group (2)

No response (3)

(Q15) Process at Q14 to change in the next 2-3 years (# of times mentioned)

No change (11)

Development plan/by-law to rectify difficulties (4)

Yes – no details (1)

(Q16) Factors in siting approval (# of times mentioned)

Separation distances (8)

Odours and mitigation (5)

Incorporation methods (4)

Existing roads (4)

Environmental impact (3)

Flood concerns (2)

Size of operation (2)

Ground and surface water (2)

Management practices (2)

Public education (1)

Prevailing winds (1)

Erosion (1)

Public opposition (1)

Soil conditions (1)

Manure storage method (1)

Additional Comments

Corporate farms a problem
 Don't be too hasty
 Less concern with Hutterite operations (they live on the land)
 Large farms as industrial use
 Limited experience on council with new operations

7.2 Analysis of Quantitative Data

As previously mentioned, one of the key indicators of rural councils' view on the economics of hog operations is the importance attached to hog barn development. Q6 gave a range of possible answers from 1 (very important) to 5 (not very important). This section does not assume to conduct a detailed statistical analysis since the sample size is small, however some quantitative analysis was considered to be of value.

Range of responses – Of the 16 RMs that replied to the survey, all indicated relative importance of hog related development. Answers are grouped as follows:

Importance (1-5)	# of RMs
1	0
2	1
3	8
4	4
5	5

Figure 7.2 Summary of Quantitative Data

From the range of responses it is clear that hog barn development is not considered to be of great importance to RMs in the Central Region. The most common or modal value was 3 (middle importance), and the average value was $(2+24+16+25)/18 = 3.7$ or less than of middle

importance. Over half of the RMs responding indicated that hog development was either ‘not very important’ or ‘next to not very important’. Given this, it would seem that rural councils do not generally see hog barn development as being economically beneficial to their municipalities.

7.3 Regional View of the Three Aspects of Sustainability

Regionally, it is clear that hog operations are an important, as 17 of 18 respondents reported having hog farms in their municipalities. It was somewhat surprising to find that only 9 of 18 commented that they were anxious to attract more hog operations. Grouping questions as they relate to environmental, social, and economic concerns yielded the results explained in the following sections. This analysis is intended to generally define the view of rural councils in the Central Region with regard to the three aspects of sustainability.

7.3.1 Councils view of Environmental Sustainability

While more direct environmental related questions arguably should have been asked of councils in this survey, indirect combination type questions and long answer questions revealed important information on this subject. Q9 asked councils which level of government was responsible for environmental compliance, with 9 of 18 indicating the RM had some role to play. 15 of 18 indicated concerns with hog operations, all mentioning at least one environmental point (odour and manure management primarily). Despite these environmental concerns, 14 of 18 councils reported that they had by-laws in place to address any problems, and 14 of 18 were happy with their current hog barn approval process. In addition, 11 of 18 did not have concerns with provincial environmental regulations. The concerns that did exist

were attributed to the provinces' inability to enforce environmental standards. Finally, potential environmental problems were important factors in councils making land use decisions on hog operation developments with concerns of environmental impact, flood zones, erosion, ground and surface water integrity, soil conditions, and manure storage practices mentioned, as was described in the last section.

7.3.2 Councils View on Economic Sustainability

Section 5.2 addressed the quantitative results provided by Q6. It was clear that rural councils do not see hog barns as important to the development of their municipalities. Q8 was asked in order to probe councils on their knowledge of the provincial strategy (largely economic) of increasing the hog population in the province in the next five to seven years. 15 of 18 responses indicated a knowledge of the province's strategy, however only 7 thought it to be important to their RM (5 did not and the rest did not comment). Of the combination questions in the survey, the only economic related concern was that of increased traffic on the existing road system.

7.3.3 Councils View on Social Sustainability

While many economic and environmental questions in hog operations are the purview of the provincial government, social sustainability questions and concerns are almost exclusively the responsibility of the municipal council. For this reason, social related questions of municipal councils were accorded a priority in the direct questioning. It is interesting to note that councils largely did not think (9 of 14 that answered) that a person 'living in the country' was obliged to endure the odours related to hog barns. Councils saw themselves as involved in

disputes between hog producers and rural residents by a margin of 13 to 4, but based on responses in Q14 and Q15, did not see ongoing disputes as a major problem, and therefore did not envision changing their current methods of dispute resolution. Only two councils mentioned discussion groups as a method of ongoing dispute resolution. In any case, treating problems as non-existent, or ignoring them (by not discussing them), will be difficult to sustain as the hog industry carries out the impending expansion. According to the factors cited by councils as 'important in siting hog barns', the top three concerns were 'separation distances', 'odours and mitigation', and 'incorporation methods', all having a bearing on social acceptability of a hog operation.

7.4 Divergence from Regional View

It was apparent in the survey that hog operations play an important role in the Central Region. For the purposes of this research, divergence is measured by considering each rural council's views on sustainability (environmental, social, and economic) and comparing it to the overall view of responding councils in the region. This comparison might identify whether or not variance exists, and if so, how significant it is. In light of the general 'non-committal' view of councils in the Central Region to hog barn development, a municipality with significantly divergent opinion would be either strongly for, or strongly against hog barn development. There are a number of reasons why an individual council may not share the regional view of hog barn development, which as mentioned was somewhat non-committal. Some of the most important objective reasons might be:

- Clear urban, or clear rural nature of RM
- Proximity to large urban centres

- Proximity to processing operations
- Degree of knowledge on council of the industry

A council divergent from the regional view has in this case been stated as being one either strongly for or strongly against development. With regard to the location of any divergent council, the following was observed:

Pro-development - One council rated hog barns as 'next to very important' in the development of the municipality. Along with their support of the importance of hog barn development, this council did not identify any social problems resulting from existing operations, but did see a role for itself in any future conflict. Although the council had some concern with existing legislation, no details were provided. The relative proximity of this RM to the new processing plant in Brandon may have been seen as an opportunity, and may have influenced their opinion. No other council rated importance of hog development as 'high', although 9 responded that they were anxious for more.

Anti-development – With the exception noted above, none of the RMs was categorically anti-development, although as seen in section 7.2, five councils felt that hog barn development was not very important to their municipality. It was interesting to note that four municipalities in close proximity to Winnipeg did not feel hog operations to be important, and were not anxious to attract more. However based on the content of survey responses, it is felt that if a responsible, well managed, appropriately sited, facility was to make a development proposal to these RMs, they might well be favourably received.

7.4.1 Synopsis of Location Based Preference

As indicated, in only two cases was strong feeling for or against development potentially related to location. The RM that rated the importance of hog development as next to highest was on the western side of the region, relatively close to the new processing plant in Brandon. Whether this may have influenced the council, is not clear. An adjacent RM was similarly anxious to attract hog development, but did not attach as much importance to the industry. A clearer example of location based divergence could be found in the vicinity of Winnipeg (in the northeast portion of the region), where four RMs indicated they did not rate the importance of hog development highly, nor were they anxious to attract more. As the bulk of ex-urban growth is occurring in the vicinity of Winnipeg, this result is not surprising.

7.5 The Central Region – an Overview of Sustainability in Hog Operations

There are a number of indicators in the survey to show whether or not a RM is generally supportive of sustainability in the hog farming industry. The first indicator is the RM wanting to attract more hog operations. The Central Region is fairly evenly split on this issue, with roughly half supporting and half not. The next indicator is the level of concern councils have in approving new barns. On this point, a number of RMs have concerns, greatly outweighing those RMs having no concerns. From the analysis of environmental, social, and economic views of council, and divergence from the regional view, the following was derived:

- Councils do not have a great deal of difficulty with the notion of hog operations as environmentally sustainable. However, there must be close monitoring of environmental standards in order to ensure compliance.

- Councils that did have concerns stated that there might be some economic liability involved in increasing hog population, due to strain on existing infrastructure such as roads. The economic strategy encouraged by the province is not necessarily supported by, or known to local councils. In addition, and most importantly from quantitative data, councils generally do not see development of hog barns as being beneficial to their municipalities.
- Councils have a great deal of concern for social issues, as they have ranked three of these factors as the most important in siting proposed hog barn developments. To date, social problems have not been overwhelming, but this may change as barn density increases.
- There was only one instance of observable divergence from the overall view of hog operations in the Region, and that was in 4 RMs in close proximity to Winnipeg. While these RMs were not necessarily strongly against hog operations, they indicated that hogs would not likely contribute to development in the municipality.

Overall, the rural councils surveyed do not appear to have firmly established their opinion on the sustainability of hog farming. The lack of understanding by local councils in addressing the issue of sustainability is mentioned in the Manitoba Pork Council paper to the Provincial Livestock Planning Advisory Committee. This lack of knowledge is seen as an item requiring corrective action in ensuring the continued growth of the industry (Manitoba Pork Council Report, 1999, p. 2). Although only mentioned once in the survey, councils are somewhat lacking in knowledge and experience in this area, and appear to be continuing on the course of assessing hog operations if and as the industry makes development proposals known. Only one RM had a specific intensive livestock by-law, with two others developing one. In the

absence of specific long-term land use planning for this industry, any regional commonality can best be described as non-committal.

CHAPTER EIGHT

Future Directions

8.0 Review of the Purpose of the Thesis

The purpose of this thesis was to determine the view of rural councils in the Central Agricultural Region on the sustainability of intensive hog operations, and how that view compared with the literature on the subject. This Chapter compares literature findings on each aspect of sustainability with the overall view of councils in the Central Region related in the previous Chapter. Based on this comparison, a possible role for councils in ensuring sustainability is suggested. Recommendations are also made for sustainability of the industry in the future.

8.1 The Science of Environmentally Sustainable Land Use

Ideologically speaking, there is clear precedent in the literature for responsible hog farming having the potential to be an environmentally sustainable activity. So long as the nutrient cycle is carried out in harmony with the needs of crops, there should be minimal danger of nutrients entering ground or surface water. Reasonable economic investment in improvement measures can greatly mitigate or virtually eliminate the potential for harmful impacts. These include:

- Covers for manure storage to prevent escape of harmful gas emissions,
- Bio-filters for barns to reduce odour emanation,
- Injection incorporation methods to reduce odour production and ammonium volatilization.
- Above ground steel manure storage tanks to reduce/eliminate groundwater seepage.

- Diking of above ground tanks to prevent a release of manure should the tank fail, particularly near watercourses, on sloping land, or on land prone to groundwater contamination.

It is understood that these measures represent the ideal in environmental protection, and some may be impractical for the industry. However, in light of evidence in the literature to suggest that these improvements have been important, even essential in other countries, it is probably best to err on the side of environmental protection. This would be particularly true where hog operations are located close to environmentally and/or socially sensitive areas. Without doubt the mitigating measures listed represent issues that local governments should be aware of when considering a hog barn development.

Local governments in the Central Region generally agree on the environmental risks of hog farming, but this may be out of ignorance of the industry. They should be educated to the fact that there are ways of mitigating these risks. From survey data on whose responsibility the environment is considered to be, it seems that a fair amount of RMs are willing to take these risks on (9 of 15 that replied). However considering the potential impact of hog industry growth on all RMs in Manitoba, it is important that all councils see that they play an important role.

8.2 Economics and the Hog Industry

Martin, (1998) and Serecon, (1998), present compelling research on the economic benefits of the hog production industry. Apparently, rural councils in the Central Region are somewhat at odds with these assessments however. Martin argues convincingly for what is called here large-scale economic sustainability. Serecon's focus is more on small-scale issues such as

economic multipliers, and impacts on local economies. From Serecon it is clear that the greatest benefit to the local economy is realized if there is a convenience/shopping centre within a reasonable distance to the hog operation. The reality of many RMs in the Central Region is that while the larger centres with sufficient commercial infrastructure and drawing power will benefit, smaller service centres or communities may be denied the participation in this economic growth. What rural councils then face is the prospect of accepting 'risk' with the approval of a barn, and losing economic benefits to centres outside of their jurisdiction. This 'risk' is greatly increased with increasing barn size, to the point where it is possible that:

- The RM is left with the economic downside of hog barn development (i.e. wear and tear on local infrastructure as mentioned in the survey), and/or potential drop in property values.
- Little or no local purchasing is done since economies of scale allow the barn to seek economic 'deals' from remote locations.
- Local employment does not significantly benefit as high paying jobs are awarded to commuters from larger centres.

If such scenarios were better known to local councils, their general low regard for hog barn development as indicated in the survey would be understandable. Economic sustainability would be more likely in a situation where agreements could be reached within what will be called here, 'hog barn catchment areas'. These areas would be more regional in nature, and would not necessarily recognize municipal boundaries. They would be more related to the location and size of convenience/shopping centres, and would recognize that while there are likely economic benefits of hog barns, they do not necessarily occur within the approving

jurisdiction. A strategy such as this would certainly need to be supported, even championed at the provincial level.

8.3 Potential for Social Acceptance

What makes expanded hog production a particularly difficult social issue for policy makers and governments is that they are not just trying to hit a moving target, but a fast moving one. Pressure is being felt on both sides, as growth planned for the industry is accompanied by increases in ex-urban expansion. Local councils surveyed seemed to recognize that rural residents should not necessarily be considered as only recent arrivals, and therefore should not be expected to tolerate offensive odours of new (or established) hog farmers. Although councils were not explicitly asked, it is assumed that they also believe that rural residents should not be subjected to degraded water quality either. If councils have not yet, as many claim, experienced social problems resulting from hog barns, it is difficult to believe that this can continue in light of the expansion plans for the industry. To paraphrase the position of Manitoba Pork, if municipal councils themselves are not conversant with the industry, how could the general public ever be? (Manitoba Pork Council Presentation, 1999). It is the opinion of the author that the key to bridging the social gap lies in four areas

- Education,
- Collaboration,
- Pro-active technology to reduce 'win-lose' aspect of debate, and
- Legislative commitment to public protection

Education – Education is not intended for just local councils, but for all citizens. In the absence of clear and understandable facts, perceptions and rumours will only add fuel to the

fire of debate. As Caldwell has mentioned, public perception does not necessarily have a basis in scientific fact, therefore there is a real need for public education demonstrating environmental, economic, and social strategies for the hog industry.

Collaboration – Collaboration is most beneficial from the outset, and not as a means of keeping dissenting neighbours quiet. As commented earlier, Provincial Technical Review Teams and Manitoba Pork Peer Advisers program⁶ are good starts, however these ideas must reach out further, more pro-actively, and in advance of conflict. Neighbours are far more likely to be willing co-habitants with hog barns if they feel they have been part of the process. Local councils indicated they felt they played a role in conflict resolution. Ideally, they could play a very important part in this collaboration process.

Pro-active technology to reduce ‘win-lose’ debate – A very useful development in technology is currently available to identify optimal siting criteria for hog barn development in this province. Geographic Information Systems, outlined in Chapter 3 can assist in making the ‘right’ siting choices for hog barns. The idea behind G.I.S. is not to baffle local politicians or the public with advanced computer technology, but to simply and graphically lay out all development options. The education process could help allay, and hopefully alleviate fears that this potentially harmful activity (important to the agricultural sector as it may be) has been inappropriately sited. All stakeholders will be assured that hog development has occurred in a responsible location, thereby allowing all concerned to ‘win’.

Legislative commitment to public protection – All of the above could easily be swept away if public confidence is lost due to a lack of local and provincial government commitment to

⁶ Peer Advisors Program is an initiative of Manitoba Pork to resolve conflicts between hog producers and rural neighbours.

protect the public's interest. As has been mentioned, there exists reasonably adequate provincial legislation to ensure the public's protection from serious environmental dangers (problems such as odour and ammonium air emissions have not been addressed, but likely could and should be). Local action to protect the public is far less evident, but uniformity in local regulations is important for both the public and the industry. Although to an extent disputed in the survey (councils are almost universally satisfied with the current hog development approval process), there remains much to be done in establishing commonality in municipal approach. If both levels of government were committed to the four keys to bridging the social gap, hog expansion might well be far less acrimonious. The industry itself bears considerable responsibility as well. Industry advocacy groups such as Manitoba Pork must recognize the importance of involving the public as well as producers and local councils in the debate, and not just in light of an imminent development. In addition, it is important that the industry be somewhat self-regulating as well, with responsible producers (the majority) taking firm and decisive action against their recalcitrant peers (the minority). While not strictly a legislative approach, this self-regulation can be very effective in enforcing industry wide standards.

8.4 Rural Councils and Their Role

This section speaks to the rationale for this thesis, which is to understand the view of rural councils regarding sustainability of the intensive hog production industry. As was seen in Chapter 7, many councils are not actively attempting to come to terms with the subject of hog development. As the arbiter of local land use planning, and in that regard, protector of the public interest, this is not a visionary approach. While comfort with past practice is a normal

human reaction, it must not be the position of rural councils in this debate. Apparently the suggestion by the Association of Manitoba Municipalities that RMs develop by-laws to deal with intensive livestock operations has not had the desired effect. This is apparent since councils state they do not have concerns with the current system (Q5 and Q13), and largely indicate they do not expect any changes in the next few years (Q15). If inaction is not or should not be the role of rural councils, what is? Based on recommendations from the literature, the following is suggested:

- Pass a specific by-law, in concert with existing provincial legislation (such as The Environment Act, Municipal Act, Planning Act, and farm Practices Protection Act) to deal with intensive livestock operations, anticipating that in the upcoming years it will be tested a number of times.
- Either conduct a basic G.I.S. survey of agricultural areas in the RM, or encourage other government agencies (P.F.R.A., A.M.M., or Rural Development Manitoba) to assist in this important undertaking. The intent here is to identify areas in the RM that might be suitable for hog barn development, and incorporate this information into the municipal development plan and zoning by-law.
- Lobby provincial government or provincial level agencies (Manitoba Agriculture, Manitoba Rural Development, A.M.M.) to begin thorough and open public relations campaign on the issue of hog operation expansion. The Intensive Livestock Advisory Committee has begun this work, but results of their efforts are not yet clear.
- Become familiar with the Provincial Technical Review Committee and the Peer Advisors Program as a start to better understanding the industry.

- Build bridges to the hog industry, either through local producers or the provincial body Manitoba Pork. Encourage the public to participate in these efforts.

8.5 Recommendations for a Sustainable Hog Industry

Based on findings in earlier chapters, the following comprise suggestions for ensuring that land use for growth of intensive hog operations is achieved in an environmentally, economically, and socially sustainable manner:

1. The Province and the Hog Industry should partner to ensure the education of rural government and citizens of the environmental, economic, and social responsibility of the hog industry. Initiatives in place, such as the Peers Advisor Program, and Technical Review Committees must be included in this education effort.
2. The P.F.R.A. initiative to perform G.I.S. surveys of RMs in Manitoba should be accelerated and expanded to take advantage this powerful tool in proper land use planning for hog facilities. All levels of government and the industry should collaborate in this endeavour.
3. Social and environmental impact analyses of proposed hog operations should be carried out, and enforced in a similar manner as Manure Management Plans. This is not intended to limit the hog industry, but is recommended for the protection of rural citizens and hog producers. This is an initiative best taken on by the Provincial Government, possibly the Department of Environment.
4. Water availability for hog operations must receive urgent study. It is not clear from Manitoba Natural Resources mapping information where there exists agricultural land for hog operations that is serviced by adequate supplies of either surface or ground water.

Areas of the Central Region suitable for hog operations that have access to water supplies must be clearly delineated. This will ensure the needs of the provinces hog population grows in harmony with residential and commercial/industrial requirements. G.I.S. studies previously recommended could incorporate this requirement. The Provincial Government, particularly the Department of Natural Resources must lead in this effort.

5. Investigation of performance standards in zoning for hog operations should take place. This investigation will become increasingly important as ex-urban and hog industry growth competes for the same land base. This investigation is best conducted by the Provincial Government in co-operation with land use planning institutions such as the University of Manitoba, Department of City Planning.
6. A more regional, instead of rural municipal, planning strategy for hog operations and their benefits should be examined. The concept of 'hog catchment areas' was proposed earlier. This concept could assure rural councils that economic benefits will not be channelled exclusively to the Central Regions' primary urban centres (Winnipeg and Portage la Prairie), but at least a portion will accrue locally to accompany any environmental or social risks. This strategy should be the combined effort of the Provincial Department of Rural Development in partnership with the Association of Manitoba Municipalities (AMM).
7. Study of the land use planning guidance for the state of Minnesota should be undertaken with the view to applying many of the principles in Manitoba. In addition to a focus on performance based zoning, Minnesota seems to offer an excellent lesson in collaborative planning. As with the previous recommendation, the study of guidance in the state of

Minnesota could be a joint undertaking of the Department of Rural Development and AMM.

8. Study of the impact of size of hog operation should be conducted. There are concerns with large corporate operations among the general public. Therefore assurances that large sized operations can protect environmental and social integrity, while increasing economic benefits, would be valuable. This academic study is likely best performed through the Provincial Department of Agriculture in conjunction with the University of Manitoba, Department of Bio-systems Engineering, with input from industry.

CHAPTER NINE

Conclusions

9.0 Research Objective

The primary goal of this thesis was to answer the research question:

“How does local government in the Central Agricultural Region of Manitoba view the sustainability of land use for hog barn development, and how does this view compare with findings in the literature.”

The research objective was attained by first conducting a literature review of the three areas of sustainability. Following this review, a survey of 24 local governments in the Central Region was conducted, seeking to, in general terms, determine councils’ perceptions of, and attitudes towards, the hog industry.

9.1 Research Findings

Research findings on the three aspects of sustainability are as follows:

- The literature seems to support the idea of environmental sustainability, while councils appear uncommitted.
- The literature on social sustainability indicates there is cause for concern, a viewpoint that might be surprising to rural councils in the Central Region, which have not experienced many problems.
- The literature on economic sustainability related a mostly positive view of hog operations, however councils do not generally see the significance of the industry, except perhaps from the perspective of a burden on local road systems.

What can be taken from the results is that there is a requirement for further study, with a particular focus on this region. Such study could consider the recommendations for rural councils, provincial authorities and the industry provided in Chapter 8. This study will require time, something that, unfortunately there appears to be little of, so it must begin without delay. What can be done though, when the growth of the hog industry is driven by the imperative that farmers diversify their business? This necessary shift in agricultural practice may be a force that, although apparently unstoppable, must be understood through study, and regulated through responsible land use legislation. If a sustainable solution is to be found, it will strike a balance between the economic needs of agriculture and social and environmental impacts. While environmental sustainability can likely be established with local councils through education and appropriate use of technology, social sustainability presents a more complex problem. As Thu (1995) and Caldwell (1996) have suggested, exact science (whether defending the economic benefit or environmental safety of hog operations) may not convince a committed non-believer. The lessons of social and environmental upheaval reported by Donham and Thu should not be ignored in this region. This is not to say that intensive hog operations are inherently bad, or that conditions reported in the workshop conducted by Donham and Thu are the same as they are here in Manitoba. Nevertheless, to ensure that lessons from the U.S. experience are learned, the industry should be the subject of uncompromising and ongoing evaluation. This evaluation is particularly important if Manitoba is to avoid the negative experiences in other hog producing countries. The goal of doubling hog production by 2005 may make economic sense, but environmental and social impacts should be tracked throughout the suggested growth period to ensure land use for hog operations continues to meet high standards. Although rapid growth is important to the

Central Region's agricultural sector in an immediate economic sense, long term environmental and social integrity of the entire Region may not be best served by dramatic, unevaluated, and probably irreversible growth in hog operations. There is no question that for orderly future expansion of the hog industry to occur, it must make, and be seen to make, sustainable use of land in all respects.

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CANADIANS AND THE ENVIRONMENTAL IMPACTS OF THE HOG INDUSTRY

A Presentation by Doug Miller

Environics International

April 27, 1998



ENVIRONICS
INTERNATIONAL

Major Themes

- Canadians presently divided on whether they would support or oppose a major increase in hog farming in their region.
- Hot Zones: Strongest opposition in Quebec. Strongest support in Saskatchewan and British Columbia.
- Dramatic increase in negative perceptions of hog farming across all regions but Quebec over past year suggests issue has significant momentum.
- Public acknowledges certain issues (eg. livestock odours) as less serious, but expects them to be dealt with more promptly.
- Prompt attention to less serious, highly "visible" issues critical to building trust on more serious, but less visible issues.

Major Themes (cont'd)

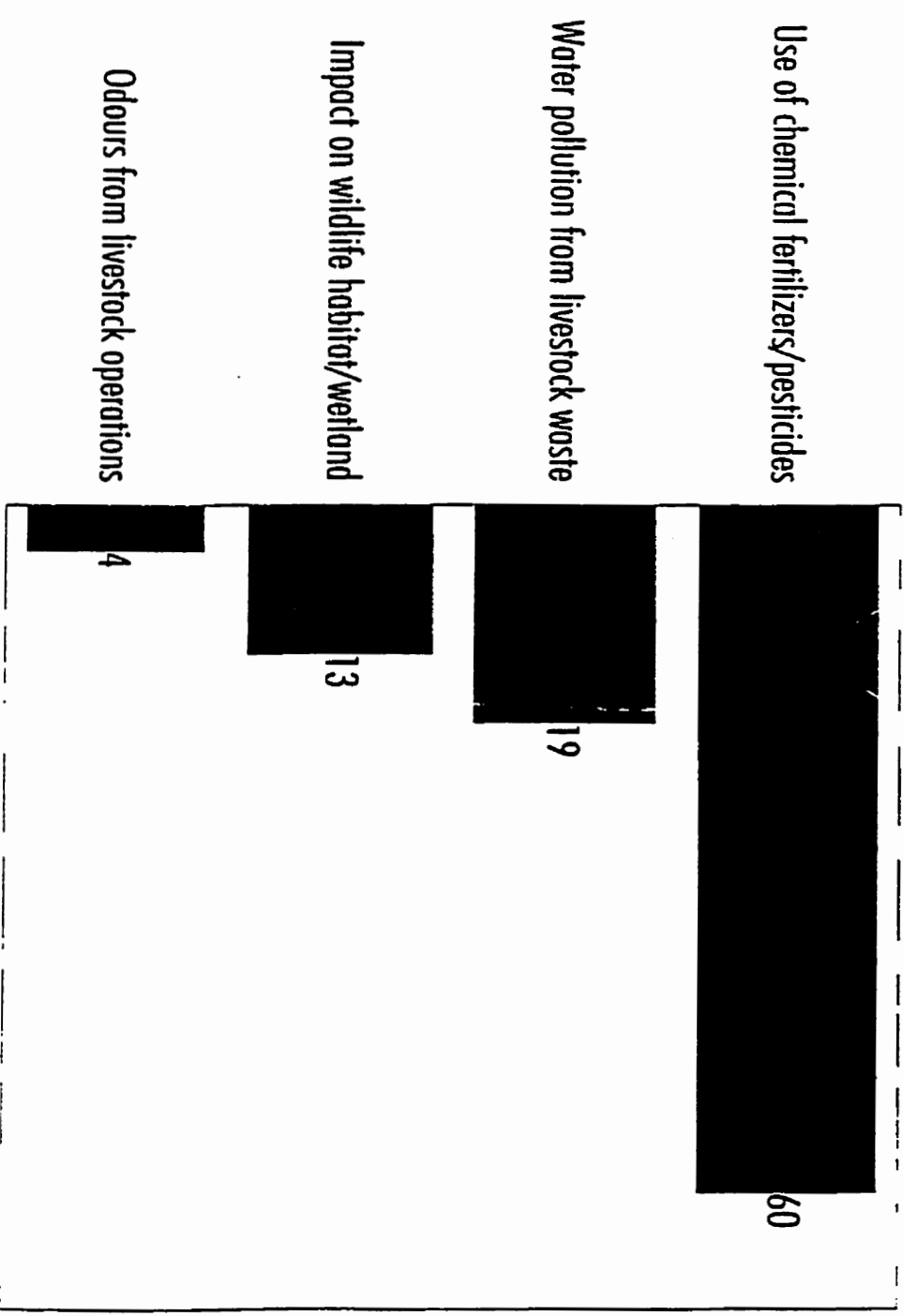
- Public most receptive to newest farms with modern technology; medium-sized family-run farms more acceptable than large farms run by outside companies.
- While strong government regulation/enforcement is strongest measure to gain public acceptance of industry growth, adoption of new technology also potent.
- Government and industry lack credibility as sources of environmental information. Joint community-industry body or independent auditor offer best approach to environmental monitoring and reporting.
- Emergence of "Greenwave III" within next five years will reinforce the need for careful attention to operational practice and public accountability.

Environmental Monitor 1998-1 Special Omnibus Survey

- Field dates: March 10 - April 7th, 1998
- Questions 8-11A
 - Sample size = 1,556
 - Sample definition = Canada-wide
 - Accurate within plus or minus 2.5%, 19 times out of 20
- Questions 12A-18A
 - Sample = 857 (rural only)
 - Accurate within plus or minus 3.4%, 19 times out of 20
 - Sample definition = Rural Canada only
 - Community sizes = 70% sample under 10K 30% sample 10K-100K

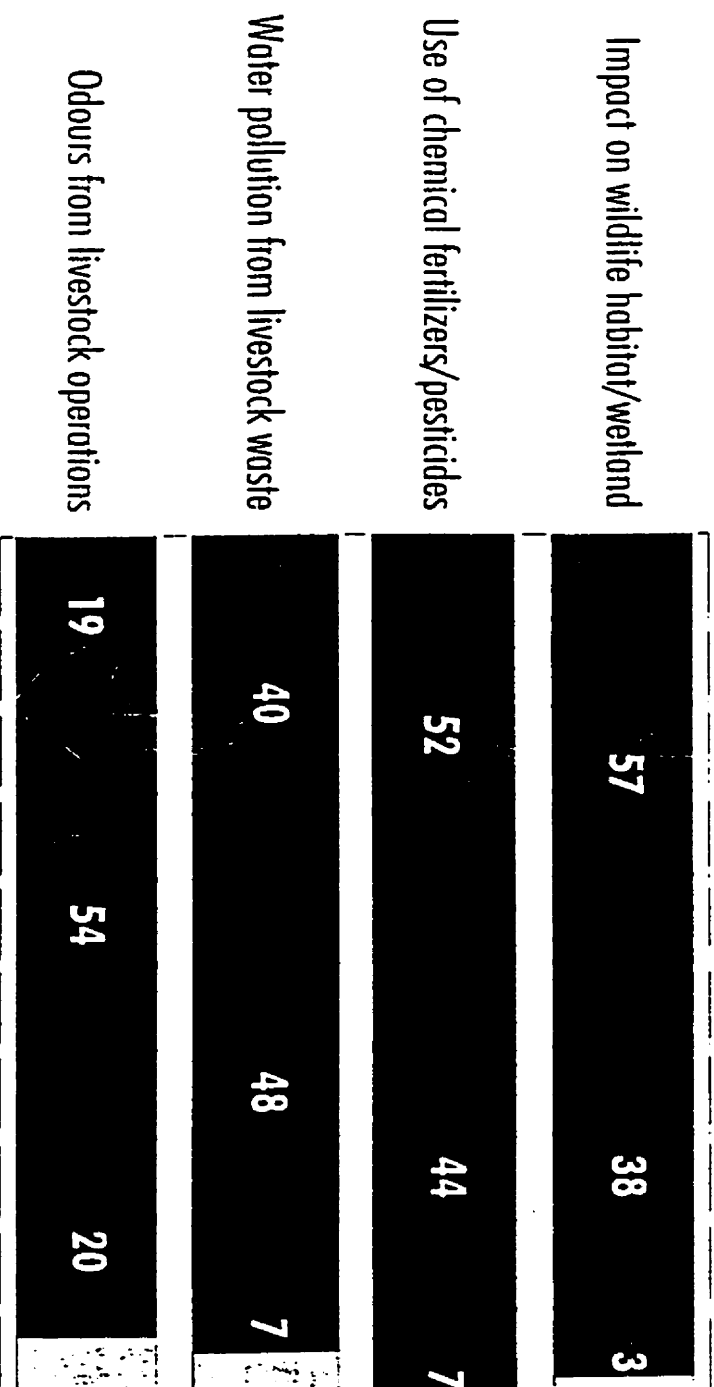
Agricultural Impact Causing Most Concern

April 1998



Strength of Concern About Most Important Agricultural Issue

April 1998

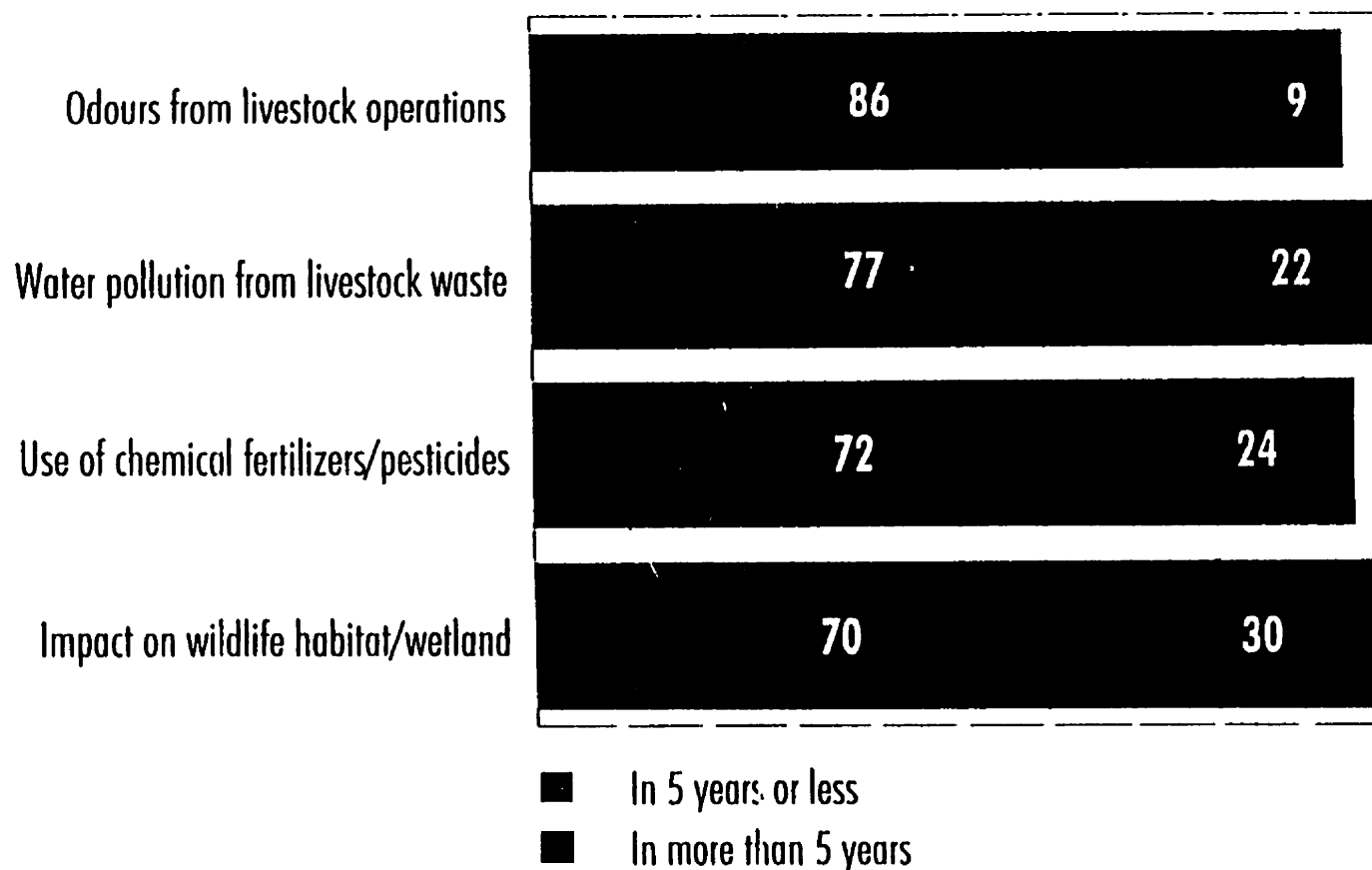


☒ Very concerned
 ☒ Not very concerned
☒ Somewhat concerned
 ☒ Not at all concerned

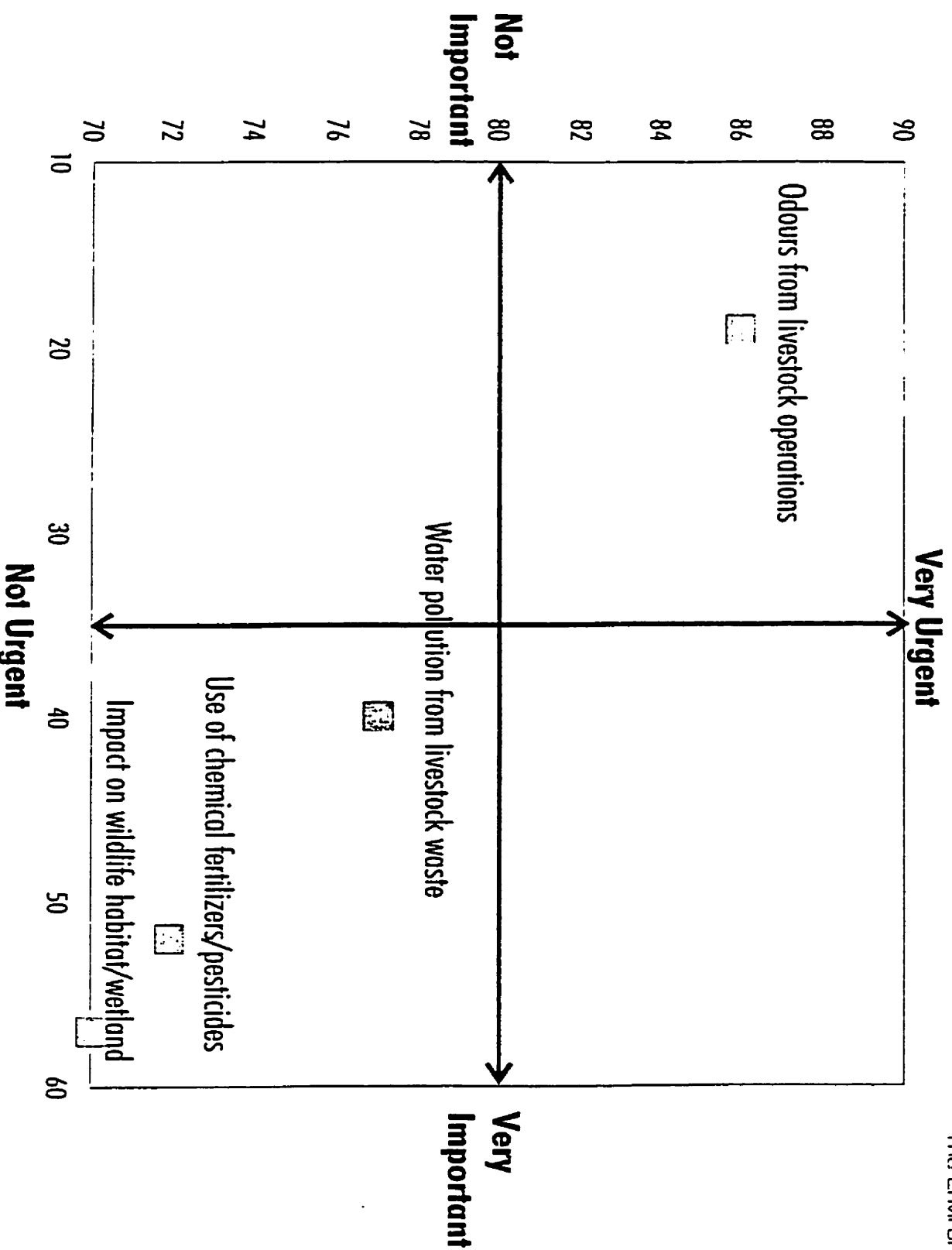
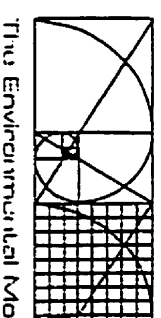


Reasonable Time Frame for Addressing Agriculture Issues

April 1998

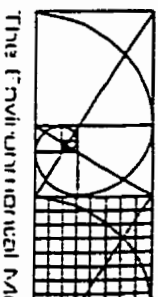
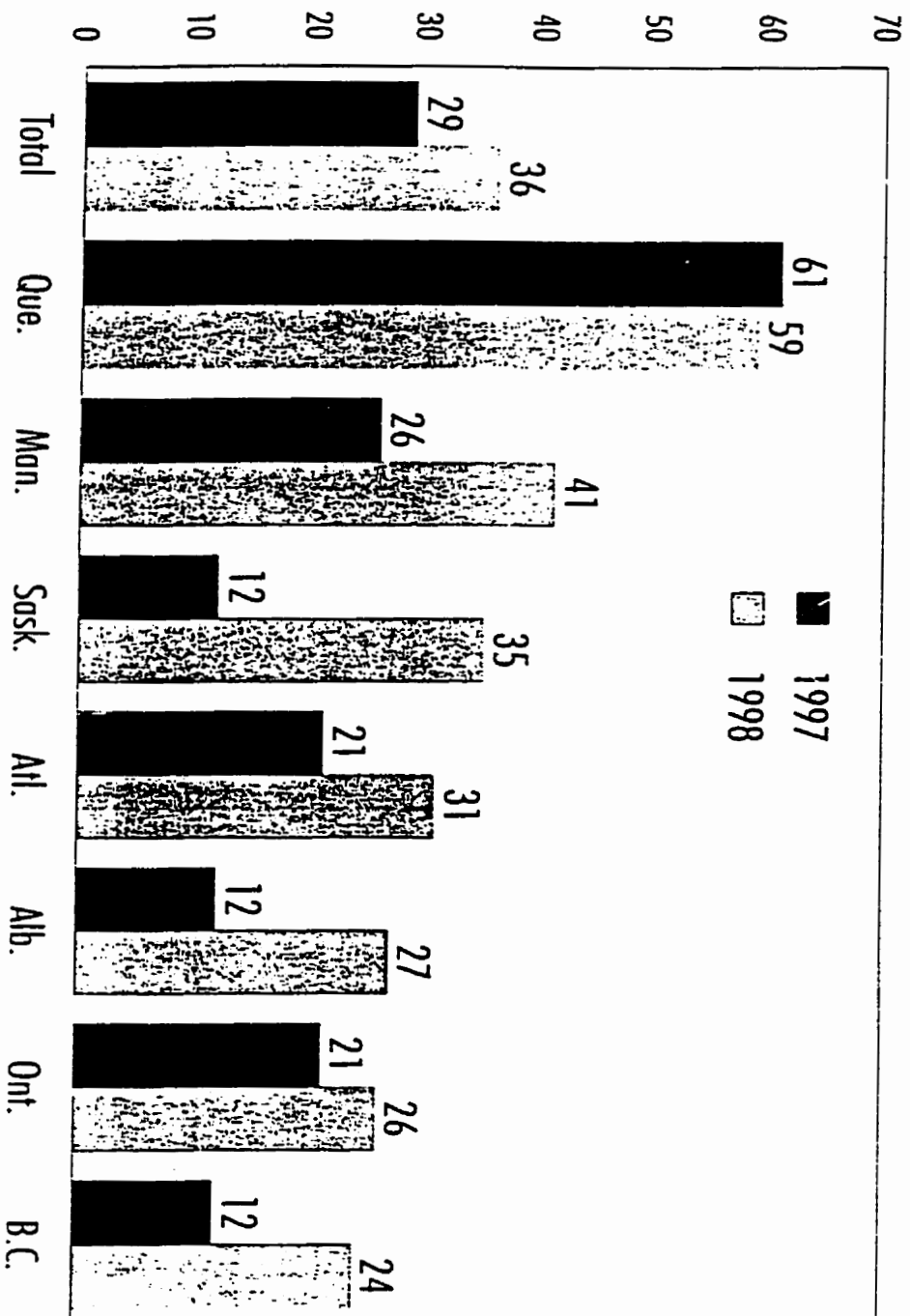


The Public Distinguishes Urgency vs. Importance



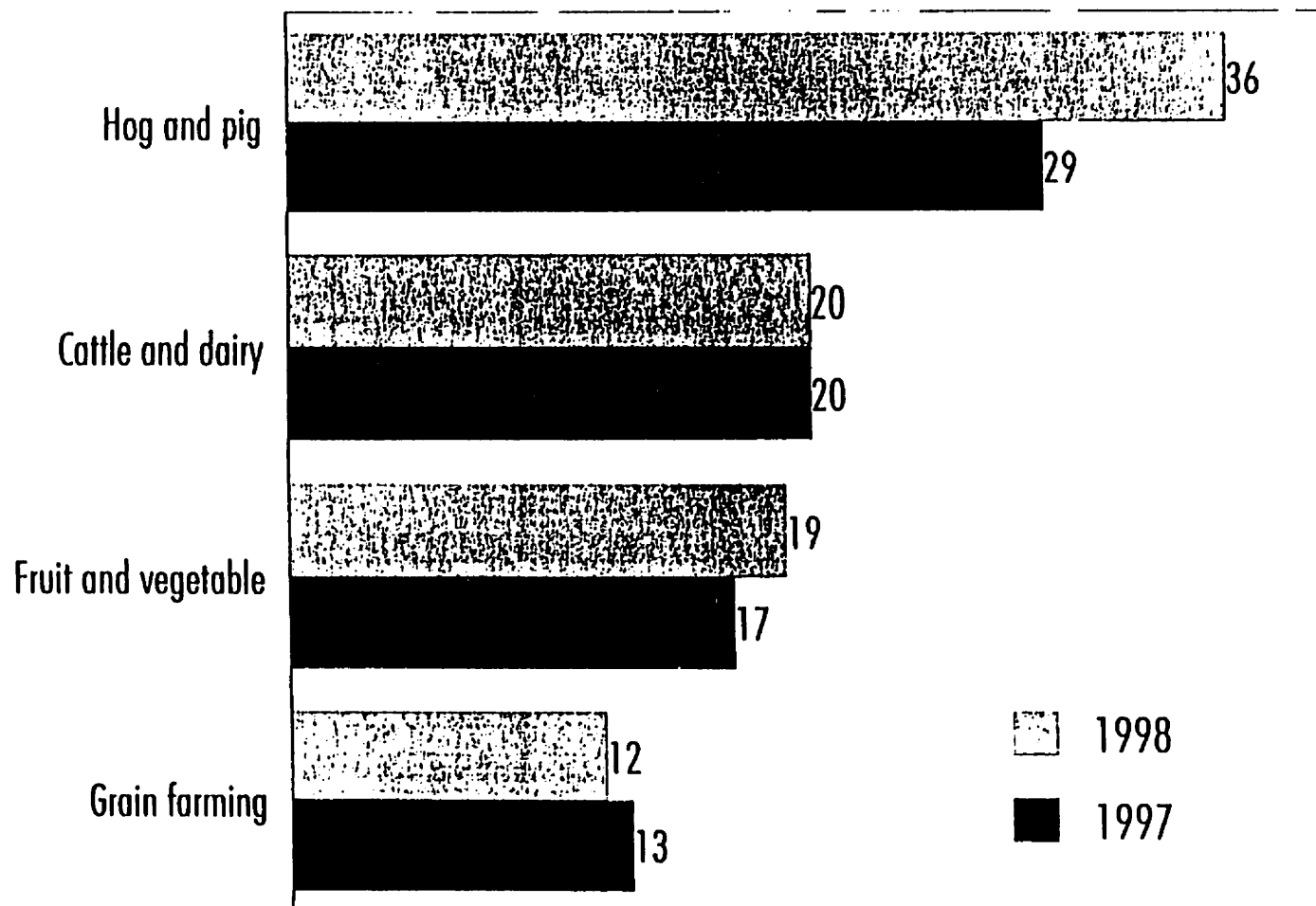
Farming With Most Negative Impact

"Hog and Pig Farming"



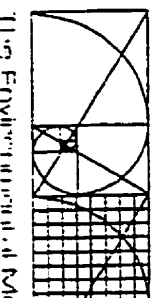
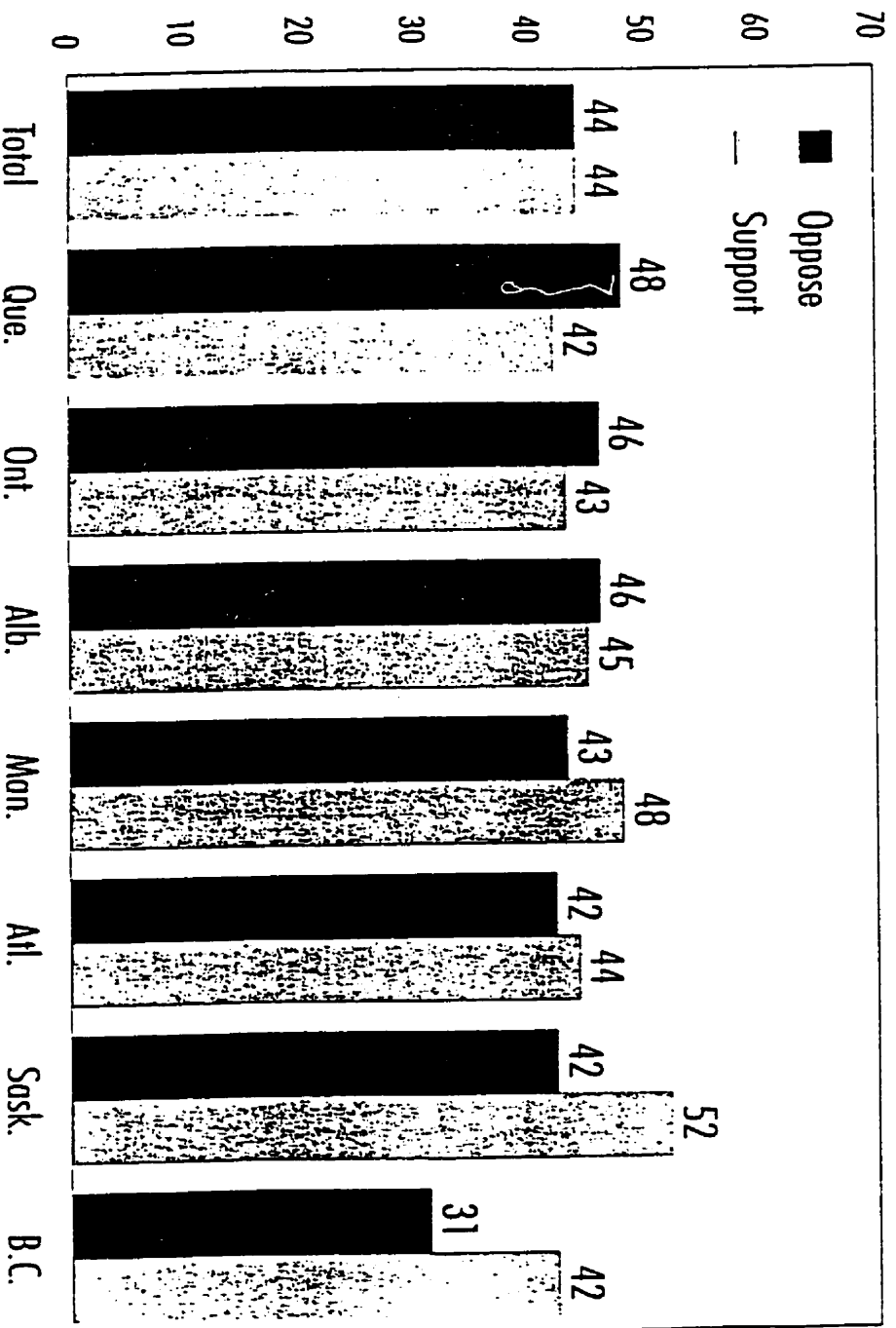
Farming With Most Negative Environmental Impact

1997 - 1998



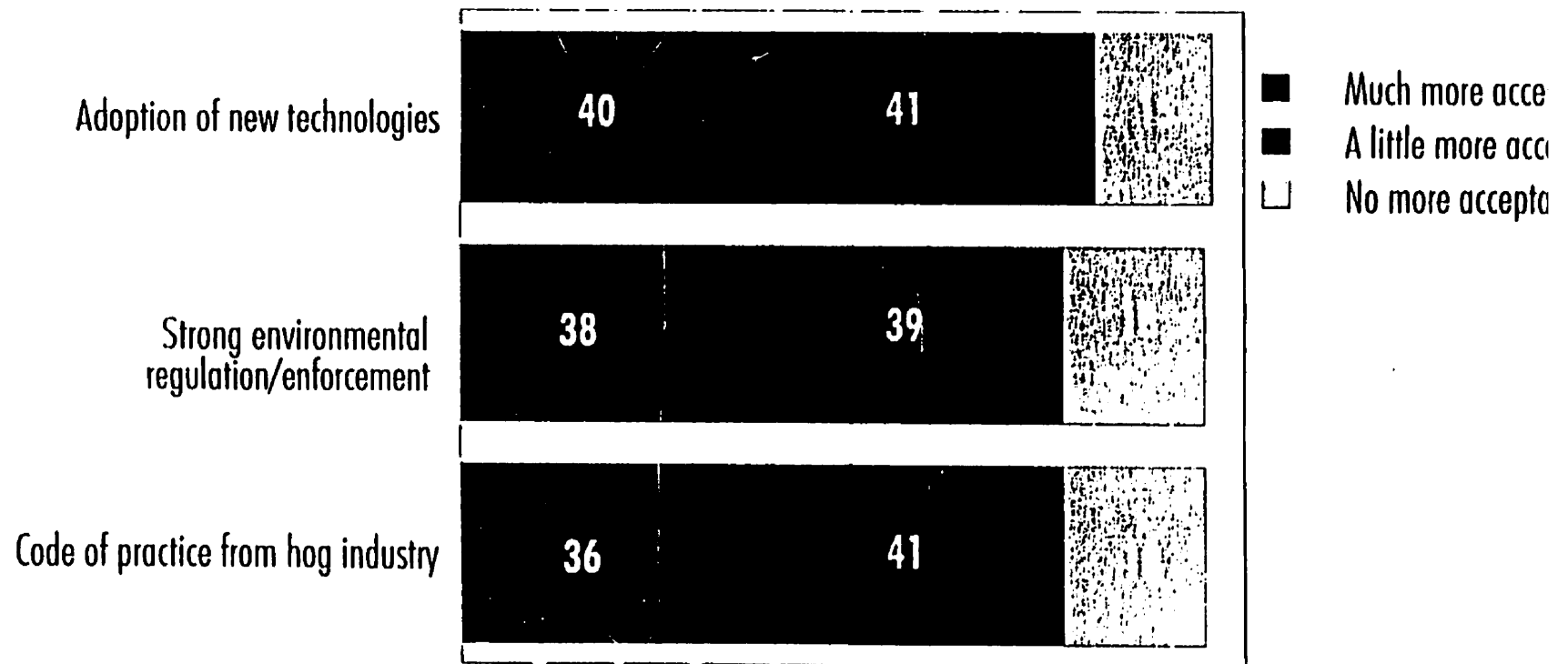
Major Increase in Hog Farming in Your Region

"Support" vs. "Oppose"



What Would Make an Increase in Hog Production in Your Region More Acceptable?

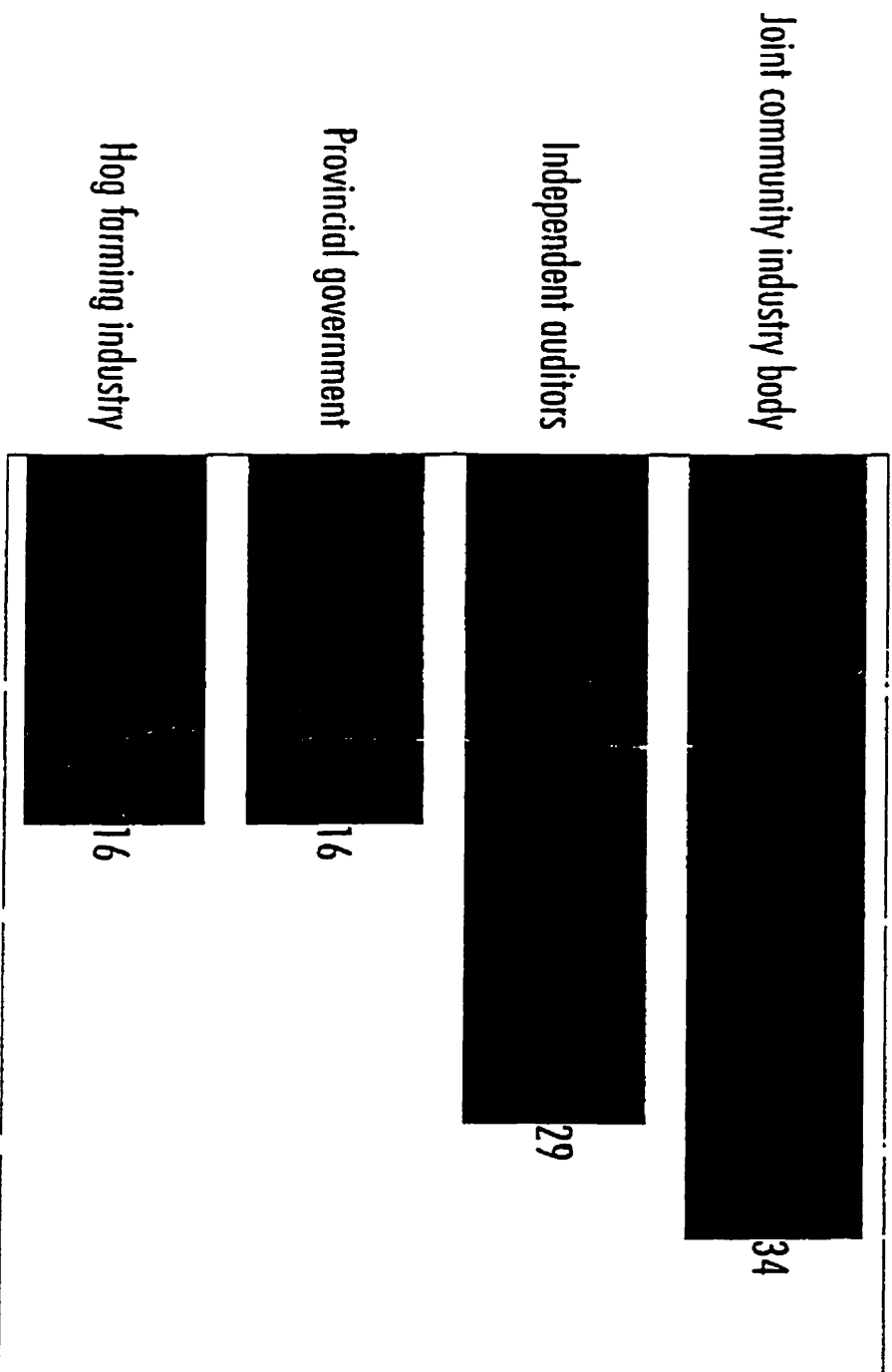
April 1998



Subsample: Respondents in rural areas

Best Organization to Undertake Environmental Monitoring and Public Reporting

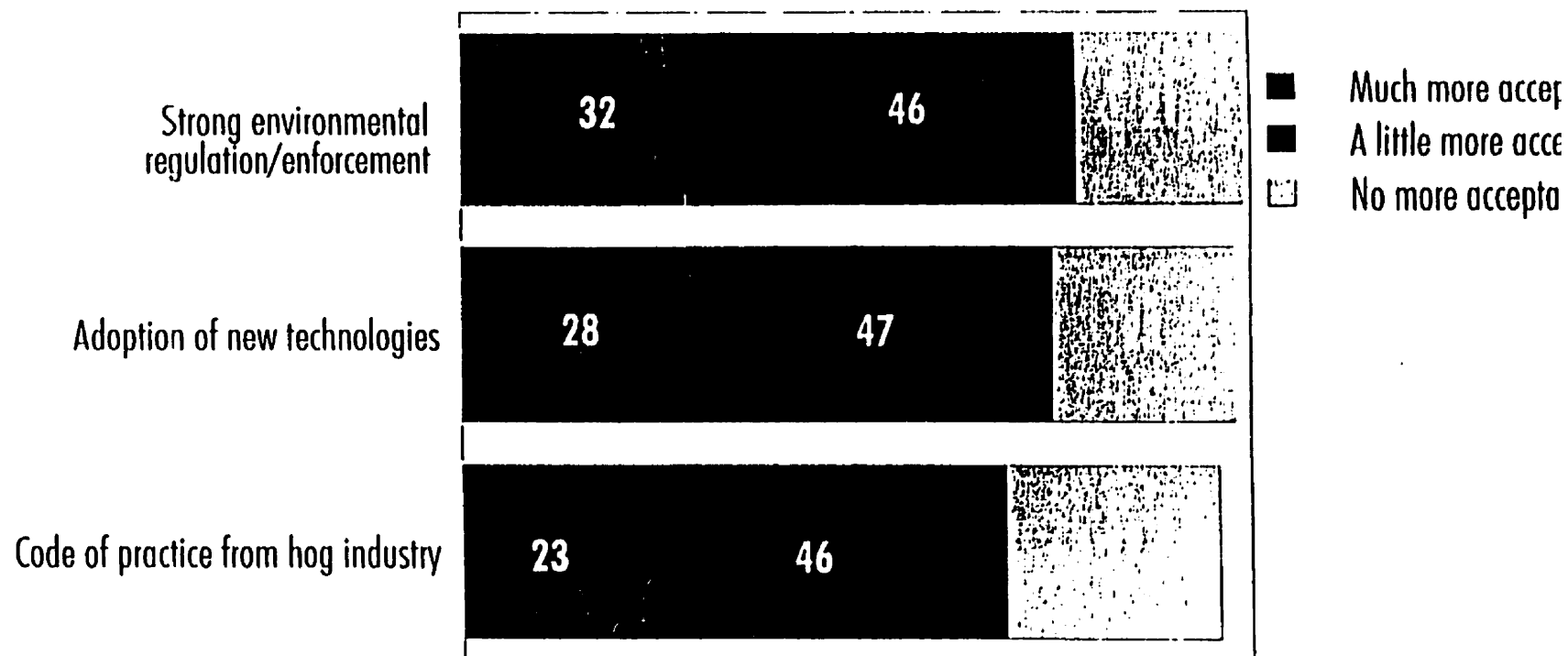
April 1998



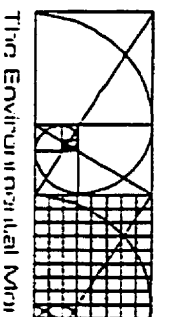
Subsample: Respondents in rural areas

What Would Make an Increase in Hog Production in Your Region More Acceptable?

Opposed to Hog Farming April 1998

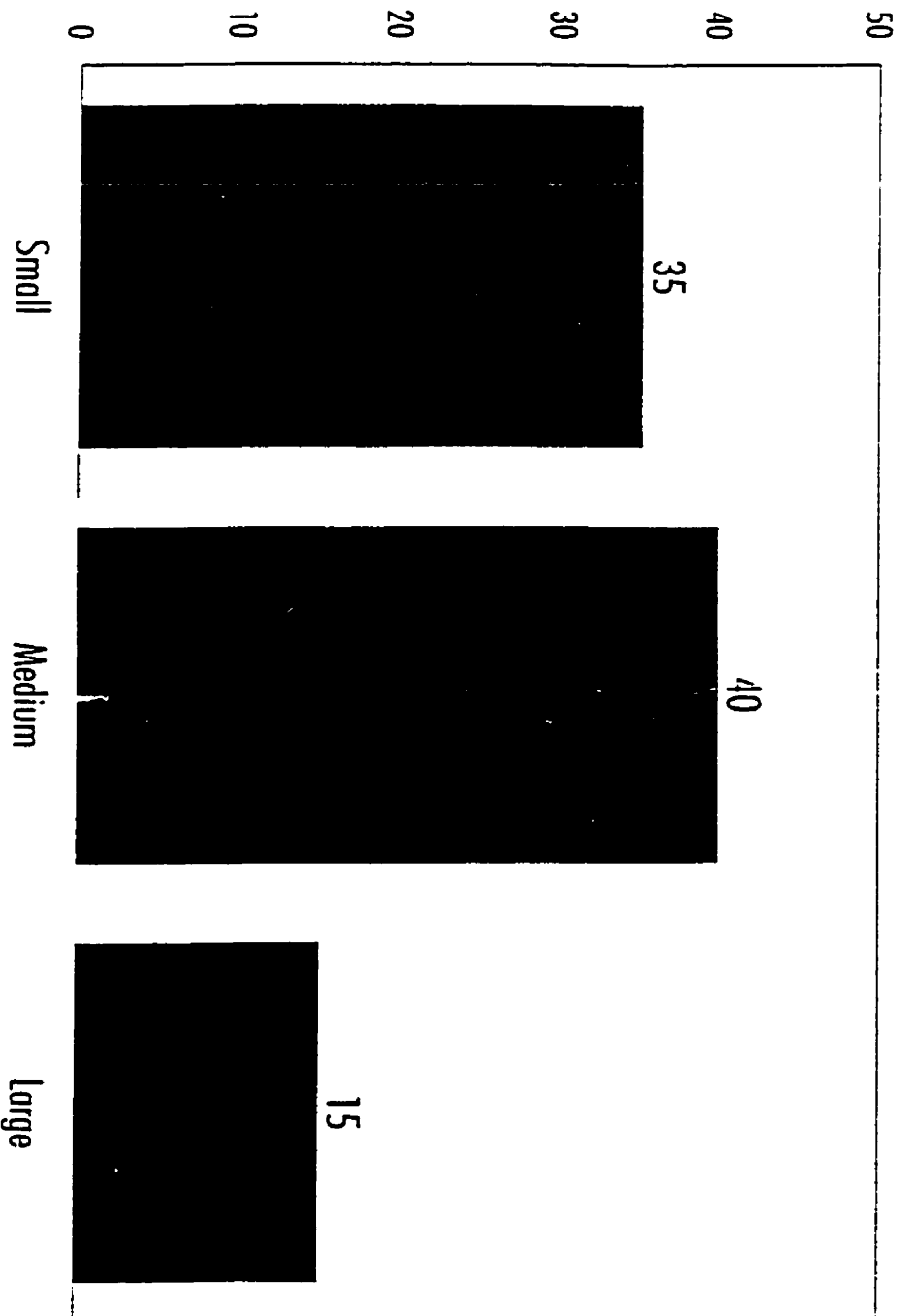


Subsample: Respondents in rural areas

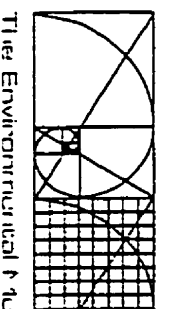


Most Environmentally-Friendly Hog Farm – Size

April 1998

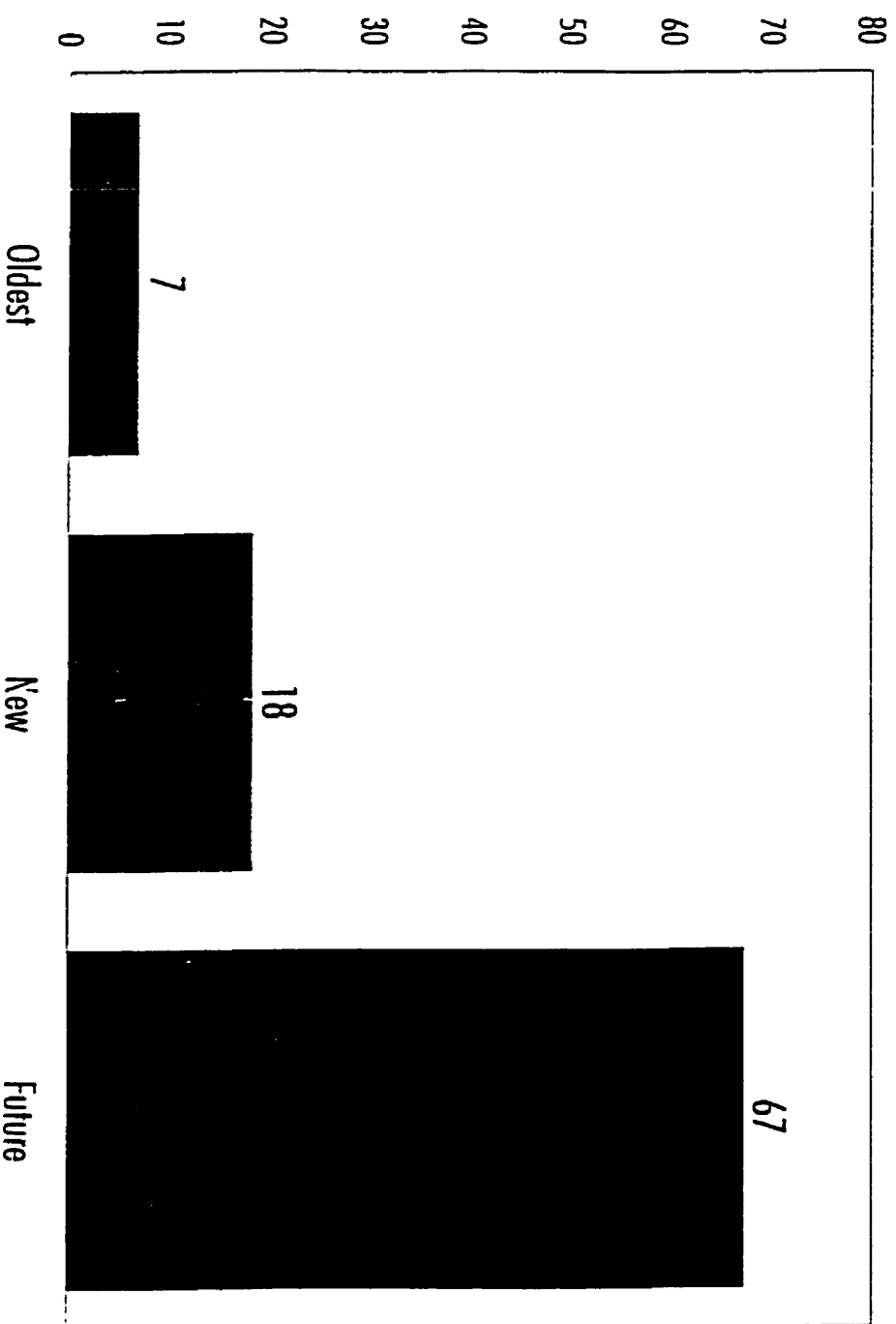


Subsample: Respondents in rural areas

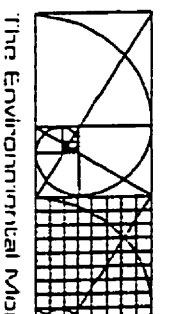


Most Environmentally-Friendly Hog Farm -- Age

April 1998

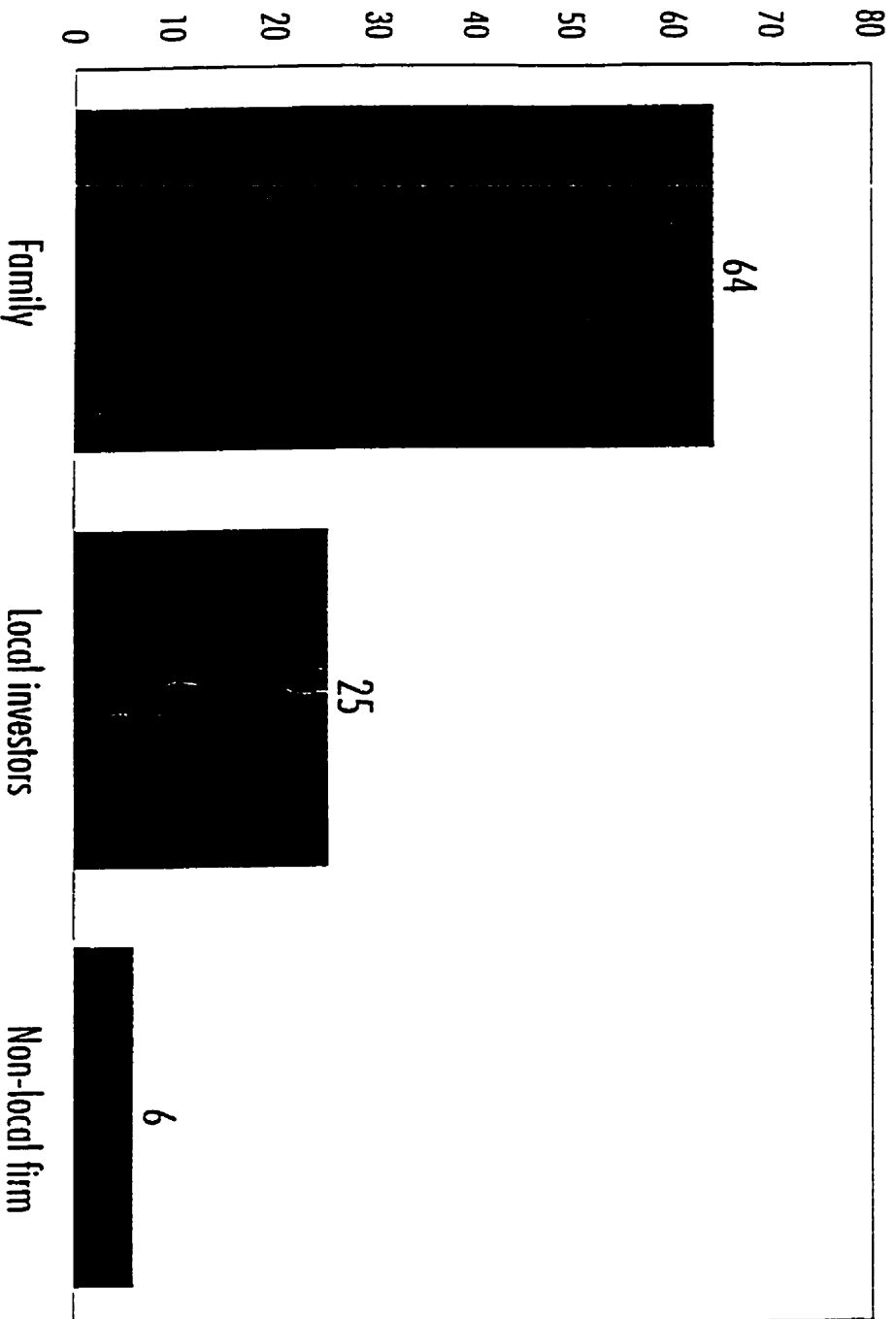


Subsample: Respondents in rural areas

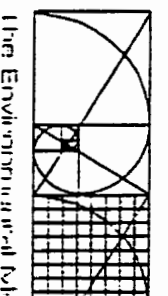


Most Environmentally-Friendly Hog Farm – Ownership

April 1998

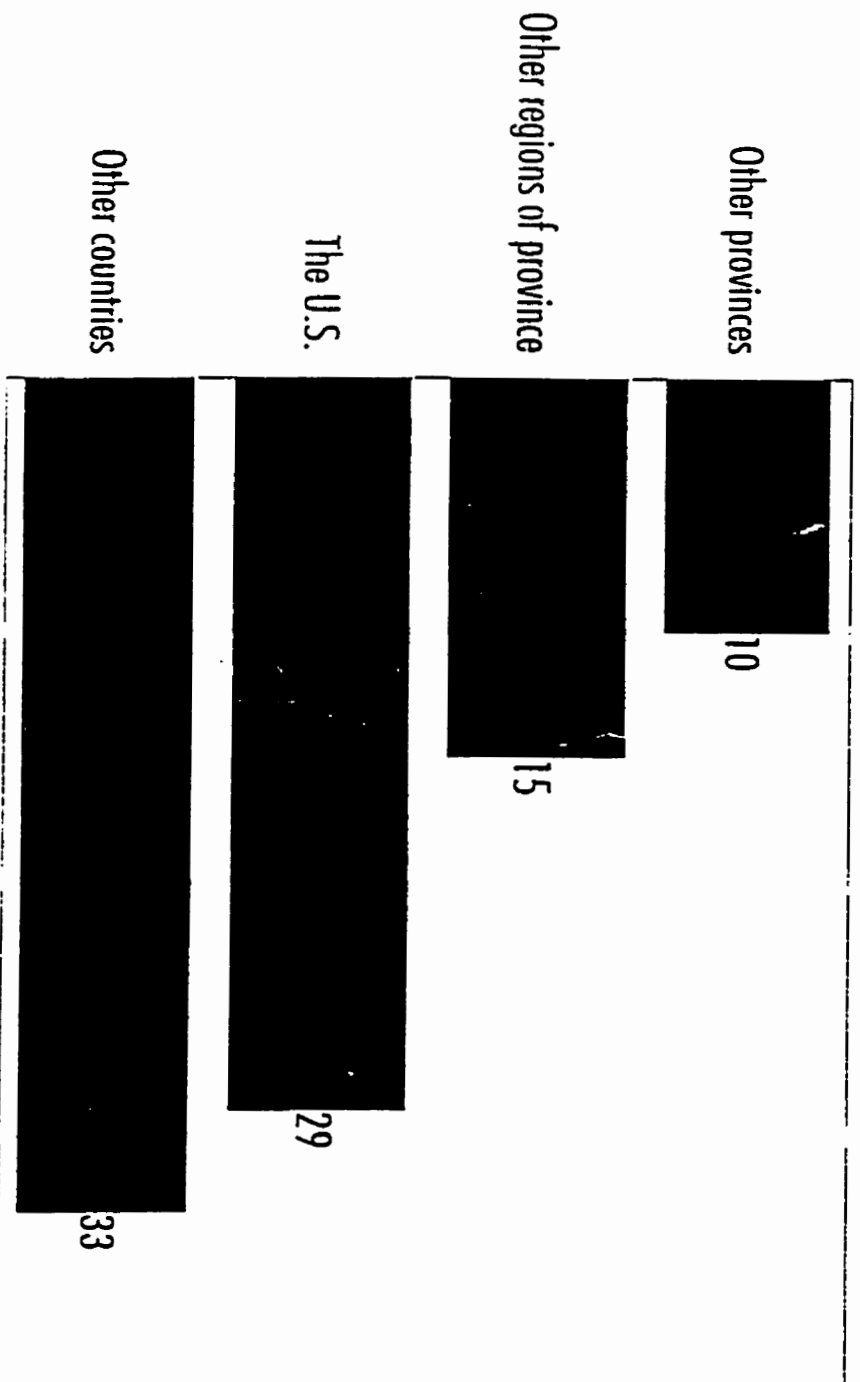


Subsample: Respondents in rural areas



Hog Producers in Your Region Compared to Those in...

Net Rating (More - Less Responsible) April 1998



MANURE MANAGEMENT PLAN

All livestock operations in Manitoba with 400 animal units (A.U.) or more are required under Section 13(1) of The Livestock Manure and Mortalities Management Regulation, MR 42/98 under The Environment Act, to submit an annual manure management plan to Manitoba Environment, at least 60 days prior to the application of manure to fields. If you require technical assistance, please contact your local Manitoba Agriculture District Office or consult a professional agrologist. Please complete this form and forward to the Environment Livestock Program, Manitoba Environment, 284 Rainer Ave, Unit 5, Box 21450, Steinbach MB R0A 2T3. Phone: 204-346-6060/Fax: 204-326-2472

Proprietary (confidential) and personal information will be protected in accordance with Manitoba law.

Name of operation (legal name) _____

Location of operation _____
Qtr Sec Twp Rge E/W or River Lot and Parish

Municipality _____

Mailing Address _____

Street or box number _____

City/Town/Village _____

Postal Code _____

Name of operator _____

Contact Numbers _____

Business _____

Residence _____

Cell _____

Fax _____

FOR GOVERNMENT USE ONLY	
Received by: _____	Date: _____
Office: _____	
Follow-up required:	Yes <input type="checkbox"/> No <input type="checkbox"/>
Nature of follow-up: _____	

ANIMAL UNIT ¹ (A.U.) INVENTORY LIST						
	A.U. Produced by One Livestock		Number of Livestock of Each Type	A.U. for Each Livestock Type	Days in confinement ²	Days out in pasture
Dairy Milking Cows (including associated livestock)	2.0	X	_____	= _____	_____	_____
Beef Beef Cows ³ , inc. associated livestock	1.20	X	_____	= _____	_____	_____
Backgrounder & grass cattle ⁴	0.475	X	_____	= _____	_____	_____
Feedlot cattle ⁵	0.75	X	_____	= _____	_____	XXXX
Hogs						
Sows, farrow to finish	1.25	X	_____	= _____		
Sows, farrow to weanling	0.33	X	_____	= _____		
Sows, farrow to nursery	0.25	X	_____	= _____		
Weanlings	0.02	X	_____	= _____		
Grower/finishers	0.18	X	_____	= _____		
Boars	0.14	X	_____	= _____		
Chickens						
Broilers	0.0059	X	_____	_____		
Roasters	0.0091	X	_____	_____		
Layers	0.01	X	_____	_____		
Pullets	0.0033	X	_____	_____		
Broiler Breeder Pullets	0.0033	X	_____	_____		
Broiler Breeder Hens	0.01	X	_____	_____		
Turkeys						
Broilers	0.0083	X	_____	_____		
Heavy Toms	0.0143	X	_____	_____		
Heavy Hens	0.0083	X	_____	_____		
Horses (PMU)						
Mares, including associated livestock	1.33	X	_____	_____		
Sheep						
Ewes, including associated livestock	0.20	X	_____	_____		
Feeder lambs	0.10	X	_____	_____		
Other Livestock						
All other except poultry	2.5 ⁶	X	_____	_____		
Other poultry	7.5 ⁶	X	_____	_____		

¹One animal unit is defined as the number of livestock required to excrete 73 kg (160 lbs) of nitrogen in a 12 month period; please refer to the *Farm Practices Guidelines for Beef/Dairy/Hog/Poultry Producers in Manitoba* for more information.

²For livestock kept in confined livestock areas e.g. wintering corrals or paddocks and on pasture, report days in confinement and days on pasture.

³Do not include calves or replacement heifers; e.g. for 100 cow calf pairs with 30 replacement heifers, simply enter 100.

⁴Weaned calves; do not include cow numbers.

⁵Cattle on finishing rations intended for slaughter.

⁶This value is for 1000 kg live animal weight; divide this number by 1000 and multiply by the average body weight of the livestock in kilograms, before multiplying by the number of livestock.

MANURE SYSTEM INFORMATION

TYPE OF LIVESTOCK (One page per type; please reproduce page 3 and 4 for each type of livestock with 400 A.U. or more on the farm.)

TYPE OF STORAGE SYSTEM

- | | |
|---|--|
| <input type="checkbox"/> Enclosed | <input type="checkbox"/> Daily scrape |
| Liquid System <input type="checkbox"/> Open (except earthen) | Solid System <input type="checkbox"/> Manure pack |
| <input type="checkbox"/> Earthen | <input type="checkbox"/> Open lot |

Volume of Manure to be Land Applied

- ☐ Imp. Gallons (liquid manure)
- ☐ Tons (solid manure)
- ☐ Cubic feet

Manure Analysis

Actual (1) or estimated (2) total nitrogen content in the manure

☐ lb/1000 gal

☐ lb/ton

(1) Please attach manure analysis report with this form.

(2) If estimated, please indicate your source of information:

- ☐ *Farm Practices Guidelines for Beef/Dairy/Hog/Poultry Producers in Manitoba*
- ☐ Average values published by analytical laboratory (specify laboratory): _____
- ☐ Other source (specify): _____

Field Application Details

Time of Application

- ☐ Spring
- ☐ Summer
- ☐ Fall

Application method

- ☐ Broadcast
- ☐ Broadcast and incorporate within 48 hours
- ☐ Injection
- ☐ Irrigation/sprinkler

Producer application ☐

Custom application ☐ Name of applicator: _____

Anticipated Manure Application Starting Date: _____

Fields to be manured must be soil sampled and the analytical reports submitted to Manitoba Environment. Sound soil sampling procedures, as outlined on page 6 of this form, are required to obtain an accurate soil nutrient assessment.

INSTRUCTIONS FOR FILLING OUT THE MANURE MANAGEMENT PLAN

B-4

ANIMAL UNIT (AU) INVENTORY LIST

- Determine the category in which your livestock operation fits.
- Calculate and indicate the A.U.'s for each type of livestock in your operation.
- If you are unsure as to which category your livestock operation fits into, contact your Regional Agricultural Representative office or Regional Manitoba Environment office.
- Do not double count animals.

MANURE SYSTEM INFORMATION

- Ensure one page is submitted for each type of livestock in your operation with 400 or more animal units (A.U.).
- Manure analysis section:

- 0 Ensure manure nitrogen ("N_{man}") content is filled out on this form.
- 0 If manure has been sampled, obtain manure nitrogen content from the analysis report and attach a copy of the analysis report.
- 0 If manure nitrogen content is being estimated, please use a reliable source of information and indicate this source on the plan.
- 0 If you require assistance arriving at this estimate, please contact your Regional Agricultural Representative office or Regional Manitoba Environment office.
- 0 If the manure is being checked in the field by a custom applicator, please indicate in this section.

MANURE MANAGEMENT PLAN

- Ensure one page is submitted for each type of livestock operation with 400 or more animal units (A.U.).

"Field Size" Column

- 0 Indicate only the field acreage on which manure will be applied, considering recommended setbacks and excluding land that may not be suitable for application (e.g. low areas, brush, sink holes, etc.).

"Soil Texture" Column

- 0 Note that Manitoba Environment Regulations make provisions for two classifications of soil:
 - medium to heavy textured soils (sand loam to clay), indicated as "MH";
 - lighter texture soils (loamy sand to sand), indicated as "L".
- 0 Indicate in soil column which category each parcel would fall into.
- 0 Soil texture analysts may be required to determine which of those classifications best describes your soil.

If you require assistance in determining a classification, contact your Regional Agricultural Representative office or Regional Manitoba Environment office.

"Soil Nitrate Nitrogen" Column

- 0 This information can be obtained from the soil analysis report.
- 0 Ensure soil testing procedures as indicated on the attached sheet have been followed.
- 0 Ensure you attach a copy of the soil analysis reports to this plan.

"Target Yield" Column

- 0 Indicate anticipated target yield for the crop year on that site.
- 0 Contact your Regional Agricultural Representative office or Regional Manitoba Environment office, should you have difficulty in estimating this target yield.

"Crop Nitrogen Recommendation" Column

- 0 This information can be obtained from the soil analysis report.
- 0 If you have any difficulty interpreting this report, please contact your Regional Agricultural Representative office or Regional Manitoba Environment office.

"Manure Application Rate" Column

- 0 Report your intended application rate in gallons per acre (or tons per acre). Your Regional Agricultural Representative office or a professional agronomist can also be of assistance for this step.

"Additional Nitrogen Fertilizer" Column

- 0 If applicable, please indicate the amount of commercial fertilizer that will be applied in addition to the manure.

Please ensure that this Manure Management Plan, completed and signed, is submitted along with all the required analysis reports to the Environment Livestock Program at Manitoba Environment, 204 Reimer Ave., Unit 5, Box 21450, St. James, MB R0A 2T3 (Phone: 204-346-8060/Fax: 204-329-2472) at least 60 days prior to the beginning of land application.

Other acceptable soil sampling procedures include the "Benchmark" soil sampling procedure, the "Grid" soil sampling procedure and the "Landscape Directed" soil sampling procedure. Additional information on these procedures can be obtained from your local Manitoba Agriculture office or your Regional Manitoba Environment offices.

B-6

Reliable results can only be made if the samples are fully representative of the field or area from which they are taken. In addition, proper sampling and sample handling procedures must be followed.

Selecting Areas to Sample

Soil sampling is normally done on an individual field basis with a single composite sample representing the whole field. Individual fields which are not uniform should be divided into smaller sampling units with a single composite sample representing each unit. The soil in each of these sampling units should have the same colour, texture, cropping history and fertilizer or manure treatments. Look for differences in slope, erosion, crop growth and yield. Any area that is different in these features and which is large enough to have manure applied at a different rate should be sampled separately. Problem areas such as saline spots, poorly drained potholes, and eroded knolls should not be sampled unless they represent a significant portion of the field. If they do, obtain separate samples. All abnormal areas such as old manure piles, burn piles, haystacks, corrals, fence rows or farmstead sites should also be avoided as well as locations of past chemical or fertilizer spills. Samples should not be taken along headlands, within 15 metres (50 ft) of field borders or snail/belts or within 45 metres (150 ft) of built up roads. If the field has been cultivated, take the sample from the compacted soil in the wheel track.

Sample one location per 2 hectares (5 acres) to a depth of 60 cm (2 ft). In all cases, however, a minimum of 15 sample locations per individual field or sampling unit should be taken. A single composite sample is then formed from 15 or more samples.

Equipment and Supplies

Special augers or probes designed for soil sampling must be used. These may be hand or hydraulic powered and are often available from fertilizer dealers. Independent firms may also be available to custom sample fields. Use two clean, labeled plastic pails for collecting samples. Information sheets, sample containers and shipping boxes are available from the lab conducting the analysis.

Note that all mechanical and hydraulic samplers may yield poor samples on very dry or very wet soils. In all cases avoid getting the topsoil in the subsoil samples, or subsoil in the topsoil samples. For example, in very dry soils, be careful not to let topsoil spill into the hole before taking deeper samples.

Handling Samples

Take care to keep samples clean and uncontaminated. Clean the probe, take a few samples from the new field and discard them before proceeding with actual sampling. Send samples to the laboratory immediately. If this is not possible or if a delay of more than 48 hours is anticipated, freeze or dry the samples. Follow these steps to dry samples:

- mix the soil in each container thoroughly, breaking lumps to less than 12 mm (1/2 inch);
- remove about 0.5 litre (1 pint) of soil and spread on a piece of clean paper;
- completely dry at a temperature of not more than 30°C (do not dry in an oven at a high temperature since this can change the phosphorus, potassium, and sulphur levels);
- care should be taken to avoid contamination of the samples with foreign materials such as commercial fertilizer, manure, salt, baking soda, water, dust, etc. (e.g. samples should not be dried on old fertilizer or feed bags or in areas where fertilizers have been handled);
- a fan may be used to ensure constant air flow over samples and enhance drying.

Once the sample is thoroughly dry, fill the soil sample cartons. Label each carton with the correct field number and sample depth. Complete an information sheet for each field.

MANITOBA ENVIRONMENT - REGIONAL OFFICES

Eastern-Interlake Region Unit 5, 284 Reimer Ave Box 21450 Steinbach MB R0A 2T3 PH: 346-6060 Fax: 326-2472	Eastern-Interlake Region 102-235 Eaton Ave Selkirk MB R1A 0W7 PH: 785-5030 Fax: 785-5024	Winnipeg Region 123 Main St., Suite 160 Winnipeg MB R3C 1A5 PH: 945-7100 Fax: 945-2420
South-Central Region 25 Tupper St. N. Portage la Prairie MB R1N 1K1 PH: 239-3188 Fax: 239-3185	South Central Region 355 Main Street Winkler MB R5W 1C4 PH: 325-1750 Fax: 325-1758	Northern Region 3rd & Ross Ave Box 2550 The Pas MB R9A 1M4 PH: 327-8307 Fax: 323-1773
Park-West Region 204 - 1011 Rosser Ave Brandon MB R7A 0L5 PH: 725-6064 Fax: 725-6567	Park-West Region 27 Second Ave SW Dauphin MB R7N 1E5 PH: 622-2123 Fax: 622-2306	Park-West Region 201 Fourth Ave S Swan River MB R0L 1Z0 PH: 734-3436 Fax: 734-5615

B-8

Livestock type: _____ Manure Form (liquid/solid): _____

[illegible]

^a Indicate the recommended nitrogen (N) application rate suggested in the soil analysis report.

Prepared by: _____

Table 1: Approach to Addressing Intensive Livestock Operations By Province

Legal & Jurisdictional Context	Newfoundland	Nova Scotia	Prince Edward Island	New Brunswick
Is there specific legislation?	No	No	No	New Livestock Operations Act
Are there provincial strategies/policies?	Draft Commodity Sector Guidelines	Manure mgmt guidelines	Yes ("Cultivating Island Solutions, 1999)	Yes (Manure Management Guidelines)
Do programs focus on livestock only ?	NO	No	No	Yes
What is the key Provincial Department?	Agriculture	Agriculture	Agriculture	Agriculture
Are provincial approvals required?	no	no	No	Yes (license under New Livestock Operations Act)
Standards for siting intensive livestock operations (general applicability)				
Building permits/zoning	Prov Legn, inconsistent mun. implementation	Prov. Legn., inconsistent mun. implementation	Prov. Legn., inconsistent mun. implementation	Prov. Legn., inconsistent mun. implementation
Separation distances	Yes (draft guidelines)	Yes (implementation by some municipalities)	Yes	Yes
Manure storage (structure/ capacity)	draft guidelines	210 days	210 days	210 - 250 days (legislation)
Environmental studies	No	no	yes	Option
Mandatory public meetings/notification	No	No	Notification only	No
Nutrient Management Plans (NMP)	No	no	No	Yes (Manure Management Guidelines)
3rd party review of submissions	-	-	-	Province reviews
Who can complete NMP	-	-	-	Staff agrologist
Approach to enforcement	-	-	-	Complaint driven (Ag Review Comm.)
Register land for nutrient application	No	No		No
Prohibit winter manure application	No	No	No	No
Limitations on livestock densities/total size	No	No (yes)	No	Indirectly - NMP
Land base requirements for spreading	No	No	Yes	Yes
Thresholds defining large	NA	NA	Range 30-60 LU	Yes

Table 1: Approach to Addressing Intensive Livestock Operations By Province (continued)

Legal & Jurisdictional Context	Quebec	Ontario	Manitoba
Is there specific legislation?	Environmental Quality Act	No	No
Are there provincial strategies/policies?	yes	Yes	Yes
Do programs focus on livestock only?	Livestock /crops	Livestock Focus	Livestock Focus
What is the key Provincial Department?	Environment	Agriculture	Environment/Agriculture
Are provincial approvals required?	Yes	No	Yes (NMP and Lagoons)
Standards for siting intensive livestock operations (general applicability)			
Building permits/zoning	Prov. Legn., Municipal Implementation	Prov. Legn., Municipal Implementation	Prov. Legn., Municipal Implementation
Separation distances	Legislation	Prov. Policy, municipal implementation	Provincial guideline (implemented by some municipalities)
Manure storage (structure/ capacity)	250 days- legislation	240 days (Prov. Strategy) some municipal implementation	Dept of Env't approvals req'd above 400 a.u.
Environmental studies	Yes	No	Required by some municipalities
Mandatory public meetings/notification	No	No	Required by many municipalities
Nutrient Management Plans (NMP)	yes	Prov. Strategy, implemented by some municipalities	Yes
3rd party review of submissions	Yes (government)	Yes	
Who can complete NMP	Agrologist	Farmers (some municipalities require consultants)	
Approach to enforcement	Fines- complaint driven	Local Ag review Comm. (some municipalities try to enforce)	Random Audits
Register land for nutrient application	yes	Some municipalities considering	
Prohibit winter manure application	yes	No	Yes for Large operations
Limitations on livestock densities/total size	Indirectly through Agro-environmental fertilization plan	Indirectly through NMP	Indirectly through NMP
Land base requirements for spreading	Indirectly through Agro-environmental fertilization plan	NMP	NMP
Thresholds defining large	75 LU	150 LU	400 LU (200 LU some mun.)

Table 1: Approach to Addressing Intensive Livestock Operations By Province (continued)

Legal & Jurisdictional Context		Saskatchewan	Alberta	British Columbia
Is there specific legislation?	Agricultural Operations Act	No	No	No
Are there provincial strategies/policies?	yes	Yes	Yes	Yes
Do programs focus on livestock only?	Livestock	Livestock	Livestock	Both (mushroom, greenhouse)
What is the key Provincial Department?	Agriculture	Agriculture	Agriculture	Environment, Agriculture
Are provincial approvals required?	Yes	No	No	No
Standards for siting intensive livestock operations (general applicability)				
Building permits/ zoning	Prov. Legn, municipal requirement	Yes	Yes (municipal implementation)	Prov. Legn, municipal requirement
Separation distances	Yes-where applied by municipality	Yes	Yes	Manure storage- water courses
Manure storage (structure/ capacity)	180 days	180 days (varies by livestock)	150 days	
Environmental studies		Yes	No	No
Mandatory public meetings/ notification	Y (recommended under guidelines)	In some municipalities	No	No
Nutrient Management Plans (NMP)	Yes	Yes	No	No
3rd party review of submissions	By government		-	-
Who can complete NMP	Anyone		-	-
Approach to enforcement	Complaint driven	Peer Review, Stop Order (Mun. Gov't Act)	-	-
Register land for nutrient application	No		No	No
Prohibit winter manure application	No	Yes according to Code of Practice (some municipal implementation)	Indirectly (waste Mgmt)	
Limitations on livestock densities/ total size	Indirectly NMP	Indirectly NMP	No	No
Land base requirements for spreading	NMP	NMP	No (spreading guidelines)	
Thresholds defining large	300 LU	Varies by livestock (some Mun.)	NA	

North Norfolk, R.M.
Box 190
27 Hampton St E.,
MacGregor, MB R0H 0R0

June 1999

INTENSIVE HOG OPERATIONS SURVEY

Dear Rural Council Members,

My name is Jeff Price, and I am completing a master's thesis at the University of Manitoba, Department of City Planning entitled "Sustainability of Land Use for Future Intensive Hog Operations in the Central Agricultural Region of Manitoba". The Central Agricultural Region consists of 24 Rural Municipalities, including your own, to the immediate south and west of Winnipeg. I have acquired a keen interest in this subject as a result of many influences, not the least of which has been living in the R.M. of St Francois Xavier, and serving as a councillor on the R.M. Council since November of last year. I have chosen the Central Agricultural Region both as a resident of the Region, and due to it being representative, in many important respects, of the entire province (agricultural, climatic, geographic features, economy, etc).

In my discussions with Rural Development Manitoba, I have learned that the planned expansion of the hog farming industry will most likely impact every R.M. in the province over the next five to seven years. Before embarking on this expansion of the hog industry however, I believe further study of the social, environmental, and economic factors in hog farming, as they are related to land use, should be carried out. As a part of this thesis, I plan to conduct a survey of all rural governments in the Central Region, which when examined with the literature on the subject should give some indication as to the sustainability of the industry. I believe this work will be of interest and possible use by your council should future application be made to your R.M. for hog barn development.

I would very much appreciate if as a group, Council would take the time to complete the attached two page survey of 16 questions and return it to me at your earliest convenience. Although your R.M. has been indicated on the questionnaire, be assured that this is only for my own record keeping. I will not be using specific names of municipalities in referring to any of the responses you give. I can be reached at (204) 864-2909 or at the address below should you have any questions, or through the R.M. of St Francois Xavier office (fax 864-2390) for completed surveys. I have also included a stamped self-addressed envelope for your convenience. Should there not be sufficient room to complete written answers please include additional pages as necessary. If you would like to receive a copy of some or all of my completed work, I would be happy to comply when done sometime later this summer. Thank-you for your time and attention, I will be in contact in the near future.

Sincerely,

Jeff Price

Mr J. Price, P.Eng.,
409 McKay St,
St Francois Xavier, MB R4L 1A9

LAND USE SUSTAINABILITY FOR HOG BARNs IN THE R.M. OF ST FRANCOIS XAVIER

QUESTIONNAIRE

- | | | |
|---|-----|----|
| 1. Do you have existing hog operations in your RM? | Yes | No |
| 2. Are you anxious to attract more hog operations to your RM? | Yes | No |
| 3. Do you have concerns with potential future hog operations?
If yes, please list examples of your concerns. | Yes | No |
| | | |
| 4. Do you have by-laws/procedures for assessing proposed hog operations? | Yes | No |
| If no, are you considering or will you consider such a by-law/procedure? | Yes | No |
| 5. Are you satisfied with your current hog barn approval process? | Yes | No |
| 6. How important are hog barns to development of your RM? <u>VERY</u> 1 2 3 4 5 <u>NOT VERY</u> | | |
| 7. Are you concerned how future hog operations in your RM might affect
neighbouring RMs? | Yes | No |
| If yes, might an extremely adverse reaction to hog barn development from a neighbouring
RM significantly alter or even cancel a proposed development in your RM? | Yes | No |
| 8. Are you aware of a provincial government strategy regarding the increase in
number/size of hog operations in the Province? | Yes | No |
| If yes, is this strategy important to your RM? | Yes | No |
| 9. Is monitoring the legislative compliance (environmental etc) of hog operations
completely the responsibility of the province? | Yes | No |
| 10. Should rural residents be prepared to 'live' with odour problems from hog
operations as a function of 'living in the country'? | Yes | No |
| 11. Do you believe your RM has a role to play in resolving potential disputes
between hog producers and rural residents? | Yes | No |

12. Does your RM approve hog barns as a conditional use of agricultural land? Yes No
If not by conditional use then by what method?
13. Are there areas of concern with existing provincial legislation? Yes No
(for example the Environment Act, Planning Act, Farm Practices Protection Act, etc)
If yes, what concerns do you have?
14. Have there been difficulties between rural residents and hog producers in your RM? Yes No
If yes, identify one or two situations that outline the process used to deal with these difficulties.
15. Do you expect that the process at question 14 will change in the next 2 to 3 years? Please explain briefly. Yes No N/A
16. If hog operations currently exist in your RM, what factors were taken into account in approving them? Please use this space to record any additional comments you wish.

Thank you for your co-operation in completing this survey. Please return to Jeff Price at: 409 McKay St, St Francois Xavier, MB, R4L 1A9, or fax to: R.M. St Francois Xavier 864-2390. Please attach extra pages as necessary.