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ECOLOGICAL FARM PRACTICES AND THE FAMILY FARM

by

Julie A. Greenwood

Department of Geography

Submitted in partial fulfilment
of the requirements for the degree
of Doctor of Philosophy

Faculty of Graduate Studies
The University of Western Ontario
London, Ontario
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ABSTRACT

The sustainability of modern agricultural systems is increasingly questioned due to evidence of environmental and economic problems. While some people propose solutions within conventional production systems, others suggest that there is a need to completely modify production systems based on ecological principles. The basic principles and differences between the two production systems have been well specified at a conceptual level, but less is known about the differences in production practices, social and structural organisation, and decision-making processes leading to the use of particular methods at an operational level.

In this thesis thirty ecological and thirty conventional farmers in Southwestern Ontario were interviewed in order to determine the social and structural characteristics of their operation, their specific production methods in the Southwestern Ontario context, and the factors that contribute to decision making leading to their choice of production methods. In particular, the relative roles of structure and agency with respect to decision making were explored. It was found that attitudes were the key to determining production practice choice for ecological farmers. Although ecological and conventional operations differ significantly in their structural characteristics, those who converted to ecological agriculture often converted operations that were originally similar in structure to existing conventional enterprises. The differences in structure appeared to arise after the decision to convert had been made. However, for conventional farmers structure played a more important role in decision-making. Thus, if ecological agriculture is to become a significant sector of agricultural production in Southwestern Ontario there would have to be a widespread shift in farmer attitudes which at this point appears unlikely.

Keywords: ecological agriculture, family farming, farmer decision-making, farmer attitudes, Southwestern Ontario agriculture
ACKNOWLEDGEMENTS

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CHAPTER ONE INTRODUCTION

1 1 Introduction

The restructuring of agricultural production has become a major research theme in rural geography. The ‘international farm crisis’ in the 1980s significantly altered the agricultural landscape and the way agricultural resources were used in most developed economies. This ‘international farm crisis’ was characterised by the oversupply of domestic markets, high costs of government subsidies and support programmes, rising farm indebtedness and bankruptcies, and increasingly unacceptable environmental damage (Bowler 1993). One of the results of the farm crisis was an uneven pattern of agricultural development, which stimulated interest from rural geographers. Geographers wanted to understand why different spatial patterns evolved and as part of this why farmers responded differently to similar forces.

The economic crisis in agriculture of the late 1970s and early 1980s raised issues relating to the survival of the family farm and the control of agricultural production by agribusiness. The independent family farm had been idealised as the appropriate form for agricultural production, and yet, in reality, concentration of ownership, and control of the system by non-farm interests were increasingly common. At the farm level, increased specialisation, intensification of capital inputs and increased scale of operations (Troughton 1986) were evident, contributing to increasing concentration of ownership and decreasing control of the production process by farmers. These forces placed the issue of the economic survival of the family farm at a high priority in research interest. Researchers examined the ways in which farm families were responding to the economic crisis and the social and economic adjustments that they made (Reinhardt and Barlett 1989, Marsden 1986, 1989, Moran et al. 1993). These studies provided a reasonable understanding of the dynamics of the social and economic organisation of the farm unit.
Although environmental problems had been recognised earlier, in the 1990s negative environmental impacts attracted increasing attention. Evidence of soil erosion and degradation, and water pollution or contamination, as the result of agricultural practices brought into question the industrial model of production. No longer were farmers viewed as benign stewards of the land, but were increasingly under public scrutiny due to the environmental impacts of their production systems. It was recognised that something needed to be done to alleviate environmental problems (Hill 1985, Troughton 1991), but opinions differed as to the extent of change required. Farmers' adjustments to the new environmental agenda also differed. Some made small adjustments to their production system, such as incorporating conservation tillage, while others converted to alternative production systems. Researchers sought to integrate their understanding of the social and economic organisation of the farm family with this new environmental dimension (Ward and Munton 1992, Ward and Lowe 1994, Lighthall 1995). However, their focus was primarily on conventional farmers and, therefore, did little to provide an understanding of alternative or ecological production systems. Thus, this thesis explores the factors which contribute to the decision-making of farm families with particular emphasis on those who have adopted ecological production systems.

Ecological production systems are defined in this thesis as organic operations in terms of their land management practices. That is, ecological farmers do not use any chemicals on their fields. In contrast, conventional farmers use chemical fertilisers and sprays to assist them with land management. The term 'ecological' was preferred over the term 'organic' because some farmers have eliminated chemicals from their cropping systems, but still use chemicals in their livestock management, and therefore are not strictly 'organic'. These farmers were included as ecological farmers in the study however. Thus, ecological and conventional farmers were differentiated on the basis of whether or not they used chemicals in their land management practices.
12 Sustainable agriculture

Much of the recent debate with respect to environmental concerns in agricultural production has centred around the concept of sustainable agriculture. A diverse literature exists on the topic, but there is little consensus as to what sustainable agriculture means at an operational or farm level. There is broad agreement at the conceptual level that no single objective function exists for achieving sustainable agriculture (Pierce 1992, Bowler 1992), and that it is a multidimensional term containing many diverse elements and goals (Brklacich et al. 1991, p 10) provide the following definition of sustainable food production systems:

A sustainable food production system will 1) maintain or enhance environmental quality, 2) provide adequate economic and social rewards to all individuals and firms in the production system and 3) provide a sufficient and accessible food supply.

To these Bowler (1992, p 241) added two other dimensions:

4) budgetary- absorb an acceptable proportion of state/public expenditure and
5) political- maintain the political support of society.

Even if agreement is reached with respect to these five goals or dimensions of sustainable agriculture, balancing these goals to produce a sustainable food production system is more difficult. Conceptual definitions of this nature can provide criteria for discerning whether a particular production system is sustainable, but they provide no practical guidance about how to attain these goals.

Meanwhile, others have advocated particular pathways for achieving sustainability. Different means are advocated based on different priorities placed on economic, social and environmental goals. Often, proponents of various means of achieving sustainability are divided between those who support the currently dominant model of production and those who oppose it by promoting a number of alternative methods of production. They are characterised by Beus and Dunlap (1990) as adherents of conventional and alternative
paradigms. Six major differences between the two paradigms are highlighted: centralisation versus decentralisation, dependence versus independence, competition versus community, domination of nature versus harmony with nature, specialisation versus diversity and exploitation versus restraint. The alternative agriculture movement is characterised by decentralisation, independence, community, harmony with nature, diversity and restraint while conventional agriculture is characterised by the opposite tendencies. Thus, both ecological and social principles are key distinguishing criteria of the two production systems.

Essentially, in the productionist (conventional) model, food sufficiency is the primary goal. Problems of sustaining the resource base or honouring the culture of the land are considered less important than the need to feed an expanding population (Douglass 1984). There is a belief in technological solutions to land resource problems and, therefore, caring for the land is not considered a priority (Ruttan 1991). There is also an associated belief in the economic system and the fact that the economic system will determine whether there is a need for change in production systems. Economic models are considered appropriate for determining when there is a need for greater consideration of the environment in the way in which land is used (Crosson 1991). Accompanying the belief in technology and the market system is a belief that the highly specialised, mechanised input intensive model of production can be sufficiently modified to reduce environmental impacts (Farrell 1984, Ruttan 1984). There is, therefore, no perceived need for wholesale changes to the food production system to accommodate environmental goals, but rather smaller modifications to the existing system. Institutions such as agribusiness and research organisations have played a central role in developing this system of farming and are loathe to explore alternatives (Schaller 1990).

Opposing the productionist model are advocates of alternative agriculture, primarily concerned with ecological systems of production, but also with social goals. They believe that systems that deplete the natural resource base and pollute the environment are unsustainable, as ultimately agricultural production is dependent on the natural resource base (Douglass 1984, Hill and Ramsey 1976). To overcome the problems of the current system of production,
ecological principles should be repositioned at the centre of decision-making (Soule and Piper 1992, Hill 1985, Gleissman 1984, Altieri et al. 1984, Jackson 1984). These authors see in natural ecosystems a generic model for redesigning stable, self-sustaining ecological systems tailored to meet local variations in the natural environment (Altieri 1991). Although the recent emphasis in the alternative agriculture movement has been with the ecological goal, a concern for the maintenance of appropriate social structures, such as the preservation of the family farm, is often associated with it (Berry 1984, Cobb 1984, Strange 1984). Arguments for alternative agriculture are essentially critiques of conventional models.

Thus, different operational definitions of sustainable agriculture have been conceptualised. Alternative agriculture places greater emphasis on social and ecological goals, relegating economic goals to a lesser priority. Conventional agriculture places greater emphasis on economic goals at the expense of ecological and social goals. With growing concern about the environmental problems of modern conventional production systems, there is increasing interest in alternative systems of production. Yet, little is known about them and, therefore, little is done to promote them in most places.

1.3 Agricultural production in Southwestern Ontario: A context for sustainable agriculture.

Canada, like other developed economies, shows evidence of the negative impacts of the industrial model of agricultural production. These impacts are both social and environmental. Increasing farm size, capitalisation and specialisation have resulted in a decline in farm numbers and removal of farm families from the land (Troughton 1992, 1995). At the same time, negative environmental impacts of production have been noted. In particular, soil erosion and degradation have been observed (SCSA 1983, Sparrow 1984, Dickenson and Wall 1987, Miller 1990), but there is also evidence of water pollution and contamination (Pierce 1995). Although both social and environmental problems are observed, the environmental impacts have been the focus of growing attention in the 1990s. Agricultural production is reliant on the natural resource base and, therefore, environmental problems question the rationality of
a production system, such as the industrial model, which destroys this resource base (Hill and Ramsey 1976. Troughton 1991)

The Canadian government has responded to the environmental challenge at a number of levels. One of the responses of the Federal government was to attempt to define sustainable agriculture for those involved in agricultural administration. The working definition produced in this context was

Sustainable agri-food systems are those that are economically viable, and meet society's needs for safe and nutritious food, while conserving and enhancing Canada's natural resources and the quality of the environment for future generations (Federal Provincial Agricultural Committee on Environmental Sustainability, 1990)

This definition does not include a social dimension, but more importantly is conceptual in nature and, therefore, provides no clear direction for sustainable agricultural development in Canada.

Soon after this definition was produced the Science Council of Canada conducted a study in order to redefine sustainable agriculture. Despite extensive research and a series of reports considering aspects of sustainable agriculture, including practical aspects (Anderson et al. 1991), economic perspectives (Thomas 1991), the way in which research and development influence the development of agricultural practices (McEwen and Milligan 1991), and system scenarios for achieving sustainability (Science Council of Canada 1991), the Science Council of Canada did little to redefine a path for sustainable agriculture.

An agriculture that works with nature to maintain essential ecological processes, guard the wholesomeness and security of the food supply, and maintains economically and socially viable farms and farm communities (Science Council of Canada 1992. p25)

Although this improves on the original definition by the inclusion of a social dimension there is still no attempt to direct future agricultural development. Conceptual definitions, such as
these, can be interpreted in a variety of ways and generally lead to the preservation of the status quo. They do not provide any practical guidance as to how to overcome social and environmental concerns.

A more pragmatic response by government was to introduce programs which had a direct impact on particular environmental problems. In Ontario, two different programs targeted at different problems were introduced. The SWEEP program and the “Food Systems 2002 Pest Management Research Program (1988-1993)” The SWEEP program provided education, information, technological inputs and financial incentives to farmers willing to adopt no-till on their farms. “Food Systems 2002” also provided education and information to farmers, with the stated aim of reducing the use of chemical pesticides in Ontario by one-half by the year 2002 (Stonehouse et al. 1993). Both programs encourage modification of the industrial model of production in order to reduce environmental impacts, but neither explicitly encourages wholesale changes to alternative production systems.

Subsequent to the implementation of these programs, studies were conducted in Ontario to determine the extent to which farmers have responded positively to them (Duff et al. 1992, Stonehouse et al. 1993). Duff et al. (1992) examined farmer decision-making with respect to conservation tillage. Stonehouse et al. (1993) conducted an economic comparison of different weed management strategies under the assumption that economics was the key variable governing farmer decision-making. Both of these studies contribute to an understanding of farmer responses to environmental programs, but neither explicitly addresses alternative production systems. Stonehouse et al. (1993) considered “Zero herbicide” users as one group in their study, but were more interested in the response of chemical farmers to the programme, than in uncovering elements of decision-making that might be particular to ecological farmers.

Little is, therefore, known about the decision-making of ecological farmers in Ontario. Yet, some would argue that ecological agriculture is the key to agricultural sustainability (Jackson...
1984, Hill 1985), and there are a number of ecological farmers in the province. These farmers co-exist alongside conventional farmers, have their own support networks and associations, such as Ecological Farmers of Ontario (EFAO), and have established markets for their 'organic' produce. The most recent breakthrough for the ecological agriculture movement in Ontario was the decision by the Dairy Board to allow the separate sale of 'organic' milk. This latter decision reflects the growing demand for 'organic' produce in the area. However, despite advances of this nature ecological agriculture is still largely unsupported by official government organisations, such as OMAFRA, while the programs described above are actively promoted by extension agents and agricultural personnel. Ecological agriculture, therefore, remains on the fringes of, or is excluded from, their programs. As a result no studies have been conducted specifically considering ecological decision-making in Ontario.

It might be argued that the models of decision-making processes derived from studies of conventional farmers could be applied to ecological farmers. However, farmers make the decision to farm ecologically unassisted by agricultural institutions. Traditional models of farmer decision-making may, therefore, be inadequate for examining the factors that contribute to decision-making on ecological farms, because the conditions under which the decision takes place vary markedly from those for the adoption of conventional innovations. Also a change to ecological production systems is more than the adoption of one innovation or practice; it is the adoption of a whole system of thinking and farming. Thus, the thesis considers the factors that contribute to decision-making on ecological farms in Southwestern Ontario in order to determine the likelihood of widespread adoption of ecological practices.

14 Aims and Objectives

One aim of this thesis is to explore the compatibility of ecologically sound production techniques and alternative systems with the existing organisational structure of agricultural production in Southwestern Ontario, Canada. Given that Canadian agricultural production is dominated by large-scale intensified farm units and agribusiness interests, the individual
farmer is in a relatively weak position to change his/her production strategy to incorporate environmental goals. The research, therefore, aims to explore the possibility of ecological farming becoming a viable production strategy for a majority rather than a minority of enterprises. This requires determining why some farmers choose these ecological systems of production and others choose to retain input intensive conventional systems. To do so involves an assessment of farmer willingness to adopt ecologically sound production practices and an assessment of farmers' ability to pursue their desired strategy within the constraints of the existing organisational structure of their enterprise. Specific objectives relating to this overall aim are

1. To compare the social and structural organisation of ecological and conventional farms, and determine the role of structure in decision-making with respect to production practices.

All farms adjust their social and structural organisation in response to changes in the operating environment. However, it is not known whether ecological and conventional operations make similar or different adjustments to their organisational structure. For example, are ecological farms smaller or larger than conventional farms? Related to this, is the question of whether differences in structure that are identified are the result of the decision to farm ecologically, or contribute to that decision?

2. To compare specific production characteristics of ecological and conventional farmers to determine whether production practices are converging or diverging.

Although ecological farming represents an alternative production system, that system is made up of a number of different production practices. By analysing specific practices of conventional and ecological production systems, it can be determined whether individual practices on conventional and ecological farms are becoming more
similar or more different. It is also possible to determine how far apart the two production systems are in terms of practices.

3. To compare attitudes of ecological and conventional farmers and to determine the role of attitudes in decision-making with respect to production practices.

The attitudes of conventional and ecological proponents and farmers have been found to differ (Beus and Dunlap 1990, 1994b). To what extent is this the case in Southwestern Ontario? Also, some idea of the influence of attitude on decision-making is required to determine whether attitude is a more powerful influence than the structure of the farm operation.

1.5 Thesis Outline

The thesis will consist of seven chapters. Chapter Two reviews the existing literature on farm family decision-making. Both adoption-diffusion approaches and political economy approaches are considered with respect to both their conceptual and empirical contributions. Chapter Three describes the research methodology. In-depth personal interviews were the main data collection strategy. Chapter Four compares the social and economic organisation of ecological and conventional farmers. Reasons for particular choices with respect to social and economic organisation and relationships with production method choices are also analysed. The production systems of ecological and conventional farmers are compared in Chapter Five. Decisions with respect to micro-scale practices are also analysed to determine whether ecological and conventional systems are converging or diverging. Chapter Six combines earlier findings in an examination of decision-making leading to the production system currently used on the farm, and then considers the attitudes and perceptions of ecological and conventional farm families. How farmers came to farm the way they do is the primary focus of the chapter. The relative weights of attitudes and constraining characteristics of the enterprise structure are also examined. Chapter seven concludes the thesis by
connecting findings to theories of farm family decision-making and assessing the likelihood of larger shifts in agricultural production systems
CHAPTER TWO LITERATURE REVIEW

2.1 Introduction

Rural geographers have sought to understand the decision-making of farm families. The majority of models developed have explored the context of decision-making, identifying the various forces acting on decision-makers (Bowler 1993), and the outcomes of decision-making processes (Marsden et al. 1986). At present the research picture in agricultural geography is dominated by examination of external factors (Whatmore et al. 1987), but decision-making at the farm level is highly differentiated and points to the need for models which consider the individual farm or farm family, and a consideration of the inputs that they believe to be important to their decision-making. Thus, in this chapter two fields of literature that have considered the contributions of different factors to farm family decision-making are reviewed.

Growing concern for the environmental consequences of agricultural production has prompted increased interest in ecological production systems and adoption of them by farm families. As environmental concerns amplify, research interest has focussed on explaining why some farmers opt to use ecological production systems while others continue to use the conventional model of production. To this end many studies have applied adoption diffusion models in order to understand decisions to utilise environmental production systems. While these models have been able to distinguish ecological and conventional enterprises, and have identified some of the motivations for, and barriers to, adoption of ecological production systems, they have failed to provide a complete understanding of the decision to convert to ecological production systems. The complexity of ecological production systems, which involve not only production practice changes but changes to other aspects of farm organisation, render decision models based on one practice or innovation problematic and point to the need for new conceptual and theoretical frameworks.
The political economy literature pertaining to the functioning of the farm family may be a useful starting point for a new approach to examining the use of ecological practices. The focus on understanding the social and economic organisation of the farm unit provides a platform on which to understand how farm families will react to changes in their operating environment. This literature emphasises relationships between decisions and points to a range of strategies that farm families use to ensure enterprise survival. Recognising that enterprise survival issues constrain the production choices of farm families, and that decisions with respect to production practices are intimately related to decisions with respect to other aspects of farm enterprise structure, has the potential to overcome some of the inability of adoption diffusion models to explain the adoption of ecological production systems.

2.2 Adoption diffusion studies of ecological production practices

The relative novelty of interest in alternative production systems means that there is not a great deal of literature examining the adoption of ecologically sound production systems. A range of studies have been conducted describing ecological production practices (Lampkin 1990, Lampkin and Padel 1994) and the characteristics of ecological farm families only (Kramer 1984, Hill 1985, National Research Council 1990, Molner et al. 1991), but few studies have explicitly addressed the issue of what prompts some farmers to convert to ecological systems, or alternatively what stops other farm families from doing so. Some clues may be gained from studies of adoption of conservation practices as they have identified the fact that environmental practices require different explanations to commercial practices (Pampel and van Es 1977), but these studies have not been particularly successful in explaining adoption behaviour (Locke 1990), and also pertain to conventional agriculture in the broad sense. Therefore, the empirical findings of these studies are not particularly useful. However, the basic framework for examining decision-making has been applied to ecological practices.
Two key facets to farmers' adoption decision-making can be identified. As Nowak (1992) discusses in relation to soil conserving practices, farmers do not adopt for two reasons: either they are unwilling to adopt or they are unable to adopt. Being unwilling to adopt will be determined by farmer attitudes and perceptions of certain production methods. Being unable to adopt will be determined by various constraining aspects of the existing production process or enterprise structure, which may, in turn, influence perceptions or attitudes. Change to an ecological production system is complex and there may be aspects of existing production systems that constrain that choice. Existing studies of ecological farmers can be classified accordingly, into those that consider farmer willingness to adopt through analysis of attitudes and perceptions, and those that consider constraints on farmers' decision-making relating to other aspects of the farm operation.

2.2.1 Farmer willingness to adopt

Farmer willingness to adopt is primarily a function of their attitudes. Attitudes are defined as the longstanding beliefs or views that a group subscribes to (Altman and Chalmers 1984). These, in turn, are believed to be influenced by various personal characteristics. The personal characteristics provide an indication of the socialisation processes individuals have gone through. In this section the state of knowledge with respect to personal attributes and attitudes of adopters and non-adopters of ecological systems of production are considered.

Studies of the personal characteristics of those who adopt ecological practices have been inconsistent in their findings. Some studies have found no evidence of differences between conventional and organic operators with respect to age or education of the producer (Malia and Korsching 1989 in Saltiel et al. 1994). Others have found that ecological farmers have higher levels of education and are more likely to come from urban backgrounds (Harris et al. 1980, Henning et al. 1991). These conflicting results suggest that ecological farmers, like conventional farmers, are not homogenous. They come from a range of backgrounds and include people in different stages of the life course. Conceptual frameworks must, therefore,
be able to account for and explore this heterogeneity rather than view these as factors in explaining adoption behaviour. Following this line of thought, it is questionable that personal characteristics alone can be used as reliable predictors of adoption behaviour with respect to ecological production systems, and these studies point to the need to move beyond description of farm enterprise or family characteristics and onto relationships between characteristics.

However, attitudes would appear to be important aspects of decision-making with respect to production system choices. Several studies have considered the relationship between overall world view and production practices, and concluded that attitudes are an important determinant of adoption behaviour (Beus and Dunlap 1994a, 1994b, Allen and Bernhardt 1995). Beus and Dunlap (1990, 1991) produced, and tested on proponents of conventional and alternative agriculture, a series of scale questions relating to different aspects of agricultural production systems. For example farmers were asked to choose between local and international levels of marketing. Having confirmed that the questions were useful for distinguishing between conventional and alternative agriculture groups, they then surveyed farmers to determine their position on the scale, and related this to several production practice characteristics (Beus and Dunlap 1994a, 1994b). They found that the farmer’s world view was a good predictor of their production practices, with alternative and conventional farmers responding differently to the questions asked, and concluded that attitude was a key determinant of farmer behaviour. Their study suggests that willingness to adopt is the key to understanding farmer decision-making.

Allen and Bernhardt (1995) refined this analysis by considering farmers’ responses to individual questions on the scale. They applied Beus and Dunlap’s (1990) scale to a group of farmers in Nebraska and found that whilst the conventional versus alternative agriculture divide existed, there were some aspects of production on which both sets of farmers held common views. Farmer responses were most divergent with respect to how food and fibre should be produced. However, all groups of farmers scored conventionally on views towards
farming as a business which earns an above average standard of living, that US agriculture was the most successful in the world and that modern agriculture is a minor cause of ecological problems. All farmers scored on the alternative side of the scale with respect to farmland being farmed so as to protect the long-term productive capacity of the land, even if it means lower profits, farm traditions and culture are essential to good farming, and that healthy rural communities are essential for modern agriculture's future success. These findings would indicate that there are a set of common goals for both conventional and alternative farmers, and that consideration of attitudes to specific aspects of production is more useful than considering the set of attitudes as a whole. But again, the study reinforces the important role of attitudes in determining adoption behaviour.

All of this research does indicate an important role for attitudes in determining production system choices. The attitudes of alternative and conventional farmers can be clearly differentiated. However, two problems with translating attitudes directly to adoption behaviour can be identified. That is, there may not be a direct relationship between a farmer's belief about something and the way in which he acts. Farmers may be constrained by other aspects of production and, therefore, although they would like to do one thing they may actually do another or modify their action to allow for the constraints of their operating environment. Second, for practitioners of alternative agriculture these analyses take place after the adoption decision has already been made and, therefore, it is difficult to determine whether these attitudes existed before the decision was made or are a result of that decision. For conventional farmers, they provide a good sense of which attitudes would need to change if a change in system of production were desired, but there is a need for clarification of the relative roles of attitudes or willingness to adopt and constraints on behaviour due to the structure of the enterprise.

Discussion of attitudes leads into a consideration of motivations to adopt ecological systems of production. Motivations differ from attitudes in that they describe the reasons given for a particular action. Traditional adoption diffusion studies assume that profit maximisation is the
driving force of production practice choices (Rogers 1983). Farmers will adopt if they believe that the innovation is likely to be more profitable than their existing production system or practice. However, studies of environmental technologies indicate that profit maximisation is not the only motivation for adoption of ecological systems of production (Pampel and van Es 1977). Studies of farmers' motivations for adopting ecological production systems identify a number of enterprise and personal considerations which impact on the decision.

Two basic enterprise considerations have been found to motivate the adoption of ecological production systems. Many farmers convert to ecological production systems for environmental preservation reasons (Kramer 1984, Blobaum 1983, Wernick and Lockeretz 1977). These farmers believe environmental degradation from modern production systems is a problem and have evidence of environmental problems on their own properties. They, therefore, convert to avoid exacerbating the problem. Financial reasons have also been found to be a prime motivating factor, particularly in more recent studies (Henning et al. 1991, Lockeretz and Madden 1987). With rising input costs and falling farm-gate prices, farmers have been motivated to adopt ecological systems of production in order to reduce input costs and, therefore, reduce the risk of farm financial failure. These farmers often feel that they have nothing to lose in trying to reduce input costs. They are also sometimes attracted by the promise of premium prices. Thus, the current operating situation of the enterprise motivates farmers to adopt.

While enterprise reasons were evident personal reasons for adopting ecological systems were the most consistently cited reasons in studies of adoption (Kramer 1984, Martin 1992, Molner et al. 1991, Blobaum 1983, Henning et al. 1991). The primary reason cited was health and nutrition. Farmers were concerned about personal health as they recognised health hazards associated with the application of chemicals. They also believed that food quality was better when food was produced ecologically. Other general concerns were philosophical, religious, political or environmental in nature. Some people believed that farming should be conducted in an environmentally friendly way for moral reasons, rather than forced into it by the
circumstances of their enterprise. Thus, personal or individual characteristics of the farmers caused the decision to convert.

Motivations for adopting ecological systems of production provide a key to understanding farmer willingness to adopt. They assist in accounting for some of the differences in attitude identified. When combined with the attitudinal studies, an indication of the divide between ecological and conventional farmers can be ascertained. Examination of these attributes of farm operations will indicate the extent to which farmers are willing to use ecological production systems, but this is not necessarily reflected in production practices. As Allen and Bernhardt's (1995) study testifies, in some attitudes ecological and conventional farmers are similar, yet they have different production systems. Having established the willingness to adopt, constraints on farmers' ability to act need to be considered.

2.2.2 Farmer ability to adopt

Discussions of the applicability of the diffusion model to conservation practices have indicated the need to take into account constraints on an operator's ability to adopt (Nowak, 1983, 1987). This is an important consideration and places more emphasis on the structure of the enterprise and relationships in decision-making. If a farmer works off the farm, the perceived additional labour requirements of ecological practices may lead to rejection of practices. Also farmers' product mix may influence the decision. Farms that are highly specialised may have difficulty re-structuring to more diverse bases. The decision to farm ecologically could also entail changes to enterprise structure. A variety of studies have been conducted on specific constraining relationships between structure and adoption, and are discussed here.

Farm size is one perceived constraint to use of particular production systems. Conflicting findings are, however, evident when comparing farm size for conventional and ecological operations. In most studies the average farm size is smaller for ecological farms (Harris et al., 1980, Henning et al., 1991), but some research has found average farm size to be larger for
ecological operations (Wernick and Lockeretz 1977) Some explain these differences in terms of geography and dominant agricultural activities in certain areas, but this has not been systematically examined. Thus, the relationship between farm size and production practice choices has not been fully established, but would appear to be an important one. Farms that adopt conventional environmental practices, such as soil conserving techniques, are known to usually be larger and more highly capitalised than non-adopters (Featherstone and Goodwin 1993), suggesting that the conflicting results from ecological farms is worthy of exploration.

Related to farm size are other production constraints. Additional time and labour required to complete ecological tasks have been identified as barriers to the use of ecological production systems (Kramer 1984, National Research Council 1989, Molner et al. 1991, Blobaum 1983, O'Connell 1992). Where farm size is small, the additional time to perform farm operations ecologically may not be an issue, but where farm size is larger, additional time and labour required may become significant constraints on adoption decisions. This indicates a need to identify structural relationships between barriers and aspects of the farm operation.

Labour constraints as a barrier to the adoption of ecological production practices were examined in detail by Pfeffer (1992). He argued that whilst the displacement of labour by technology is clearly visible, the displacement of labour by chemicals is less visible and, therefore, has been overlooked in examination of constraints on reducing chemical inputs. Since the 1930s, developments in agriculture have acted to displace labour to the extent that in the current operating environment labour scarcity may act as a barrier to the adoption of ecological practices. Farmers have shed labour and have also themselves entered into labour markets, with off-farm employment. Therefore, he contends that the organisation of labour rather than access to capital is a major constraint on reducing chemical use.

There were two parts to Pfeffer's (1992) analysis. First Pfeffer (1992) determined that perceived production barriers such as inability to control insects, diseases and weeds, yield
declines and profit declines were more significant barriers to the reduction of chemical inputs than were labour supply problems. Labour supply problems were evident, but were not as significant as production barriers. He then tested to see whether perceived production and labour supply barriers were related to labour supply variables. Results indicated that labour supply considerations were clearly related to farmers’ concerns about their ability to deal with production problems if they reduce chemical inputs. This was found to be more significant on farms which relied solely on family labour as they did not want to adopt practices that might force them to hire labour to complete tasks. Thus, labour availability and use constrains farmers’ production choices, and acts as a barrier to the adoption of ecological production systems. The precise relationships between labour and production system choice have not been fully explored though as Pfeffer (1992) focussed on conventional operations only. There is a need to compare ecological and conventional operations in terms of labour relations.

Another constraint on adoption of ecological production practices identified in the literature is the existing product base of the enterprise (Lyson and Welsh 1993, Saltiel et al. 1994). Ecological farms have consistently been found to have more diverse product bases than conventional farms (Poincelot 1986; Saltiel et al. 1994). More specifically ecological farms usually combine crops and livestock. This was found to be an important consideration in farmer production practice choice (Saltiel et al. 1994). They found that farmers with highly specialised operations were more likely to adopt soil conserving practices whilst farmers with diversified operations (both livestock and crops) were more likely to adopt low input systems of production. They argued that this was due to differences in perceived profitability because of the constraints of the existing product base of the farm enterprise. Low input systems require manure, which in turn requires livestock, and thus, highly specialised cash croppers would have to make a complete change to their production system to become low input producers. They, therefore, did not perceive low input systems to be as profitable as their existing system. In contrast existing livestock and cropping operations did not have to make such significant changes and therefore, low input systems meshed better with their operation characteristics.
Access to capital has been found to be a constraining factor for most agricultural innovations (Heffernan and Green 1986) However, there is no discussion of this in the studies of the adoption of ecological systems of production. Ecological systems tend to substitute labour for capital and, therefore, access to capital is not likely to be a constraint on adoption. In fact, the reverse may be true in that lack of access to capital, or a desire to resist strong linkages with capital may encourage the use of ecological practices which are less dependent on capital.

Whilst the previous studies have identified constraints on adoption of ecological production practices at the farm level (which is the focus of the research) it is important to note research that identifies constraints at an institutional level (Youngberg and Buttel 1983, MacRae et al 1990) These studies consider barriers to the adoption of ecological production practices at the food system or institutional level. Although the findings of both studies are similar, the findings of MacRae et al (1990) are most relevant to the research as they consider the Canadian institutional environment. Price supports for certain crops, tax incentives to make capital changes to the enterprise and the low cost of capital relative to labour, are some of the existing policy stances that encourage farmers to adopt high input systems of production. MacRae et al (1990) suggest that changes will have to be made at the institutional level to encourage greater adoption of ecological practices. This is likely true, but it is important to understand how policy changes will be played out at the farm level and, therefore, to understand farm family responses to these kind of changes to their operating environment.

In summary, studies of ecological production systems have identified factors which distinguish ecological and conventional enterprises and farm families, motivations for adoption of ecological practices and barriers or constraints to that adoption. These studies provide a useful empirical summary of what is known about ecological production systems and some indication of the variables that play a role in decision-making. However, in many cases results have been contradictory. This suggests that decision-making is more complex than these analyses can account. The treatment of aspects of farm organisation as factors which
differentiate enterprises and families cannot account for the dynamics and complexity of farm level decision-making. Decisions with respect to production practices may be interrelated with decisions with respect to other aspects of farm organisation. There is, therefore, a need to build on these empirical findings and holistically examine the farm family and enterprise and the variety of decisions that are made in order to provide a better understanding of why some farmers adopt ecological production systems and others do not.

2.3 The Functioning of the Farm Family

In contrast to the previous discussion of adoption diffusion approaches which focus on decision-making with respect to one technology or innovation, the literature on the family farm attempts to understand the way in which the farm family functions. By understanding the social and economic organisation of the farm family it is possible to understand the responses of farm families to particular stimuli. Rather than specify a reaction to a particular phenomena, these studies attempt to understand the farm family in a more general sense. Then when an innovation or alternative is introduced, the awareness of how the farm family functions will allow some understanding of how the farm family might react.

The initial focus of research on the farm family was to explore the persistence of the farm family despite penetration by industrial capitals (Marsden et al. 1989, Reinhardt and Bartlett 1989). There is no question that capital penetration and technological innovation have modified the production process on farms, nor that industrialisation of agriculture has occurred, but researchers are interested in the continued dominance of agricultural production by family owned and operated enterprises. A variety of approaches to understanding this have been developed.

The early political economy literature posited that farm level change was largely structured by the changing needs of off-farm capital (Marsden et al. 1986, Goodman et al. 1987). This research posited that the farm family was in a relatively weak position within the agrifood
system and that changes would occur on farms in accordance with the aims of other players in the food system. Thus, the off-farm nature of capital accumulation and profit motivation would lead to a unilinear pattern of development, namely the industrial model of production, with all farmers enlarging and attempting to accumulate capital. Little attention was paid to alternative outcomes, the unevenness of the penetration process, or farm level resistance to changes imposed by others in the agrifood system.

In the late 1980s and 1990s, however, evidence of the unevenness of the penetration process and variety in farm family responses to similar operating conditions led to reconsideration of the position of the farm family and the ability of its members to negotiate farm level outcomes. It was still recognised that the external or structural forces beyond the farm gate influence farmer decision-making, but emphasis changed to the relations between these and internal production relations (Whatmore et al. 1987), and to aspects of internal organisation that enable farm families to survive (Moran et al. 1993, Reinhardt and Barlett 1989, Barlett 1986). Thus, the emphasis switched from defining the extent of links with external credit, technology and markets and subsequent control of the farm family over decision-making (Whatmore et al. 1987), to the variety of strategies that farm families use to ensure survival. Rather than analyse the penetration of capital and place emphasis on structure, it is necessary to also acknowledge the role of agency in individual responses or adjustments.

To this end a range of adjustment strategies have been identified. At one level Bowler (1992) and Pierce (1995), building on earlier work of Whatmore et al. (1987) have characterised the overall development trajectories of farm families. Bowler (1992, 238) suggests that farm businesses follow one, or a combination of, six development trajectories:

1. Extension of the industrial model of farm business development based on traditional products or services.
2. Redeployment of farm resources (including human capital) into new agricultural products or services.
3. Redeployment of farm resources (including human capital) into new non-farm products or services.
4 redeployment of human capital into an off-farm occupation (OGA, Other Gainful Activity)
5 maintenance of traditional farm production and services with either reduced inputs and/or reduced income.
6 hobby or part-time farming

Each of the trajectories implies a different level of concentration on agricultural products in farm business composition. Paths one and two illustrate cases where full-time farming is still the primary basis of the enterprise. In paths three and four diversification of the income base has occurred, and in five and six the farm has been marginalised as a profitable business. Both Bowler (1992) and Pierce (1995) use this as a conceptual basis to examine agricultural restructuring. However, the level of analysis is broad and, therefore, it is difficult to determine the precise nature of farm level changes which result in different production practices.

Other researchers have examined the individual adjustments that farm families make (Gasson et al. 1988, Marsden et al 1989, Reinhardt and Barlett 1989, Ilbery 1992). These studies identify various adjustment decisions that together make up the trajectories listed above. The micro-scale adjustments identified can be summarised into eight basic choices:

1) changes to production methods (Ilbery 1992),
2) changes to product base (Ilbery 1992),
3) changes to tenure arrangements (Marsden et al. 1989),
4) changes to farm size (Marsden et al. 1989, Gasson et al. 1988),
5) changes to labour/management relations—hiring or firing of labour on the farm (Gasson et al. 1988),
6) changes to business structure—ie. the inclusion of tourism or alternative enterprises (Ilbery 1992),
7) changes to marketing (Ilbery 1992) and,
8) changes to economic centrality—ie. off-farm employment or capital investment (Marsden et al. 1989)
Farm families must make decisions with regard to each of these which contribute to their overall trajectory. Thus, it is useful to identify the strategies and recognise that decisions with respect to one aspect of farm operation are made in relation to decisions with respect to other aspects. However, although these studies provide some indication of ways in which farm families adjust, they do not provide any indication of how or why they make these choices. They essentially reflect the outcomes of negotiation processes, but not the negotiation processes themselves.

Central to an understanding of the way in which farm families maintain control is the unity of farm business and farm household (Marsden et al. 1989; Gasson et al. 1989; Reinhardt and Barlett 1989; Moran et al. 1993). It is widely recognised in the literature that the farm is the setting for both household and enterprise reproduction. Household survival for farm families is more closely linked to enterprise survival than it is for many other enterprises. Thus, the farm family is committed to the survival of the enterprise and can adjust resource allocation accordingly. Common adjustments are the increased use of unpaid household labour in times of economic uncertainty, or decreases in household consumptive expenditure (Reinhardt and Barlett 1989). Similarly, succession or the transfer of the enterprise from one generation to another has been identified as a means of maintaining control over the production process and eliminating penetration by external credit (Marsden et al. 1987; Greenwood 1992; Moran et al. 1993). Adjustments of this kind suggest that family farms may be motivated by goals other than profit. Gasson (1973) found that profit motives were indeed often overshadowed by other lifestyle considerations and familial goals. Thus, the unity of household and enterprise is important in understanding the way in which farm families function and the levels of control that they maintain over their production system.

Moran et al. (1993) contend that this same level of control can be maintained in links with external organisations. They argue that farmers adjust their relations with product markets, labour markets and other farms in order to ensure enterprise survival and that many of these adjustments allow them greater control of production practices. This links back to the range
of adjustment strategies but Moran et al (1993) actually link these strategies with the organisation of the farm unit and the unity of household and enterprise. Thus, in order to understand decision-making on family farms it is necessary to understand the social relations of production.

This literature aimed at understanding the survival of the farm enterprise is useful in a number of ways. First, it places the farm family within the context of the agri-food system and recognises structural constraints on decision-making. Having done so, it then considers the ways in which farm families have been able to negotiate or adjust these relationships to their advantage. Thus it recognises the ability of the farm family to alter those relations, and, therefore, the variety of individual responses to the same forces. Some work has also considered the nature of enterprises that choose particular strategies, contributing to an understanding of why farmers choose different overall strategies. However, the focus of all of this work has been the conventional enterprise, and social and economic organisation of the farm unit, but there have been few attempts to incorporate an environmental dimension. This is largely due to the need to understand the outcomes of the economic crisis in agriculture, but with growing environmental concern there is also a need to integrate the environment into this understanding of the functioning of farm families.

2.4 Farm family organisation and the environmental dimension

Several recent studies have attempted to incorporate an environmental dimension into the understanding of the social and economic organisation of the farm family. Ward and Munton (1992) were the first to suggest a means for conceptualising agriculture-environment relations in this context. They suggested that farm families were continually adjusting to economic and social conditions and that production practice choices must be viewed in this context. They, thus, placed emphasis on the structural constraints to production practice choices. Farm families were viewed as being on a production treadmill and their choices were constrained by their belief that it was risky to deviate from this trend (Ward 1993). Within this
conceptualisation, Ward and Munton (1992) recognised the ability of farmers to negotiate their relations with external organisations, but found that farm family reliance on the advice of external advisors tended to perpetuate the productionist treadmill trend. An empirical application of the conceptualisation to a group of farmers in Britain confirmed that those enterprises that were most linked to industrial or external capitals (that is those with high levels of debt or off-farm work or most technologically dependent) were also the least likely to use environmentally friendly practices on the farm (Ward 1993). Thus, they identify the need to view production practice choices within the context of social and economic organisation of the farm unit, but also recognise the role of individual decision-making.

Later work by Ward and Lowe (1994) and Ward (1995) places greater emphasis on agency or individual goals and aspirations in decision-making with respect to production practices, whilst still recognising structural constraints. This suggests a variable response to environmental concerns from enterprises of similar social and economic organisation. In both of these studies, pesticide pollution is studied in an area of Britain. Ward and Lowe (1994) consider attitudes towards pollution and link these to the age of the farm operator, tenure arrangements, potential succession and business structure. They found that the younger the farm operator, the less complex the tenure arrangements, the less likely succession was, and the more diversified the business structure of farm operations, the more likely the farmer was to understand the dimensions of the agricultural pollution problem. Older traditional farmers, planning to pass on the family farm, and with agricultural only business structures were locked into the productivist agricultural way of thinking, and, therefore, were sceptical that a pollution problem even existed. However, in terms of implementing of pollution control technologies, the latter group was most likely to invest. Ward and Lowe (1994) attributed this to the longer term framework for investment adopted by these farmers due to the promise of succession of the enterprise.

In another article, Ward (1995) considered the role of individual decision-making within the context of the overall trajectory of agricultural development. He traces the emergence of
chemical use with the increasing availability of chemicals and the productivist philosophy of the agricultural community. Ward (1995) then points to the emergence of the pollution issue with increasing consumptive uses of rural spaces and the threat of regulation. Taking these changes social values into consideration, he then examines farmers' reasons for pursuing the production practices that they do. He interviewed predominantly conventional farmers and confirmed that the role of advisors was an important one in determining production practices or spray volumes. Ward (1995) also found that farmers were generally more concerned about production maximisation and weed control than they were about pollution, and this acted to reinforce their existing practices. Thus, he sees no incentive for change given the existing value sets upon which farmers are making decisions.

Ward's research is useful in that it provides an understanding of the forces working towards the use of chemicals. He argues that individual responses are variable to human agency, but that the values of farmers are, in turn, conditioned by societal values. Thus, the existing agri-food system and the relationships between farmers and other actors in the food system, particularly advisory personnel, are important in shaping individual attitudes. The research extends previous research which conceptualises the social and economic organisation of the farm unit and provides a useful means of incorporating environmental issues into the understanding of the farm family and its position in the agrifood system. However, by considering conventional farmers only, it does not provide an understanding of how ecological farmers have managed to remove themselves from this common value set and organisational framework.

In a similar conceptual frame, Lighthall (1995) and Lighthall and Roberts (1995) attempt to unravel the reasons for the different production system choices of farm families, by examining the relative roles of structure and agency. They examine the production choices of farmers in the Corn Belt, Iowa, differentiating between farms where conventional systems are still prevalent and farms where low input systems have been adopted. Lighthall and Roberts (1995) argue that, although farmers begin with a set of personal attitudes, values, ideologies
and farming knowledge, the importance of these in decision-making may be transformed by the material conditions of the production unit. In other words, the structure of the farm will have the greatest impact on decision-making as it alters the farmer's perception of risk associated with particular production practices.

Lighthall (1995) demonstrated that large scale operations based on wage labour are structurally constrained from adopting alternative production systems that minimise or eliminate chemical use. This failure is due to the necessity of domination over natural forces by such operations. Where farm operations have expanded beyond family labour there is a structural requirement to choose production systems that are simple and where time frames or production windows are constrained. In contrast, smaller operations can adopt production systems that increase production complexity as they are generally dependent on family labour and are capable of completing the necessary tasks.

Although their research indicates that the structure of the farm enterprise and existing social relations are the main influences on the decision-making process, Lighthall and Roberts (1995) recognise that certain events may catalyse alternative actions. For example, personal exposure to chemical toxicity may lead farmers to reconsider their production system. However, the capacity of the farmer to make changes to production system is again dependent on material conditions and social relations. Thus, although economic and ecological crises in agricultural production have lead to rethinking of production systems, the extent to which existing operations can change is constrained by the structural conditions of production.

Whilst Lighthall and Roberts (1995) and Lighthall (1995) provide a solid conceptual basis for examining production practice choices, their analysis is primarily confined to conventional farmers. There are some organic farmers in their sample, but insufficient numbers to determine precisely how these farmers have managed to opt out of the industrialised model of production. They do point to the need to examine the structural composition of the farm.
operation and also suggest that agency plays an important role in those who decide to alter production systems. However they, like the adoption diffusion literature, do not analyse the relationships between decisions and the extent to which farmers are prepared to alter structural conditions if they are sufficiently convinced of an alternative production system.

2.5 Thesis Approach

Previous research contributes to our understanding of ecological production systems. Comparative research conducted in the adoption-diffusion framework identifies some of the distinguishing characteristics of ecological and conventional farm families. However, this literature has failed to explain decision-making leading to the use of ecological production systems. The literature of the family farm with its focus on the relative roles of structure and agency in decision-making is better able to explain decision-making, but has not directly considered decisions with respect to ecological production systems. Thus, this thesis builds on some of the theoretical contributions of the family farm literature to examine decision-making with respect to ecological production systems.

The relative roles of structure and agency are a dominant feature of the family farm literature and correspond to the relative roles of attitudes and constraining variables in the adoption-diffusion literature. However, whilst the adoption-diffusion literature treats attitudes and various structural characteristics of the enterprise as factors and attempts to explain adoption behaviour in terms of distinguishing characteristics, the family farm literature examines the relationships between structure and agency and the extent to which farm families negotiate production system outcomes. It is this latter theoretical position that informs this thesis.

In this thesis, each of the structural characteristics of the farm enterprise is seen in its dynamic context. The farm family literature identifies the structural elements of the farm enterprise that are subject to change in order to ensure survival. Production system choice is one of these
adjustments, but decisions with respect to production system are in turn influenced by other structural considerations. Therefore, in order to understand decision-making with respect to production systems there is a need to understand the relationships between these various adjustment strategies. Attitudes or perceptions will also play a role in decision-making and farm families will have to negotiate outcomes based on attitudes and structural constraints. Thus the thesis explores ecological production systems and decision-making based on attitudes and compatibility with the dynamic structural conditions of the farm enterprise. This differs from many other studies which have held other variables constant whilst investigating production system choices.
CHAPTER THREE  METHODOLOGY

3.1 Introduction

In the previous chapter literature pertinent to farmers' production systems choices was reviewed. Researchers have varied in their methodological position depending on the nature of the questions being asked. In this chapter, the research methodology used in this thesis is outlined. Before describing the methodology in detail, it is important to note that published sources, such as the Canadian Agricultural Census, do not contain separate statistics for ecological and conventional farmers. Therefore, it was necessary to gather the data directly from farmers, and the methodology is constructed accordingly.

3.2 Research Design  Quantitative and Qualitative Methods

Debates regarding the choice of research methodology are common in the recent social science literature (See Bryman 1988 for details of the debate.) In the past, researchers argued vehemently for one or the other of quantitative or qualitative research strategies, regarding the latter as a non-valid basis for research, and often not acknowledging any aspects of common ground. More recently, however, the validity of both approaches has been widely recognised and methodological choices have largely been determined based on the research question. It has even been argued that research questions rarely correspond solely to quantitative or qualitative matters, and that results obtained from one procedure or analytical position can be enlightened through results obtained by another (Trow 1970; Honigmann 1982). Thus, quantitative and qualitative methodologies have been usefully combined to provide a more thorough understanding of the phenomena under examination in many social science research projects (Bryman 1988, Jick 1979, Reichardt and Cook 1979, Trend 1979).

The research problem in this thesis suggests the use of a combined approach. While the primary aim of the thesis is to understand the relative weight of factors that contribute to
decision-making processes of ecological and conventional farm families which lead them to use different production systems, it is also intended to identify similarities and differences in the social and economic organisation and attitudes of the farm operations. Thus, the primary focus of the thesis is on process but, to assist in understanding process, it is necessary to establish some of the structural regularities in the systems under investigation. Bryman (1988) argues that quantitative and qualitative methods can be successfully combined in this type of study. Quantitative methods provide a static account and, therefore, can be used to provide a description of the regularities and patterns of structure which are a feature of social life. Qualitative methods, with their focus on the processual, can be used to examine the dynamics of change and the processes leading to the outcomes described by quantitative accounts. Ford et al. (1982) make a similar point when they argue that quantitative data is used to provide frequencies of an event and qualitative data is used to indicate reasons for those frequencies.

Given the dual intents of the thesis, the research methodology must be flexible enough to accommodate both quantitative and qualitative analyses. Structural regularities can be identified through basic counts of farm families which can be characterised by a certain attribute, but do require a certain rigidity in sampling design. The complexity of decision-making processes, however, requires in-depth and detailed data. It is argued by Filstead (1970) that in order to understand the complex processes that precipitate human action, the researcher must obtain information regarding the real world under investigation as perceived by those participating in it. This means that the researcher should not enter the research process with preconceived ideas about what is important to participant decision-making, but must collect data in such a fashion that allows participants to explain the relative roles of attitudinal, situational and environmental factors in their decision-making. Although previous literature may have provided some indication of what to expect, the research should be designed so that this is not imposed on the participant. Thus, he supports the use of qualitative methodologies.
One means of acquiring the types of data required for the thesis is the collection of qualitative descriptions using a structured sampling design. Bryman (1988) and Ford et al. (1982) suggest that this is a useful strategy where the division of groups under investigation are clear, but the variables necessary to explain the process are unclear. In this case, the two groups of farmers (ecological and conventional) can be clearly identified, but the reasons for their different production choices and the factors explaining these choices are not clearly defined in the literature. Thus, this type of methodology would appear to be appropriate. The qualitative data collected can be converted to quantitative data in analysis to explain patterns, but can also be used in its qualitative form to explain process. This type of research design is flexible enough to account for a variety of responses and allow farmers to respond in their own terms of reference, but rigid enough to ensure that the same information is collected from each participant.

Research designs of this kind have been usefully applied by other rural geographers examining farm family functioning and decision-making (Marsden et al. 1993, Lighthall 1995, Ward and Lowe 1994). The variable responses of farm families within and between localities and the dynamics of production and social relations have contributed to the use of these research designs. There is a recognition that the static nature of many quantitative analyses cannot account for the regional specificity of farmers actions, and the complex relationships between structure and agency that contribute to decision-making. Thus, these researchers have examined fewer farm families in greater depth, using life history or key informant style analyses to allow the farmers to describe their stories in their own words, plus gathering some quantitative data to enable the situating of individuals within the larger social system. Given the recognition of such research strategies in the social science literature in general, and the family farm literature in particular, it was decided to use a triangulated research design in order to collect the data for this thesis.
3.3 Data collection

The data collection method used for the thesis had to be sufficiently flexible that farm families could tell their own stories, but sufficiently rigid that all of the farmers were essentially asked the same questions. For this reason it was decided to use a semi-structured interview schedule as the primary basis for data collection (Appendix 3). All farm families were asked the same questions in the order set out in the interview schedule. The interview format, and the open-ended nature of many of the questions, allowed for the exploration of a variety of ideas within this framework. Open-ended questions also allow the researcher to understand the world as seen by the respondent (Filstead 1970, Miles and Huberman 1994). At the same time, the standard set of questions asked of each of the farmers permitted responses to be standardised, and allowed for the preparation of some basic, comparative, descriptive statistics.

Along with the contribution to overall research design, the personal interview format was chosen for several reasons. First, it provided the researcher with the opportunity to see the farm enterprises and in some cases tour the farm operation. Although not a full participant observer, this allowed some degree of understanding not provided when farms are not visited. Second, given the complex nature of the issues being considered and the need for detailed information, the personal interview format allowed for clarification of any points of misunderstanding. Further, the interview format allowed various issues of interest to the farmer and relevant to the research to be fully explored. It was possible to fully engage the farm family in discussion and thus, provide depth of responses, not possible with survey techniques. These have been identified as some of the advantages of face to face interviews by Kidder and Judd (1986) along with higher response rates and the establishment of a rapport between interviewer and participant which encourages the participant to answer fully and accurately. All of these are believed to contribute to maximal data quality when compared to other comparable data gathering techniques such as surveys.
Face to face interviews are not, however, without their disadvantages. Kidder and Judd (1986) recognise that face-to-face interviews may increase the likelihood of interviewer effect. That is, participants may respond in the way that they think the interviewer wants them to respond rather than with their real thoughts. It is recognised that in some cases participants may have given socially desirable responses. It is also possible that being a female conducting the interviews in a predominantly male environment may have had some effect. However, overall the necessity of obtaining in-depth data and the possibility of needing further explanation outweighed the possible problems of interviewer effects.

The interview instrument consisted of several sections. In Section One basic demographic data was obtained. Farmers were asked a variety of questions relating to the farm and the farm family, and this data was primarily used to compare and describe the basic characteristics of conventional and ecological operations as part of objective one. Section Two asked farmers to describe the components of their overall production system, and to explain briefly why they used a particular practice. Data regarding the specific components of the two production systems were collected to determine how different the two production systems were and whether there is any possibility of a reconciliation of practices within the two systems, by small scale modification. This Section of the questionnaire was directly related to objective two. These two sections provided the basic descriptive data for the thesis.

Sections three and four were the two key components to the interview: historical accounts of changes in production practices or systems (Section Three of the interview), and changes in other operational characteristics and social relations of the farm (Section Four of the interview). In Section Three, farmers were asked whether their overall production system had changed since they purchased the farm, and, if so, why they had changed their production system. In particular, farmers were asked to account for changes to either no-till or ecological agriculture, but those who had not significantly altered their production practices were also asked to explain why they continued to farm the way that they did. The questions were deliberately open-ended so that farmers could relate their conversion experiences in their own
words. This information on the contributors to decision-making as the farmers viewed them, was used to meet objectives one and three, that is to determine the relative roles of structure and agency in decision-making.

In Section Four of the interview, objective one was addressed. Farmers were asked a number of questions relating to changes in the structure of their farm enterprise. In particular, they were asked whether they had made any changes to the size of the farm, product combinations, tenure arrangements, capital investments, labour relations, business structure, marketing methods, off-farm employment relations, and levels of off-farm investment. If a change had been made, farmers were asked to detail when the change had occurred, why they had made the change, and to relate this change to their production system choices. These responses were largely factual and, therefore, no scaling was required. By obtaining this histiographic account of changes to the enterprise structure, alongside changes to production systems, it was possible to explore the relationships between decisions with respect to production systems and farm structure.

The semi-structured interview schedule was supplemented with a questionnaire of attitudes towards different aspects of the Canadian agri-food system (Appendix 4). This questionnaire was completed at the end of the interview process. The questionnaire was adapted from Beus and Dunlap (1990) and provided a quantitative assessment of farmer's attitudes. Adaptations amounted to changing references to the United States to references to Canada, and omitting some questions not deemed relevant. After Beus and Dunlap (1991) developed the scale, they tested it on known proponents of alternative and conventional agriculture and found it to be valid. Since then, it has been used successfully to determine differences in attitudes for ecological and conventional farmers in the United States (Beus and Dunlap 1994a, 1994b, Allen and Bernhardt 1995). It includes questions relating to attitudes toward nature, decentralisation, self-sufficiency, and sense of community. The scale questionnaire was used to complement existing attitudinal data collected during the course of the interview, and to compare the attitudes of ecological and conventional farmers. However, the influence of
attitudes on decision-making was derived from the qualitative accounts of the development of the enterprise

3.4 Study Area and Sample Design

3.4.1 Study Area

Southwestern Ontario was chosen as the study area for the research (Figure 1). This geographical area was chosen for a variety of reasons. First, it is the major area of agricultural production in eastern Canada (Statistics Canada 1994). As such, if a change to a more sustainable production system is to occur in a Canadian context, it would have to occur in an area like Southwestern Ontario. Second, there is evidence of environmental degradation due to agricultural production in the area (Sparrow 1984, Miller 1990), and policy attempts to overcome some of these concerns have been implemented, e.g., SWEEP program aimed at soil conservation. Third, although the area is dominated by conventional farmers, a number of ecological farm enterprises exist and compete alongside the conventional enterprises. As well as practitioners at the farm level, there are a number of organisations centred in Ontario which support the ecological production systems such as Ecological Farmers of Ontario (a general information and support group for ecological farmers) and Ontarbio (an organic marketing cooperative). Finally, the study area was easily accessible to the researcher, who was based in London. Southwestern Ontario, therefore, provides an appropriate area in which to examine farm family decision-making with respect to production practices.

3.4.2 Sample Design

Having decided upon the study area, a sample of sixty farmers was constructed: evenly divided between ecological and conventional operations. The collection of data from both ecological and conventional farmers was required in order to make comparisons between
Figure 3.1 Location map of study area
decision-making, although it is recognised that thirty is a small proportion of the total number of conventional farmers in the study area

The limiting of farmer interviews to thirty ecological and thirty conventional farmers was premised on a number of considerations. First, having made the decision that in-depth interviews were necessary for this type of research, time constraints were imposed by the need to complete all of the interviews within one production season. Production practices are known to change with the environmental conditions in any given production year (Martin 1992, pers. comm.) and, therefore, it was necessary to complete all of the interviews within one production season. The time window available for interviews was further narrowed by the fact that interviews could only be conducted during the winter months when farmers were not busy with farm chores.

Second, the main aim of the thesis was to uncover the factors contributing to decision-making processes. Various researchers have suggested that when investigating phenomena through personal interviews a point of saturation is reached (Patton 1990, Miles and Huberman 1994). The saturation point is said to be reached when data gathered in interviews becomes repetitive, and generally 20-30 interviews is considered sufficient for saturation to occur (Miles and Huberman 1994). Thus, thirty farmers is considered a sufficient sample to reveal the variety of responses of farmers, and the main influences on decision-making for the farmers in the area, particularly where attention was on the ecological group.

The sample was further divided into two sub-areas. These sub-areas were identified based on the presence of ecological farmers. When the spatial distribution of ecological farmers in Southwestern Ontario was examined, three basic levels of ecological activity were identified (Figure 1). To the north of the region (Grey and Bruce Counties) lies the greatest concentration of ecological agriculture. While the numbers of ecological farmers are low (29 farmers in Bruce County and 25 farmers in Grey County) when compared to conventional operations, these are considerably higher than the numbers in the southern counties of the
study area (Kent 2 farmers, Essex 1 farmer, Lambton 4 farmers, Elgin 4 farmers and Middlesex 6 farmers) In between in Perth, Waterloo, and Huron counties lie intermediate numbers of ecological farmers

Due to this clear pattern in the geographic distribution of ecological farmers, it was decided to divide the overall region into two subareas a northern area including Grey and Bruce Counties, and a southern area including Middlesex, Elgin and Oxford counties. It was decided that fifteen ecological and fifteen conventional farmers should be interviewed in each sub-region. This decision was made in order to determine whether there were any specific locational factors that influenced decision-making with respect to ecological practices.

Samples were then constructed from farmers in the two different study areas. The Directory of Organic Growers (Canadian Organic Growers 1992a), which provides the names and addresses of all organic farmers that existed in Canada in 1992, was used to select ecological farmers for the research. Past studies of ecological operations have often standardised farm operations by farm product type (Locke closed et al 1975a, 1975b) Although this is useful for certain research problems, in this case it was decided to include a variety of farm product types in the sample. This was considered necessary in order to account for the role of product combinations in decision-making and also to determine whether it was a feature that differentiated ecological and conventional operations.

Unfortunately, when contacted, some of the ecological farmers listed in the directory were no longer farming, or no longer farming ecologically, reducing the number of farmers in each study area from which to derive a sample. In the southern area this was more problematic because there were fewer ecological farmers to begin with and this brought the number of ecological farmers close to the fifteen necessary for the sample. However, a full page advertisement of organic operations in the London Free Press (1994) provided some additional names of farmers who have since started ecological operations, and some of the
farmers interviewed provided additional names. These were added to the original set of names to obtain a sample of fifteen ecological farmers.

Due to the greater numbers of conventional farmers in the study area, it was necessary to use purposeful sampling. This type of sampling is widely used in anthropological studies where exploration of process is desirable (Honingman 1982). With thirty conventional farmers only it is impossible to provide a representative sample on multiple criteria, so it was decided to purposefully sample to attain representativeness by farm product type. In practical terms, this meant that if ten percent of the farmers in the sub-area were dairy farmers, then ten percent of the sample of conventional farmers would be dairy farmers. At the same time as providing some level of representativeness in the conventional group, providing a sample that included a number of product types allowed comparisons of ecological and conventional farmers on the basis of product mix. It is acknowledged that these farmers cannot be used to generalise to the population of conventional farmers, but they do provide a useful comparative basis for the ecological farmers.

Key informants were then used to select the sample of conventional farmers. The OMAFRA offices in Middlesex County and Bruce County were contacted. The research was explained to the respective officers and they were asked to provide assistance in obtaining a sample of farmers to be interviewed. The Middlesex County officer provided a list of sixteen farmers according to the product type breakdown, fifteen of whom were interviewed. In Bruce County the OMAFRA office was unwilling to assist with names of farmers but did provide contacts with the Bruce County Milk Committee and the Bruce County Federation of Agriculture. A sample of suitable farm families was derived with the help of these two organisations.

The sample selection process for farm families, therefore, did not occur in a random manner. Ecological farmers were selected from listings which were supplemented by word of mouth contacts. No attempt at random selection was made with the conventional farmers. However,
these farmers were representative by farm product type and when compared to published statistics, provide a reasonable representation of the conventional group. Given that it is an in-depth understanding of decision-making inputs that is required for this research, the conventional sample provides a useful comparative basis for the ecological sample. It cannot, however, be taken to represent all conventional farmers in the study area on all criteria.

3.5 Interview procedure

Interviews with farmers were conducted over the winter between October 1994 and April 1995. The winter time period was deliberately chosen to avoid peak work periods for farm families in the spring and fall. It was originally hoped to conduct the interviews during the summer of 1994, when road conditions were better and commitments in London fewer, but this did not eventuate as the wet summer meant that many of the livestock farmers were busy with hay throughout the summer months and could not sufficiently organize their time for the interview.

The first contact with farmers was made via an introductory letter (Appendix 2). The letter explained the basis of the research and was sent to nineteen ecological farmers in Bruce County. It was then followed up by a telephone call to set up an interview date and time. Farmers were contacted prior to the interview because of the length of the interview and because the sample was targeted. Upon telephoning the farmers after the letter, had been sent, it was found that eight of the farmers listed in the Directory no longer farmed and two were unwilling to take part in the research. This left eight farmers from the original mailing to the northern study area.

After conversations with these farmers, it was also decided that a less formal means of contact rather than the introductory letter was acceptable. Farmers suggested that an introductory phone call was sufficient to establish contact. This, combined with the high number of farmers that were no longer ecological in the original mailing, lead to the decision to eliminate the
introductory letter and contact the remaining farmers by telephone in the first instance. Thus, on contact by phone, the research objectives were outlined to the farmer, and if they were willing to participate, an interview date and time was set up.

Rejection rates from this latter contact process were low. In Bruce County, seventeen ecological farmers were contacted, two preferring not to participate. One of these farmers did not wish to participate because his English was poor, whereas the other farmer did not have the time to dedicate to the research project. Likewise, sixteen conventional farmers were contacted in Bruce County to obtain the sample of fifteen farmers, with the one farmer not wishing to participate because he was too busy with farm responsibilities. In Middlesex and Elgin counties, rejection rates were lower. One ecological farmer contacted did not wish to participate due to a language problem, and all of the conventional farmers contacted were willing to take part. Those unwilling or unable to participate may have provided some different insights, particularly those who felt that they could not participate due to language, but it is believed that the resultant research sample is appropriate and adequately reflects the structure of the desired sample. Given that the interview process was relatively long, these low rejection rates are considered good.

All of the interviews were conducted at the farm at a time that was convenient to the farm operator. The decision to travel to the farms for the interviews was made for a number of reasons. First, interviewing at the farm allowed the researcher to see the farm, and thus get a visual impression of the operation to complement the data gained from the interview process. Second, the farm environment was a more comfortable one for the participant. There is evidence that people are more responsive to interviews when the interview takes place in a familiar environment (Robinson 1977). Third, the fact that the researcher travelled to the farm to conduct the interviews reduced the amount of time that the farmer needed to give to the research as there was no travel time involved. Finally, conducting the interviews in the home environment meant that where possible all members of the farm family involved in decision-making could be present for the interview. Although in the majority of cases only
one member of the farm family was available, there were several cases where both husband and wife were present at the interview. Where only one member of the farm family was interviewed, it was predominantly the household male (particularly for conventional farmers where all single person interviews were conducted with the male), but in seven cases the interview with the ecological farm family was conducted with the female. In many of the cases the decision was made by multiple decision-makers, but self-selection in terms of who was interviewed meant that it was described in one person's words. This may have influenced some of the results, but it was felt that the factors contributing to decisions would have been the same had both members been interviewed, and in some cases that the person interviewed likely held most of the responsibility in terms of farm management decisions.

Each interview took approximately two hours to complete. Some interviews took considerably longer and included meals and informal farm tours, whilst others took a little less time. However, few interviews were completed in less than two hours. The lengthy interview was necessary to collect the detailed insights required for the research. There was also some time in each interview devoted to establishing a rapport with the farmer. This is in line with the literature suggesting that, in order to be successful, interviews should occur as a discussion, thus allowing the participant to gain from the experience as well as the researcher (Kidder and Judd 1986).

The interviews were taped so as to allow the interviewer time to listen and develop lines of enquiry based on farmers' responses to earlier questions. At the same time, key ideas were written down on the interview schedule, so that these could be explored in more detail. The taping of interviews is also the most accurate way of collecting this type of data as farmers' words can be directly recorded. In a few cases (three) the farmer interviewed was not willing to be taped and, therefore, these interviews were written on the interview schedule in full. Although these were recorded as accurately as possible by the researcher, it is acknowledged that data recording of this type is not as accurate as the taped interviews. Thus, it was not
possible to use these interviews for direct quotations, but key themes and ideas were available.

On completion of the interview part of the data gathering process, farmers were then asked to fill in the scale of attitudes. Originally it was intended to leave the questionnaire with the farmers and have them mail it back to the researcher, but it was found that farmers were already involved in the research and were willing to complete it while the researcher was still there. This proved to be useful for two reasons. First, all of the farmers completed the scale of attitudes and the researcher was able to walk away from the farm with a complete set of data about each farmer. Mailing may have resulted in a lower return rate. Second, some of the topics in the questionnaire prompted further discussion with the farmer. These points could be noted on the interview schedule and where farmers were uncertain about a particular question, they could seek clarification. This was an interesting process because during the completion of the questionnaire many farmers commented that they believed in one thing but they did the opposite on their farm, and so were uncertain of what response to give. If the questionnaire had been completed without the presence of the interviewer, these additional insights would have been lost.

On completion of each interview, additional information gained from the visual impression of the visit to the farm, some personal insights of the interviewer, and a summary of the main points of the interview were recorded on the cover sheet of the interview schedule. These overall impressions gained from the interview were not used directly as data in the thesis, but helped with identifying some of the main themes to be explored.

Where possible, the tapes of completed interviews were transcribed soon after the interview took place. However, the researcher was both conducting the interviews and transcribing the tapes and, therefore, for a two-month period following the completion of interviews transcription was still taking place. Interviews were transcribed in full. One hour of tape
amounted to eight to ten hours of transcription. Transcripts were then stored with the associated questionnaires and identified by a code number.

In accordance with normal practice in oral history, transcribed material was written in the exact words of the farmers that were interviewed, and punctuated accordingly (Hoopes 1979, Yow 1994). Although this means that some of the quotations used in the thesis are not grammatically correct, or are not punctuated in accordance with the rules of English, the literature maintains that leaving the transcripts in this form better represents the true meaning that the farmers intended (Hoopes 1979, Yow 1994). Words of hesitation, such as ‘um’ and ‘ah’, which did not add to the meaning of the quotation were, however, removed.

3.6 Data Analysis

The primary focus of the data analysis was to compare ecological and conventional farm operations. Glaser and Strauss (1970) suggest that the use of comparative analyses is useful in qualitative research because it maximises credibility by detailing similarities and differences of comparison groups and is, therefore, useful in predicting the behaviour of different groups. For similar reasons, they argue that having comparative groups aids analysis, because the researcher can focus on those similarities and differences in their descriptions of the data and can also generate relations between categories, that may not be clear where a qualitative assessment of one group only is conducted.

It was originally intended to also analyse interviews according to the two subregions. However, in the majority of comparisons, no differences were found between subregions, and thus, subregion analysis was restricted to product combinations, and some specific practices, where differences were identified. On most other criteria differences between study areas were insignificant compared to differences between ecological and conventional operations. Therefore, the differing locations were not felt to contribute to an understanding of decision-making and were not analysed separately.
There were two different data analysis approaches for the two different data collection techniques used. The interview data, once it had been classified according to the ecological-conventional dichotomy and filed, according to research themes as represented by the major sections of the interview schedule, was analysed in three different ways: (1) classification and enumeration of variables to be used to compare ecological and conventional operations, (2) content analysis of the detailed transcripts to determine any common themes or patterns in farmers' decision-making processes, and (3) thematic interpretation or identification of quotations and case studies which would reflect the complexity of the decision-making process, and the themes outlined through content analysis. In contrast, the scale questionnaire was analysed quantitatively.

3.6.1 Analysis of interview data

(1) Classification and enumeration of variables for comparative purposes

The use of a semi-structured interview schedule which included some basic demographic data, allowed comparisons of ecological and conventional operations to be made on some standard criteria. The classification systems used to identify structural patterns within the comparative data sets were derived from two sources. In some cases, the classification system used by the agricultural census was adopted, e.g., age of operator, tenure arrangements. In other cases, themes were determined from the literature. For example, the various aspects of farm operation that were considered in their dynamic context were determined from the review of the literature identifying adjustment strategies. Similarly, characteristics that had been used to differentiate ecological and conventional operations in past studies were incorporated.

Where analytical categories had been predetermined in this way, analysis involved the compiling of basic descriptive statistics. Frequencies of farmers in each of the categories were obtained, in each case with a view to comparing ecological and conventional operations. More sophisticated statistical tests were not conducted for two main reasons. Sample size was
considered too small, particularly for conventional operations. It was also not the intent of the research to identify any statistical relationships. The primary focus was on the decision-making processes as outlined by the participants. Thus, basic counts were largely conducted to provide the reader with a general idea of the characteristics of the two groups of farmers under consideration.

(2) Content analysis and enumeration

In most cases, analytical categories were derived from the data using content analysis. Transcripts were read and coded according to categories that emerged from the data (Miles and Huberman 1994), particularly where they reflected differences between ecological and conventional operations. This method of categorisation was particularly relevant when decision-making was analysed. For example, the various evolutionary sequences by which farm families arrived at their current production system had not been specified in the previous literature, and yet it became apparent that farmers who farmed ecologically had arrived at their production system in different ways. These different sequences were further reflections of alternate decision-making processes, and different relative influences of structural constraints and attitudes. Therefore, the paths to use of particular practices became both a result and an analytical category with which to consider decision-making.

In practical terms content analysis involved several readings of the transcripts. Some insights as to potential distinctions between ecological and conventional farm operations had been gained through the interview and transcription processes, but in order to ensure that no potentially important distinctions were not identified the interviews were revisited with a preliminary coding scheme constructed. The transcripts were organised into the various sections of the thesis at this stage and the coding schemes developed under these headings. Transcripts were then reread to develop a detailed coding scheme of descriptive categories. Any categories or codes that were not present in the original listing, but provided useful information with respect to the two production systems were added to the list.
In the content analysis portion of the thesis the coding was primarily descriptive coding which requires little interpretation (Miles and Huberman 1994). For example, when considering the equipment investments of ecological and conventional farmers, it was apparent that some farmers regularly updated their equipment, others maintained it as long as possible, and others had divested themselves of equipment and hired custom operators. Thus, these different strategies were given different coding on the coding scheme. Other categories derived in this way included the labour relations on the farm, pathways to different production systems and marketing methods. Thus, the categories derived through this method were readily apparent, and the choice of categories were not subject to substantial interpretation.

After this initial coding scheme had been developed the transcripts were reread and the a numbered code placed in the margins of the transcript. Then frequencies of various responses were recorded. These frequencies were then used directly to compile frequency tables designed to compare ecological and conventional production systems and social structures.

(3) Thematic interpretation

Thematic interpretation goes beyond coding to focus on the words and responses of individuals and insights thus provided (Glaser and Strauss 1987 in Miles and Huberman 1994). It recognizes the value of understanding individual responses, leading to a deeper understanding of process. Although individualistic, it is possible to group responses to identify common themes. Due to the complexity of decision-making, and the rich collection of qualitative data gained in the interview process, thematic interpretation was used to analyse the decision-making data.

To do this, the basic process of thematic interpretation described elsewhere was followed (Glaser and Strauss 1987 in Miles and Huberman 1994). First the transcripts were read and reread, and a list of themes and issues that had emerged with that reading was constructed.
For example, the importance of a number of triggers altering attitudes of ecological farmers were identified. At this stage all of the themes and issues that had been raised by participants in the interview process were included on a listing.

After this listing of themes had been derived the transcripts were read for a second time to determine the frequency of occurrence of different themes. During the interview process farmers had stated the variety of factors that contributed to their decision-making, but had not been asked to rate these factors in order of importance. This meant that the researcher could not determine the relative importance of individual criteria to individual farmers. However, by counting the number of times that a response was given to a particular question, it was possible to determine the relative importance of different factors to the group as a whole.

After these counts of responses had been conducted, those themes that emerged in the majority of farmers responses were included in the thesis as the key factors that contributed to decision-making.

Once the list of key themes had been identified in this way, the responses of individual farmers were again examined, and cases that were illustrative of the themes that had been uncovered were listed under the theme headings, with references to the places that they had occurred in the original transcript. From these cases, quotations were identified which best illustrated the main themes that had been determined by the frequency of response. These quotations were able to portray the common thought processes of farm families, which had been identified through the thematic interpretation.

These quotations were presented in full in the thesis in an attempt to overcome some of the potential problems of interpretation inherent in qualitative research. By retaining lengthy quotations in the thesis it is possible for the reader to interpret the same information that the researcher was utilising and compare this to the interpretation given by the researcher. Although interpretation issues still exist, the reader is in a position to determine the extent of that interpretation.
3.6.2 Analysis of the scale questionnaire

The scale questionnaire used in the thesis was analysed quantitatively. As mentioned earlier, this research instrument had been used elsewhere, and an analytical scheme constructed (Beus and Dunlap 1991). This analytical scheme was adopted in the research. The data obtained in the questionnaire was in the form of a scale response to two opposing views. If a farmer identified strongly with the alternative agriculture view identified in the scale, they would circle the number on the five point scale closest to that view. If a farmer identified strongly with a conventional agriculture view, they would circle the response closest to that view on the scale. After all responses had been recorded, individual responses were grouped under the various numbers on the scale according to the different questions.

The questions were then reorganised so that a five on the scale would indicate a strongly alternative view and a one would indicate a strongly conventional view. An average response was then calculated for both ecological and conventional farmers. Thus, an average near five would indicate an alternative response by the farmers, and an average near one would indicate a conventional response by the farmers. Then a comparison of ecological and conventional responses was made.

3.7 Conclusion

In summary, the methodology used was a triangulated approach. A qualitative personal interview formed the core of the methodology, using a structured sampling design and a structured interview schedule. This research design was sufficiently flexible to allow the acquisition of detailed data, that could be used to define common factors which entered into the decision-making processes for farm families. Obtaining descriptions of decision-making in the words of the farmers was important in order that no important aspects of the decision-making were ignored. The research design was also sufficiently rigorous to allow for comparisons of the structure, production practices, and social composition of ecological and
conventional operations. Finally, the addition of a previously tested scale of attitudes allowed the researcher to determine precise differences in attitudes and link the study to other studies of attitudes of ecological and conventional operations.
CHAPTER FOUR SOCIAL AND STRUCTURAL FRAMEWORK FOR DECISION-MAKING

4.1 Introduction

The literature reviewed in Chapter Two identified the need to examine the social and economic organisation of the farm unit in order to understand farm family decision-making in general, and decision-making with respect to production systems in particular. It was also recognised that the social and structural conditions of production were themselves evolving, sometimes in relation to production system choices. In this chapter, the existing social and economic organisation of ecological and conventional operations are compared, and the evolution of these organisational outcomes explored.

4.2 The Farm Family Demographic Characteristics

4.2.1 Age and Family Structure

Standard demographic characteristics, such as age and stage in the life course, of ecological and conventional farmers interviewed were similar (Table 4.1). The average age of ecological farmers was 44 years old and conventional farmers 43 years old. In both cases the average age was greater in the southern study area (both 48 years old) than in the northern area (40 and 38 years old respectively). Also, for both ecological and conventional farm groups, more than a third of the farmers were between 31 and 40 years of age. Family structures were also similar. Most of the farm families interviewed were married couples with school age children at home. Thus, in this research, age and family structure do not distinguish ecological and conventional farm families.

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Table 4.1 Age and Family Structure of Ecological and Conventional farmers

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Ecological</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30</td>
<td>1 (3%)</td>
<td>3 (10%)</td>
</tr>
<tr>
<td>31-40</td>
<td>11 (37%)</td>
<td>12 (40%)</td>
</tr>
<tr>
<td>41-50</td>
<td>11 (37%)</td>
<td>8 (27%)</td>
</tr>
<tr>
<td>51-60</td>
<td>4 (13%)</td>
<td>6 (20%)</td>
</tr>
<tr>
<td>61-70</td>
<td>3 (10%)</td>
<td>1 (3%)</td>
</tr>
</tbody>
</table>

Household Structure

<table>
<thead>
<tr>
<th></th>
<th>Ecological</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alone</td>
<td>1 (3%)</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>Married - no children</td>
<td>1 (3%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Married - young children</td>
<td>5 (17%)</td>
<td>4 (13%)</td>
</tr>
<tr>
<td>Married - school children (&lt;12)</td>
<td>8 (27%)</td>
<td>7 (23%)</td>
</tr>
<tr>
<td>Married - children &lt;18</td>
<td>8 (27%)</td>
<td>9 (30%)</td>
</tr>
<tr>
<td>Married - grown children</td>
<td>7 (23%)</td>
<td>7 (23%)</td>
</tr>
</tbody>
</table>

Interpretation of this result should be treated with caution in terms of the influence of these variables on decision-making. The fact that similar characteristics were found would suggest that age and family structure do not influence decision-making with respect to ecological practices and yet age has been found to be an important variable in adoption research (Ervin and Ervin 1982). However, the present age of the farmers does not show the age at which they adopted their present production system, and, therefore, age may have been a factor. Also, ecological production systems are not new and, therefore, adoption of such systems cannot be traced to a specific time period. What the data does reveal, though, is that ecological and conventional production systems are not confined to a particular age group, or family structure, and that the demographic profile as depicted by age and household structure are similar for these two types of farms.

4.2.2 Gender and Ethnicity

Two distinguishing demographic features were identified. First the country of origin of farmers seemed to have a relationship with the decision to farm ecologically. While all of the
conventional farmers were Canadian born, four of the ecological farm families were of European origin, three Dutch farm families and one Swiss farm family. Also farmers interviewed identified several other recently immigrated German farmers as being at the centre of the ecological movement. These numbers are inconclusive, but one interpretation might be that ecological farming is diffusing from Europe to Canada and that farm conditions and experiences in Europe have convinced more farmers of the need for alternative production systems.

Second, a greater proportion of the ecological farmers are women. Four ecological farms were operated primarily or solely by women, whereas none of the conventional farms were. Fourteen other ecological farmers reported dual decision-making and active involvement of women in the farm operation. Ten conventional farmers reported similar roles for women in the farm enterprise. This evidence suggests that ecological farming either appeals more or lends itself more to female farmers.

4.2.3 Farm family Background

In agreement with past studies (Harris et al. 1980, Henning et al. 1991) a high proportion of people from urban backgrounds, high levels of general academic education and less farming experience were found among ecological farmers (Table 4.2). Most of the conventional farmers interviewed had taken over the family property and only two conventional farmers were from non-farm backgrounds. In contrast, less than half the ecological farmers had taken over a family property and one third were from non-farm backgrounds. More than two thirds of the ecological farmers had tertiary education, while about a half of the conventional farmers did. Where tertiary education was attained by conventional farmers, most had agricultural related education, while ecological farmers came from a range of educational backgrounds.
Despite these differing backgrounds, similar numbers of ecological and conventional farmers had never left the home farm (Table 4.2). Higher proportions of ecological farmers had spent time in other occupations, although a little more than half of the conventional farmers had also spent time in other occupations. Ecological farmers are more likely to have less farm and more off-farm experience.

Table 4.2 Background characteristics of ecological and conventional farmers

<table>
<thead>
<tr>
<th>Birthplace</th>
<th>Ecological</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current farm</td>
<td>13 (43%)</td>
<td>25 (83%)</td>
</tr>
<tr>
<td>Another farm</td>
<td>6 (20%)</td>
<td>3 (10%)</td>
</tr>
<tr>
<td>Non-farm</td>
<td>11 (37%)</td>
<td>2 (6%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th>Ecological</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;Grade 10</td>
<td>3 (10%)</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>Grade 10+ (High school only)</td>
<td>4 (13%)</td>
<td>10 (33%)</td>
</tr>
<tr>
<td>College</td>
<td>6 (20%)</td>
<td>9 (30%)</td>
</tr>
<tr>
<td>University</td>
<td>17 (57%)</td>
<td>9 (30%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time spent away from current farm</th>
<th>Ecological</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never left home farm</td>
<td>4 (13%)</td>
<td>5 (17%)</td>
</tr>
<tr>
<td>Left home farm for education only</td>
<td>4 (13%)</td>
<td>9 (30%)</td>
</tr>
<tr>
<td>Spent time in other occupations</td>
<td>22 (73%)</td>
<td>16 (53%)</td>
</tr>
</tbody>
</table>

These different backgrounds of ecological and conventional farmers suggest that ecological and conventional farmers interviewed represent different groups of people. While there are exceptions the experiences that they have had and the socialisation processes that they have undergone vary considerably. Children that have taken over a family property have little experience other than farming the way that their parents did and are, therefore, less likely to change production methods. Likewise those that have only had educational experience off the farm, but no work experience, mostly participated in agricultural programs that reinforced the conventional method of farming. This would suggest that many conventional farmers are engrained in their system of production and do not have external experiences that may alter their thinking with respect to agriculture and ultimately their system of production. These
aspects are explored more fully in Chapter Six, where the decision-making processes and paths to particular farm production systems are considered.

4.2.4 Farm goals and values

Given the differing backgrounds of ecological and conventional farmers, it would be expected that their reasons for farming would also differ. Farmers were asked to explain why they farmed. Most farmers provided a combination of social, economic and environmental reasons for farming. For many, there were also tradeoffs involved in the decision to farm. Many had initially decided to farm for one reason but continued to do so for other reasons.

Most farmers, both ecological and conventional, farmed for the lifestyle (Table 4.3). Only four ecological and four conventional farmers did not mention some aspect of lifestyle in their reasons for farming. Thus, the main reason for farming was common to both ecological and conventional farmers. Many also suggested that ideally they farmed to make a living, but the current economic environment for farmers meant that this was not possible, and they continued to farm for lifestyle reasons. The specific aspects of lifestyle common to both ecological and conventional farmers included factors such as the farm is a good place to raise children, independence/self-employment, living in a rural area as opposed to urban living, personal satisfaction and integration of work and family. Four ecological farmers also said that they farmed to be self-sufficient. Interestingly no conventional farmers mentioned this.

Other reasons for farming were given different priorities by ecological and conventional farmers. The next most frequent reasons for farming for ecological farmers were environmental reasons, such as contact with land and animals, preservation of habitats and showing that sustainable agriculture is possible. Environmental reasons ranked at the bottom for conventional farmers, below economic and social reasons. For conventional farmers, the second most dominant reason for farming was economic. Although they suggested that making a living from farming was difficult, many farmed to earn a decent living. Social
reasons were given by similar numbers of ecological and conventional farmers. However, as few conventional farmers cited environmental reasons, social reasons ranked higher than environmental reasons in conventional farmers' decisions to farm.

Table 4.3 Reasons for farming ranked by major category and production methods

<table>
<thead>
<tr>
<th>ECOLOGICAL REASONS FOR FARMING</th>
<th>CONVENTIONAL REASONS FOR FARMING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifestyle (26 respondents-87%)</td>
<td>Lifestyle (26 respondents-87%)</td>
</tr>
<tr>
<td>Environmental (16 respondents-53%)</td>
<td>Economic (17 respondents-57%)</td>
</tr>
<tr>
<td>Economic (11 respondents-37%)</td>
<td>Social (6 respondents-20%)</td>
</tr>
<tr>
<td>Social (5 respondents-17%)</td>
<td>Environmental (3 respondents-10%)</td>
</tr>
</tbody>
</table>

Note: Farmers could provide more than one reason for farming and often farm for a combination of two or more reasons.

The differing reasons for farming would appear to have an impact on the production system choices of farmers. Environmental factors were more likely to influence into ecological farmers' reasons for farming than for conventional. In contrast, conventional farmers placed greater emphasis on economic reasons for farming. This is reflected in production practices, with those placing greater emphasis on environmental reasons also farming in a more environmentally friendly manner.

4.3 Social Links

4.3.1 Membership in Farm Organisations

Ecological and conventional farm families had memberships in different farm organisations (Table 4.4). Most of the conventional farmers belonged to one of the national farm organisations, although many stated that they did not take an active part in the organisation's activities and were members primarily in order to obtain their tax refund. Recent legislation
required farmers to be members of one of the national organisations in order to receive their tax rebate from the government. In contrast, one third of the ecological farmers had chosen not to belong to any of the stable funding farm organisations. Instead there were high numbers of ecological farmers who were members of the Ecological Farmers Association of Ontario (EFAO). These farmers were active participants in the association's activities and suggested that the association was best able to meet their needs as a farm group.

Table 4.4 Membership in farm organisations by ecological and conventional farm families

<table>
<thead>
<tr>
<th>Type of Organisation</th>
<th>Farm Organisation</th>
<th>Ecological</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Farm</td>
<td>Ontario Federation of Agriculture</td>
<td>15 (50%)</td>
<td>23 (77%)</td>
</tr>
<tr>
<td>Organisations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Christian Farmers Association of Ontario</td>
<td>1 (3%)</td>
<td>2 (6%)</td>
</tr>
<tr>
<td></td>
<td>National Farmers Union</td>
<td>2 (6%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>10 (33%)</td>
<td>4 (13%)</td>
</tr>
<tr>
<td>Other organisations</td>
<td>Ecological Farmers of Ontario</td>
<td>24 (80%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Canadian Organic Growers</td>
<td>4 (13%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Soil and Crop Improvement</td>
<td>0 (0%)</td>
<td>13 (43%)</td>
</tr>
<tr>
<td>Association</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Membership in farm organisations provides an indication of the types of links that farm families have with other farm families. It became clear during the interviews that membership in the EFAO was an important social support network for ecological farmers. The EFAO provides a number of services to its members: a quarterly newsletter with articles about practical aspects of farm management and any forthcoming events, farm tours during the summer months so that farmers can see what other ecological farmers are doing on their operations, and a free advisory service to those interested in ecological agriculture. More recently, the group has divided into several local area networks that hold monthly meetings.
to discuss a variety of issues. The activities of the EFAO are an important means of relieving some of the isolation often felt by the ecological group.

Conventional farmers, although belonging to various farm organisations, did not have the same type of relationship with these organisations. As noted earlier, many were members primarily to receive the monetary refund but did not use the organisation as a source of information or as a social support network. On the one hand, this reflects greater institutional support for conventional agriculture, while on the other, it reflects the greater numbers of conventional farmers. Conventional farmers generally felt that the national farm organisations met their needs and had no need to create alternatives.

4.3.2 Relationships with other farmers

At a less formal level the relationships between farmers differed for ecological and conventional farmers. Most of the ecological farmers stated that they had little in common with their neighbours, who were conventional farmers, and, therefore, relied on their contacts through organisations such as the EFAO for support and advice. This meant that even informal exchanges of information occurred over large distances for ecological farmers. One ecological farmer commented that he had nothing to talk to conventional neighbours about as he did not understand their jargon which included all kinds of chemical terms. Thus, by their production system choice ecological farmers were separated from their neighbours social groups. Even those farmers who had grown up on their present farm, and knew the neighbours well before their decision to convert to ecological practices, found that their relationship with neighbours was strained by their production system choice.

In contrast, conventional farmers maintained strong social links with neighbours. They attended the same meetings and used the same production practices. They were, therefore, able to exchange ideas in a neighbourly fashion and found their neighbours to be their strongest support group. Cooperation among conventional neighbours was also reflected in
their participation in equipment and labour sharing arrangements as discussed in Section 4.4.4

4.4 Tenure Arrangements

At the broadest scale of analysis ecological and conventional farmers are similar in their ownership patterns (Table 4.5) The majority of the farm units were owned and operated by the farm family, with the exception of two ecological farm families and one conventional farm family who rented their land from a family member. No corporately owned and managed farms were included in the sample. Specific land ownership arrangements varied slightly, with ecological farmers less likely to have incorporated, and the majority of operations being owned as husband and wife partnerships. These differences, however, are unlikely to be attributable to different production systems and, in terms of decision-making, the fact that they are all family-owned and operated is of greater significance.

<table>
<thead>
<tr>
<th>Tenure Arrangement</th>
<th>Ecological</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land owned</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sole Proprietorship</td>
<td>12 (40%)</td>
<td>9 (30%)</td>
</tr>
<tr>
<td>Family Partnership</td>
<td>14 (47%)</td>
<td>13 (43%)</td>
</tr>
<tr>
<td>Family Company</td>
<td>2 (6%)</td>
<td>7 (23%)</td>
</tr>
<tr>
<td>Land Rented</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family member</td>
<td>2 (6%)</td>
<td>1 (3%)</td>
</tr>
</tbody>
</table>

When the individual sections of land that make up the farm property are considered, however, differences in ownership patterns can be observed. Conventional farmers are more likely to rent land than ecological farmers (Table 4.6). Similarly, conventional farmers are more likely to rent more land than ecological farmers. These trends are more pronounced in the southern study area where only one conventional farmer did not rent land, and the average acreage rented was 320 acres. In contrast, only six ecological farmers rented, with an average of 68...
acres. In the northern area, eleven of the fifteen conventional farmers rented on average 279 acres, while five ecological farmers rented an average of 256 acres.

Table 4.6: Rental behaviour of ecological and conventional farm operations

<table>
<thead>
<tr>
<th></th>
<th>Conventional</th>
<th>Ecological</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers who rent</td>
<td>25</td>
<td>11</td>
</tr>
<tr>
<td>Average land rented</td>
<td>300 acres</td>
<td>162 acres</td>
</tr>
</tbody>
</table>

Rental behaviour has implications for how land is used. It has been suggested that farmers are likely to take better care of land that they own than they are of rented land (Lighthall 1995). Land improvements on rented land are rare because of the short planning horizons associated with the rental agreements. These short term planning frames may also be a disincentive for ecological farmers to rent land as their production system relies on long term planning. The fact that fewer ecological farmers rent land is, therefore, not surprising.

4.5 Enterprise Choice and Structural Characteristics

4.5.1 Farm business structure

Ecological and conventional farm enterprises can be differentiated based on the combination of activities that comprise the business structure. Although similar numbers of ecological and conventional farm families (sixteen farms in each category) had non-crop or non-livestock activities as part of their business structure, the contribution of these activities to the farm enterprise differed. The number of activities associated with ecological farm enterprises was greater than that for conventional operations. Non-crop/livestock activities on ecological operations included horse drawn hay and sleigh rides, Christmas tree sales, processing of various products (e.g., woven goods from wool, salsas and processed food items), maple syrup processing, crafts (dried flowers or stooks of grain), school tours, a fish pond where fishing could occur, ‘haunted hay rides’ and haunted barn tours, plus the use of woodlots on a
periodic basis for timber and frequently for firewood. The range of activities of this type on conventional enterprises was more limited, with activities including seed dealerships, value added breeding stock, harvesting of woodlots occasionally, school tours, maple syrup processing, a hunting preserve, a Bed and Breakfast operation and some crafts. Few of the conventional farmers were involved in value added activities which were a feature of many ecological enterprises. Thus, the ecological farmers innovated and diversified their operations in different ways to conventional farmers.

Similarly, many conventional enterprises were engaged in only one non-crop/livestock activity, primarily the harvesting of a woodlot, while ecological farm families were often engaged in several alternative activities. Two conventional farmers were actively involved in a number of alternative activities, however. One of these operations conducted school tours, sold trees, had a seed dealership, and occasionally held festivals with all types of activities for people. The other conventional operation with several non-agricultural activities harvested a woodlot, processed maple syrup, and maintained a hunting preserve. It was common for ecological enterprises to include a variety of activities, with typical operations combining value added food products with various crafts, plus the use of woodlots.Thus, activities not centred on the main agricultural base of the farm played a more significant role on ecological farms than they did on conventional farms. Using the typology constructed by Bowler (1992) it could, therefore, be argued that ecological farmers are more dependent on non-agricultural incomes than conventional operations. Although the enterprise structures of both conventional and ecological farms suggest that both felt the need to diversify, ecological farmers have been more likely to do so.

One other business structure feature differentiated ecological and conventional operations. Many ecological farm families mentioned activities undertaken on the farm operation aimed at self sufficiency. These activities were performed to decrease consumption rather than increase income. The dominant activity of this nature was the presence of the home garden. Most ecological enterprises maintained a home garden. Although partially because these farm
families had concerns about food quality of store-bought produce, the home garden was also a symbol of the farmer’s desire for self-sufficiency and quest to decrease consumptive spending. The home garden, combined with produce from the agricultural aspects of the operation, often supplied the majority of the farm family’s food consumptive needs. This has been identified as an adaptation strategy for many farm families in Florida (Gladwin and Butler 1994), although in their study the farmers were conventional.

Several ecological operators also mentioned that they did all the construction on the farm themselves from wood harvested from farm woodlots. This was also identified as an important means of farm survival, as one ecological farmer stated:

I guess I see that (construction activities) as, maybe my hog farm is really only a half time job so all these other things are my other jobs. I could not go off the farm to do it but I prefer to do my own here. I guess that’s why I’ve always got to be aware of that. The hog farm is not a full time income. I have to realise it’s a half time income and I’ve got to be prepared to do something else for my other half-time job.

The motto was that a dollar saved in this way was better than a dollar earned. Thus, many ecological operations included activities to decrease expenditure rather than increase income.

Fewer conventional farmers mentioned that they undertook activities which lessened consumptive expenditure such as home gardens and doing their own construction work. No conventional farmers mentioned that they maintained a home garden. However, the question was not specifically asked and, therefore, some may have had home gardens but did not mention them. The lack of acknowledgement of such activities could be interpreted as an indication that if home gardens did exist, they were not as important to conventional farm families as they were to ecological farm families. Some conventional farmers did mention that they did as much as possible of the construction and renovation work around the farm. However, activities of this nature were more limited for conventional farmers.
Examination of the business structure of ecological and conventional operations suggests that ecological farms are more diverse than conventional farms. Ecological farm families often engage in more than one non-agricultural activity which supplements income from agricultural sources. Their choices of activities reflect a certain level of innovativeness. They also include several activities that reduce expenditure, in particular home gardens. In contrast, conventional farmers who are engaged in non-agricultural activities are primarily engaged in harvesting of woodlots or utilisation of existing resources rather than innovative diversification schemes. They also are less likely to engage in the consumption reducing activities evident on ecological operations.

4.5.2 Agricultural product combinations

Ecological and conventional farm operations were engaged in different agricultural activities (Table 4.7). Ecological farm operations were more diversified with higher proportions of farmers involved in mixed farming operations, and most operations had both livestock and cropping activity. Conversely, conventional farmers had specialised in one or two different activities. Many were involved in one activity only such as cash cropping, but others combined cash cropping with various livestock enterprises. Where activities were combined, the two activities functioned as separate entities, whereas the mixed farms included several different agricultural activities. These results confirm results of previous studies that have found that ecological operations are more diverse than conventional operations (Saltiel et al. 1994). They also reflect organic regulations or standards which recommend that farmers have both livestock and cropping components, and that these components are interactive. The exceptions to this are the vegetable and fruit growers who are more highly represented in ecological operations, but do not generally have internal diversity.

A geographic component exists in the difference in activities on ecological and conventional farms. In the northern study area, the differences in product combinations are not as pronounced as they are in the southern study area. This reflects the nature of agricultural
production in both areas. The northern study area is dominated by livestock operations and, therefore, ecological and conventional operations are closer in their product combinations. In contrast, conventional farming is dominated by cash cropping activity in the southern study area and, since ecological farmers generally do not engage in cash cropping, product combinations are distinctive.

Table 4.7 Comparison of ecological and conventional farmers by farm product type

<table>
<thead>
<tr>
<th>FARM TYPES BY REGION</th>
<th>Ecological</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bruce</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash Crop only</td>
<td>0 (0%)</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>Hog only</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Poultry only</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Dairy</td>
<td>5 (17%)</td>
<td>8 (27%)</td>
</tr>
<tr>
<td>Beef only</td>
<td>1 (3%)</td>
<td>3 (10%)</td>
</tr>
<tr>
<td>Two specialities (*)</td>
<td>2 (7%)</td>
<td>2 (7%)</td>
</tr>
<tr>
<td>Vegetables / Fruit</td>
<td>2 (5%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Mixed</td>
<td>5 (17%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>South</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash crop only</td>
<td>0 (0%)</td>
<td>5 (17%)</td>
</tr>
<tr>
<td>Hog only</td>
<td>0 (0%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Poultry only</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Dairy</td>
<td>2 (7%)</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>Beef only</td>
<td>1 (3%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Two specialities (*)</td>
<td>1 (3%)</td>
<td>5 (17%)</td>
</tr>
<tr>
<td>Vegetable/Fruit</td>
<td>3 (10%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Mixed</td>
<td>7 (23%)</td>
<td>1 (3%)</td>
</tr>
</tbody>
</table>

*Note. Two specialities generally means that farmers are engaged in two specialised activities, e.g., cash crop and beef but these activities are functionally separate.*
Differences in product combinations on ecological and conventional operations are deeper than the distinction by product types identifies. Except for dairy and cattle operations, conventional farmers often view their livestock operations and cropping operations in discrete terms. That is, each part of the enterprise is seen as a specialty in itself and could often continue without the other aspects of the operation. For example, feed for livestock is purchased from off the farm and the land is used to produce crops for market not for livestock. In contrast, all ecological farmers are conscious of a symbiotic relationship between cropping and livestock. Crops are grown to feed the animals which in turn supply manure as fertilizer for the farm. Neither could operate without the other and crops are only sold where there is an excess over livestock needs. This different view of the organisation of production helps explain the differing product combinations of ecological and conventional operations.

Also, the range of agricultural products on individual farms was much greater for ecological farmers. Individual ecological farms would often have a combination of vegetables for market, chickens, ducks, turkeys, beef cattle and some grains. The exceptions to this were the dairy farmers who were highly specialised. In contrast, conventional farms often specialised in one type of livestock, or one type of activity such as cropping. Conventional enterprises with a mix of livestock and other agricultural products were rare, only one being found in the sample. Thus, conventional farmers dedicated their time and money toward one aspect of production, while ecological farmers engaged in a variety of activities.

The literature suggests that levels of product diversity will determine farmer perceptions of the viability of ecological production systems (Saltiel et al. 1994). By comparing diversity of farms with production practices, they conclude that the more diverse the product base, the more likely the farmer is to view ecological production systems as viable. To argue this further, those farmers with more diverse product bases are most likely to adopt ecological systems of production and thus the resultant patterns of product combinations identified earlier. However, these analyses focus on either conventional farmers only and their perceptions, or product combinations after the decision to farm ecologically has been made.
Thus, little is known about whether those that actually convert initially had more diverse product bases.

Analysis of change in product combinations of ecological farmers indicates that the diversity of product bases associated with ecological agriculture is more a result of the decision to farm ecologically, than a contributor to that decision. Many ecological farmers who had converted to ecological production systems had specialised production bases prior to conversion. For example, two farmers grew continuous corn for several years before deciding to switch production systems. Several others were specialised livestock producers before switching to ecological production. Others stated that their product bases had become increasingly diversified since becoming ecological in response to market demands for other ecological products. Thus, although diversified product bases are a feature of ecological production systems, the lack of diversity in conventional farmers cannot be directly seen as a barrier to a switch to ecological production. It may alter perception, but farmers have switched who were producing in a specialised way.

4.5.3 Scale of Operation

Conventional farms were generally larger than ecological farms (Table 4.8). This pattern was more pronounced in the southern study area where even the largest ecological farm was small in comparison to the majority of conventional farms. In the northern study area, some ecological farms were similar in size to the conventional operations, although average farm size was still smaller.

The key explanatory factor in the different farm sizes was farm product type. Cash croppers were generally largest and had higher representativeness in the conventional group. Vegetable growers were the smallest, and were proportionally greater in number in the ecological group. In some cases where similar product types, such as dairying, were encountered ecological farms were larger than their conventional counterparts dispelling ideas that ecological farming
only occurs on a small scale. This also confirmed the idea that different scales of operation were more a factor of farm product type than the ecological nature of production. However, this is not to say that ecological farmers have not deliberately chosen activities where small farm sizes are viable.

### Table 4.8 Farm size for conventional and ecological farms

<table>
<thead>
<tr>
<th></th>
<th>Southern Area</th>
<th>Northern Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conventional</td>
<td>Ecological</td>
</tr>
<tr>
<td><strong>Average land owned</strong></td>
<td>298 acres</td>
<td>96 acres</td>
</tr>
<tr>
<td><strong>Farm size range</strong></td>
<td>164-1250 acres</td>
<td>10-275 acres</td>
</tr>
<tr>
<td><strong>Av total farm size</strong></td>
<td>557 acres</td>
<td>123 acres</td>
</tr>
</tbody>
</table>

Note: Average farm size in Middlesex-Elgin is 201 acres (Source: OMAFRA 1994). Average farm size for Bruce County is 229 acres (Source: OMAFRA 1994).

Both ecological and conventional farmers were asked whether they had changed the size of their operation since taking ownership, the reasons for the changes in farm size and whether they felt that enlargement was a necessary strategy in modern agriculture. In analysing the answers to these questions, some idea of the dynamics of the scale of operation can be obtained. Analysis also allows exploration of how decisions with respect to farm size relate to other farm decisions.

Although ecological farms were generally smaller in scale than conventional farms, they were not exempt from pressures of expansion. Several ecological farmers had expanded their operations and several smaller farmers expressed desires to expand. The main reason identified for expansion was needing more land to maintain the self-sufficiency of the farm enterprise. Livestock operators required more land or feed so that they could provide it all from within the farm, and vegetable growers required increased acreages to allow for the rotation of their patches of vegetables. In one case, the extra land was required due to the farmer switching to ecological production of berries and, therefore, needing more land to
grow ecological straw to use as mulch for weed control. Before becoming ecological, the farmer could purchase straw but one requirement of being ecological was to use ecological straw and expansion was necessary to do this. Thus, self-sufficiency was the primary motivation for expansion on ecological farms.

Having self-sufficient production as the primary goal meant that ecological farmers placed limits on their willingness to expand. They unanimously suggested a need to do better with what they had before expanding, and only when the current land base could not supply all the farm production needs did they consider expansion. Several suggested that they would not expand beyond the farm needs and beyond the household labour supply as continual expansion brought more problems. One ecological farmer referred to a friend who farmed 2000 acres and suggested that the friend was unhappy as he had no free time and had to hire labour to manage the land, adding an additional cost. The friend was happier when farming 100 acres despite possibly not making as much money. Another suggested that once you had to hire labour, you had to pay taxes and do all sorts of paperwork and it was not worth the bother. Thus ecological farmers deliberately kept the enterprise at a small scale, manageable with family labour, but capable of supplying all the farm needs.

Alternatives to the expansionist philosophy were recognised and often pursued. Diversification of the product base to accommodate the smaller scale of production was seen as a viable alternative. Evidence of the sincerity of using this strategy to limit expansion can be seen in Section 4.5.1 and 4.5.2 where enterprise structures are discussed. Many ecological farmers show diverse product bases in comparison to conventional farmers. There are also connections to marketing strategies, as certain products lend themselves better to the ecological market. Nevertheless, certain product choices enable ecological farmers to stay small.
For some ecological farm families, expansion of farm size at current rates was viewed as an "evil thing." Ecological farmers made the following comments in relation to whether expansion was a necessary element of farming these days:

Exponential growth is a toxic concept and is unecologica and uneconomical.

I think it would be better if it [farm size] got smaller. I think there is room for more people to be involved in farming and they are sort of taking people off the land and sort of filling it up with machines and stuff. If it got smaller you could put more people back on.

As these statements suggest, the main reasons for aversion to enlargement were environmental and social. Environmental reasons were no less prevalent in the interviews as might have been expected from difference in attitudes (Chapter 6), but were mentioned by several farmers. The majority disliked the trend toward large farms for social or community reasons. They blamed the breakdown of rural communities on the exodus of farm families and purchase of their land by large-scale operations. One farmer mentioned a 100,000-acre foreign-owned farm which could be 1000 farm families if one company had not bought it all. Whether this farm is fact or fiction, ecological farmers perceived such threats to the family farm. As ecological farmers placed a high value on the rural community, they disliked anything that was perceived to diminish its health in any way.

As farm size for conventional farmers is generally higher than for ecological operations, it is not surprising that most conventional farmers had also expanded their operations. Some farmers had even doubled or tripled their land bases since purchasing the farm. This large-scale expansionary trend was most predominant among cash-crop operations. Many other farm types had not expanded their acreages to any greater extent than their ecological counterparts. For those conventional farmers who had livestock operations only, they wanted to be self-sufficient in feed supply, have more acres over which to spread manure, to have sufficient land to maintain their crop rotation, or another barn was required to house livestock. Consequently, those conventional farmers who had livestock generally placed limits
on expansion in a similar fashion to the ecological farmers. They set limits determined by their ability to handle all the work efficiently and were not interested in expanding beyond their livestock requirements. The similarity in size of ecological and conventional livestock operations is a reflection of similar reasons for expansion.

Conversely, where cash cropping was either the sole activity, or a significant part of the enterprise base, expansion occurred for different reasons. The primary reason given was shrinking margins for crops. Thus, if farmers wanted to achieve similar income over time, they needed to expand acreages as they needed to double their crop yield to retain the same income. As one conventional farmer currently working 520 acres said:

Oh, yeah, you have to get bigger because they are paying us less. In 1975 you could send a letter for 6 cents and corn was $3.07 a bushel. In 1994 it costs you 43 cents to send a letter and corn is $2.97 a bushel. So I guess you better do more.

Closely related to this was the heavy investment in modern equipment that was very expensive. Increasing the land base allowed machinery costs to be capitalised over a larger land base. As another conventional farmer commenting on whether enlargement was necessary stated:

You have to enlarge. No doubt about it. If you went out and bought a new combine. That combine has got to cover 1000 acres of crop. And you can either own it, rent or do custom work, but in order to bring the cost per acre for that combine down to a realistic level, it has to cover a minimum of 1000 acres a year. Sobering but it's true. My used combine, it effectively covers 500 acres.

Overall then, retaining profits with shrinking margins, and forced capitalisation of machinery over large acreages (both economic forces) drove expansionary decisions for the conventional cash croppers.
With increased income potential driving expansionary decisions, there is little reason for these farmers to set limits on their expansion. As they see it, the more acres that they have, the greater their return will be. Having decided to expand for these reasons, these farmers find themselves on a vicious cycle of expansion. Two farmers expressed desires to reverse the expansionary trend.

I've often said that I would love to go back and be able to make a living with 100 acres. I wouldn't care about having a big tractor with a cab on it. I'd be happy to do that 100 acres with a little 40 horsepower tractor if I knew that I was going to make enough off my product to support my family on that 100 acres. But that hasn't been the case. It's kind of a vicious cycle. I sometimes wonder who we are working for. The machinery companies or the chemical and fertiliser companies.

If I only had 100 acres unless it was all specialty crops or something I could not make a go of it. It's hard to reason why you would want to get bigger but for us it is a must. You know when you do get bigger you buy another piece of machinery or rent more land so you always increase costs too. So it's sort of a big vicious circle.

These kinds of statements from conventional farmers provide evidence that conventional farmers on expansionary paths do not necessarily endorse the idea of enlargement. Many shared ecological farmers' concerns with respect to expansion, particularly the demise of rural communities with the exodus of farmers and purchase of their land by large operations. Where conventional farmers differed from ecological farmers was in their belief that they could not do anything about expansion and that it was necessary for their survival. Most conventional farmers genuinely did not want to "own half the township" but felt there was nothing they could do about it if they wanted to maintain their profit line. Though they could often quote evidence of people surviving on smaller farms in their area, they often felt that those farmers did not have the same standard of living or lifestyle. Also, many were unprepared or unwilling to diversify. One farmer farming 1250 acres even asked how he could get smaller as he did not think there were any viable alternatives.
Both ecological and conventional farmers had adjusted to pressures of expansion by purchasing land. For livestock operations, the rationale for expansion is the same for both groups and both ecological and conventional farmers recognize that there are limits to wise expansion. In contrast, cash croppers believe they must expand to maintain their income in the face of shrinking margins and to capitalise their high machinery costs. They feel caught on a technological treadmill and do not see any way to remove themselves from it. Thus, one could argue that in their decision to have ecological production methods, ecological farmers have found a way to break out of the cycle of expansion in which conventional farmers believe themselves to be trapped. Thus decisions with respect to farm size are linked to decisions with respect to production practices.

4.5.4 Investment in Equipment

It follows from the previous discussion that ecological and conventional farmers would have different levels of investment in machinery. Again, while not true across all farm types, conventional farmers overall have greater amounts of capital invested in machinery. The conventional farmers interviewed would typically have a "full line of machinery." The composition of the full line varied depending on the nature of the operation. Dairy farmers specialised in forage equipment while cash croppers typically owned field crop equipment. Investment was high, typically in the hundreds of thousands of dollars, with only four conventional farmers having much lower investment. Even then, investment was around $50,000. One cash cropper summed up how much investment with the following statement, after listing several major items such as combines and tractors:

And the rest of it is all nickel and dime stuff that probably adds up to $100,000.

If conventional farmers consider this investment small, then investment in equipment must be substantial. A new combine typically costs $120,000 to $130,000. The fact that much of the
equipment is new and was acquired recently contributes to the high values Few conventional farmers had equipment dating before 1975.

Ecological farmers had substantially smaller investments in machinery All but five farmers had less than $50,000 invested and some much less than that Several had less than $10000. These farmers recognised that their investment would be considered small by other farmers, but in their own terms the investments were major Many had equipment dating back into the 1960s and early 1970s, explaining the lower value Also of consequence were two ecological farmers in the sample who farmed with horses and thus had equipment appropriate for that which was of low value The exceptions to small investment were three dairy operations who had substantial investment in equipment, one berry grower who switched to ecological farming in 1994 so still had substantial equipment with high value and a beef cattle/cash crop operator who liked to maintain equipment to be independent These farmers had all chosen to maintain a more expensive line of equipment, but were the exceptions rather than the rule.

Three general equipment purchasing strategies were identified from the interviews The first strategy was the ownership of a full line of machinery and continual updating of that machinery Farmers would generally update every few years to more modern models with new features Sometimes this meant updating soon after purchase of the previous line of equipment The second strategy was the continued use of used machinery and repairing of it until it needed replacing At that point it was usually replaced by other used machinery The third strategy was divestment of machinery This might entail a change in production methods, such as the switch to pasture and haying to eliminate the need for tillage machinery. It may also result in selling of equipment and a switch to greater hiring of custom work.

Ecological and conventional farmers chose different strategies with respect to equipment purchasing (Table 4 9) Conventional farmers were continually updating equipment. The frequency of updating varied, but trading in equipment a year after buying something new to get new features was common for these farmers. They might also trade because machinery
companies offered good deals. Half of the conventional farmers who updated frequently operated in this way. Others had full lines of equipment to maintain independence and updated on a less frequent basis. The ecological farmers who updated and the other half of the conventional farmers were in this latter category. Thus, ecological farmers were more inclined to keep equipment for extended periods and replace with used equipment when the need arose. As one ecological farmer commented:

'We believe in maintaining our machinery well and keeping it as long as it works. We don’t replace anything unless it is broke.'

Three conventional farmers also followed that strategy. To complete the picture, four farmers had chosen to divest themselves of equipment and were evenly divided between ecological and conventional farm systems.

Table 4.9 Equipment purchasing strategies of ecological and conventional farmers

<table>
<thead>
<tr>
<th></th>
<th>Continual update</th>
<th>Used and repairs</th>
<th>Divestment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>25 (83%)</td>
<td>3 (10%)</td>
<td>2 (7%)</td>
</tr>
<tr>
<td>Ecological</td>
<td>6 (20%)</td>
<td>20 (67%)</td>
<td>2 (7%)</td>
</tr>
</tbody>
</table>

Note: Two vegetable growers in the ecological group were excluded as investment in equipment was extremely small.

Increased mechanisation is a feature of modern industrialised agriculture (Troughton 1986). The continual updating of equipment can be seen as conforming to this trend. Other strategies can be interpreted as decisions to opt out from the general trend. Those who continually updated did so for independence and efficiency reasons. They could not afford to have machinery breakdowns and ran their machinery over large enough acreages to make the investment viable. Where farmers wanted to retain smaller acreages, they had to consider other options.
Conventional and ecological farmers who opted to buy used equipment and generally repair and maintain old equipment did so to keep costs down.

A lot of it is adequate, good running shape but I don’t have to do custom work to pay for it. That is what has happened to a lot of places. They buy this big expensive equipment and they have to run it all over the place to try and make it pay. (Ecological farmer)

Like we were just 150 acres here. We were just sitting with used equipment and it was small and that was okay. You know we survived but we barely survived. There was certainly no new equipment or even new used equipment changes that you can think about at that time. (Conventional farmer)

A relationship between decisions with respect to equipment purchases and farm size is apparent. In both cases the farmers also referred to the size of their property or acreage over which they would run the machinery. They felt that size was an important factor in equipment decision-making and there were limits to the expansion they were willing or able to make. They, therefore, adjusted their equipment purchasing strategy accordingly. Ecological farms were smaller, so equipment purchasing strategies reflect that.

Ecological and conventional farmers who had decided to divest themselves of equipment also did so for similar reasons. Both wanted to cut costs, but as illustrated in the following quotations, the net result of that decision was different:

For us it makes sense to have a custom operator combine the field crops because then we don’t have that money tied up in a $140000 combine... It’s unfortunate because there was a time when everybody could afford their own and they were independent and they could, you know, harvest with them at any time but its just not possible any more. (Conventional farmer)

We used to grow corn, but for all those things you need big machinery. And we have done away with that and mainly grow hay and pasture now. (Ecological farmer)
Both farmers expressed a desire to reduce their equipment as a cost saving method but in the conventional case this led to additional hiring of custom work. While the ecological farmer had changed his production methods to reduce the need for a combine, this held true for the other two farmers. Four cases is too small a sample to be conclusive, but it does provide some indication that where divestment of equipment is concerned, the accompanying strategies are different for ecological and conventional farmers. One is merely changing the cost structure, that is paying to have something done rather than lay out initial capital, while the other is changing the nature of the operation to exclude the need for that investment capital.

Although not really a purchasing strategy, one other equipment investment strategy was identified in the interviews and was important for several farmers. Eight of the farmers interviewed mentioned that they were engaged in machinery arrangements with family or neighbours. There were two forms of this. Those farmers engaged in the arrangements cooperatively owned all of the equipment, so had a half or third share in all equipment. Alternatively, those farmers engaged in the arrangement owned different pieces of equipment and ran them over all of the acres. In this way duplication of machinery, other than possibly tractors, was avoided. Both arrangements allowed farmers to reduce their personal investment in machinery while retaining access to a full line.

Equipment sharing was more widely used by conventional farmers than ecological farmers. Only one of the eight farmers that engaged in an equipment sharing arrangement was an ecological farmer. This is surprising given the supposedly cooperative nature of ecological and alternative farm systems. However, most of the farmers engaged in these arrangements are cash croppers and ecological farmers are not represented in large scale cash crop operations. Those that are not cash croppers engaged in these arrangements are involved in intergenerational transfer arrangements with parents. This is the case with the one ecological farmer and another conventional farmer who is not a cash cropper. Although ecological farmers' philosophy may still tend toward cooperation more than conventional farmers'
philosophy, there is not the same need for large capital investment on ecological farms and correspondingly not the same need for entry into machinery sharing arrangements.

Those involved in these relationships did so to spread the high cost of machinery over more land. Whether ecological or conventional, the following is a typical reason for sharing equipment with neighbours or family.

Spread the cost over. Neither one of us could afford to own some of the stuff, you know, but spread it over three operations and it will go far. It’s about 800 acres altogether you know so I can justify something like this. It helps us a lot.

The fact that they share equipment with others and increase the land base enables these farmers to purchase newer, larger machinery. Thus, in an innovative way they have overcome some barriers of farm size. However, the fact that most of the farmers involved in these relationships are related to the other partners would suggest that there is little movement toward neighbourhood sharing of equipment that was a feature of agriculture in the past. A longitudinal study of ecological and conventional farmers’ participation in such arrangements would be revealing, but is not conducted in this thesis.

Another factor could contribute to fewer equipment sharing arrangements for ecological farmers. Ecological farmers tended to be surrounded by conventional neighbours. Lack of acceptance of their alternative production system meant that social ties to neighbours were not strong for ecological farmers. Instead, their main social network was other ecological farmers who were likely to be some distance from them. This made sharing of equipment more difficult as neighbours were unlikely to share equipment with a farmer whose practices they were sceptical of, and ecological farmers were too far apart to make sharing of equipment tenable.

Levels of investment in equipment and equipment purchasing strategies suggest that ecological farmers are less likely to make large capital investments in machinery than
conventional farmers. They deliberately purchase used equipment and will even change production methods to accommodate smaller investments. They have broken away from the machinery intensive production method that dominates agricultural production today, and in so doing altered other economic and social relations such as farm scale and labour relations. Conventional farmers on the whole may be on the technological treadmill, with frequent buying of new equipment. Several have devised cost minimising strategies within that. The machinery sharing arrangements between conventional farmers are a good example of this. Some have also opted to get the greatest use out of existing machinery by repairing it often and purchase used equipment. Thus, in terms of equipment ecological and conventional farmers could be seen to be heading in different directions. Low levels of capital investment on ecological farms reduces the dependence on external capitals and provides farmers more opportunity for adjustment to production practices. Conventional farmers who have invested large sums of money into equipment are unlikely to change to less equipment intensive systems of production.

4.5.5 On -farm labour provision

Ecological and conventional farmers were asked to discuss who performed various tasks on the farm and to account for any changes to sources of labour. Information on the division of labour on the enterprise was wanted to determine whether ecological and conventional farmers had different levels of reliance on hired labour and to determine the extent of farm family involvement in farm production activities. Changes to the sources of labour and reasons for these changes were required to determine the dynamics of labour provision.

Five differing relations with labour were identified from the interviews. Farmers could hire full-time labour, rely predominantly on family labour but employ people on a seasonal basis, rely on family labour but use custom workers for certain operations, enter a labour sharing arrangement with other farmers or rely solely on family labour (with perhaps some occasional hiring for relief milking or haying). Each of these relations has a differing level of dependence
on outside labour. Full-time hiring has the greatest level of dependence, and all family labour is the lowest. Labour sharing arrangements are based on reciprocity of labour, but there is still some dependence on external labour. While each farm family is only listed in one category, it is possible that a farmer could hire full-time labour and have custom hiring for certain tasks or be involved in a labour arrangement and hire someone as well. Because the purpose of the classification is to determine different levels of dependence on external labour, farmers in this situation are classified into the category with the greatest dependency on external labour. Thus, a farmer with full-time hired help who also hires some custom work would be classified in the full-time hiring category.

Three key differences between ecological and conventional farms with respect to sources of labour can be identified (Table 4.10). More conventional farmers employ full-time hired labour than ecological farmers. More conventional farmers are involved in labour sharing arrangements with neighbours than conventional farmers. Ecological farmers are more likely than conventional farmers to use only family labour. The total numbers of ecological and conventional farmers who rely predominantly on family labour and employ labour on a short-term basis are relatively even. However, ecological farmers more often employ seasonal help, while conventional farmers are more likely to custom hire certain tasks. Thus, ecological farmers are less dependent on hired labour. This may contribute to their reduced participation in labour sharing activities, as they keep their enterprise within the scope of family provision, and do not have to be creative in meeting the labour needs of the farm enterprise.

Table 4.10 Sources of labour for ecological and conventional farms

<table>
<thead>
<tr>
<th></th>
<th>Full-time Hired</th>
<th>Family and Seasonal</th>
<th>Family and Custom</th>
<th>Labour Sharing</th>
<th>Family Labour Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>7 (23%)</td>
<td>3 (10%)</td>
<td>9 (30%)</td>
<td>7 (23%)</td>
<td>4 (13%)</td>
</tr>
<tr>
<td>Ecological</td>
<td>2 (6%)</td>
<td>6 (20%)</td>
<td>3 (20%)</td>
<td>1 (3%)</td>
<td>17 (57%)</td>
</tr>
</tbody>
</table>
These differing levels of dependence on external labour suggest different decision-making processes with respect to labour provision on the farm. Examining the characteristics of farms in these various groups and the dynamics of labour hiring is important, including the reasons farmers give for hiring or not hiring. The use of hired labour in any form may be the result of a number of forces. It could be due to a lack of availability of family labour. It may be that family labour exists, but is not used for certain tasks. Hiring of labour may be temporary in response to short-term lack of labour availability on the farm. It may be that the enterprise has expanded beyond the means of family labour. It could be related to other strategies such as the machinery investment decisions discussed earlier. By examining changes to labour hiring and the reasons for the changes, some explanation of the differing levels of hiring can be determined.

One factor that enabled ecological farmers to avoid hiring of labour was their smaller farm size. All of the farms that hired labour full-time were large in comparison to similar enterprises that did not hire labour. Likewise, farms that hired seasonal labour, custom work for certain operations, or entered into labour sharing arrangements were generally larger than those who supplied all of the farm labour needs. The exceptions to this were several conventional operations that were large, and supplied all of the labour needs to the enterprise. These were all cash crop operations and labour hiring was avoided because these farms were large enough to justify the purchase of all equipment needed. In a sense, enlargement enabled them to perform all of the labour tasks on the farm. Except for these large cash crop operations, the smaller size of ecological operations meant that they were less dependent on hired labour.

For many ecological farmers keeping the farm size at a level that farm chores could be performed by family members was a deliberate strategy. As one ecological farmer stated:

I can pretty well manage with my whole family. That is my whole intent. I don't want to get so big that I have to hire somebody. If I do hire somebody, I would have to rent more land to make it worthwhile, and there is more
paperwork like, there is all the compensation, workmens' compensation and it just goes on and on

Several other ecological farmers made similar comments. Thus, decisions with respect to farm size and relationships with labour were interrelated.

Another factor contributing to the avoidance of hired labour by ecological farmers was the high levels of involvement from family members. Family sizes and stages in the life cycle were similar for ecological and conventional farmers, but the extent to which family members participated in farm activities was different. On all ecological farms, all family members were actively involved, including small children, and a conscious effort was made to allow this. In contrast, on 14 conventional farms only the male household head participated in farm work. With lesser family involvement, there was a need for greater hiring.

One important reason for the non-participation of family members in farm activities on conventional farms was the nature of the tasks to be performed. The use of large equipment on many conventional farms and of substances known to be harmful to human health acted against the involvement of children and other family members in the farm's activities. Comments such as the following indicate an inability to involve children in the farm operation:

Cash cropping is just so tough to involve the children. We don't do the hand labour that I did as a kid on the farm. Where, you know, we had to help pull turnips and pull the mustard and do those kind of things.

I will not let my son spray. Only one person has to be licenced to spray but I don't want to expose my 14 year old son, or 15 year old to a sprayer, to spray. Like 'cos he's got the longest time for it to become a problem.

While conventional farmers spoke of difficulties finding tasks to involve family members, ecological farmers spoke of high levels of family involvement in the farm enterprise. Children could help with weeding in the garden, milking or raising various animals that were part of ecological enterprises. Ecological farmers even expressed concern for conventional farmers.
about intergenerational transfer. They recognised the low levels of involvement of families in the labour performed on conventional farms.

In one aspect, the natures of tasks directly lead to the hiring of labour. Many conventional farmers chose to hire custom operators for spray applications. Reasons for this varied. Some decided not to get licences when they were required to in the late 1980s. Others decided that they did not wish to spray for health reasons. One farmer, for instance, whose wife had allergies to sprays did not want spray anywhere near the house or her. Finally, some farmers found that by custom application of sprays and other chemicals, they did not have empty containers sitting around on the farm property. None of the farmers indicated that they did not have the time to spray, but rather that they did not wish to spray due to the nature of the task.

Keeping farm size within the limits of family labour and full family involvement in farm activities contributed to ecological farmers' greater ability to resist hiring of labour. However, not all ecological farmers were able to do so. In particular, vegetable growers had difficulties in supplying labour needs from within the farm family during summer peak labour demands. All family members were involved but they were forced to hire labour on a seasonal basis. Even then they resisted for as long as possible and considered ways of reducing this reliance on external labour.

"It's really easy to lose your profit in wages. And so you almost have to make a commitment to yourself that you are going to do as much as possible until the crunch. And then you hire what you need. We try to force ourselves not to hire labour until we absolutely have to because as soon as you have them here then they are here. And then it is amazing when you have to pay them minimum wage and stuff. Some years you don't have a profit left at the end of the year you know. It goes out in labour. And with this type of farming it's very easy to let it go out the door in labour and wages."

Like I said we have really found that one way that soak up a lot of profit is wages. So if you can make your farm efficient enough that you can use your
own labour by and large you can make a go of it. So like how big can you go and still do most of it yourself?

The fact that methods of avoiding long term hiring of labour were considered underlines the essential nature of hiring to the farm enterprise. Ecological farmers could not have accomplished all of the farms’ tasks without the hired labour, yet they recognised declining profits due to hiring.

The same levels of necessity were not evident in conventional farmers’ reasons for hiring. Of the seven conventional farmers that hired labour on a full-time basis, four indicated that hiring was not essential, but that they hired labour partially for lifestyle reasons. If pushed, family labour could perform all the farm tasks, but hiring of labour allowed farm families to take a break from daily chores and focus on the aspects of farming that they preferred. Some farmers preferred management to hard labour, and hiring allowed them to focus their attention on that. Likewise, custom operators were not always hired due to a lack of family labour. As indicated earlier, some farmers preferred to avoid certain tasks such as spraying. Others hired custom operators to avoid investment in equipment. They substituted labour costs for capital outlays. This latter strategy is, however, equally applicable to ecological farmers who hire labour. Thus, although hiring of labour on conventional farms was primarily due to an inability to handle all the work with labour from within the farm family, other reasons also contributed.

Overall ecological farmers are less dependent on hired labour than conventional farmers. Ecological farmers made deliberate attempts to avoid hiring of labour, such as keeping farm size at a manageable level and altering production methods to reduce reliance on external labour. Where hiring of labour could not be avoided, particularly with vegetable growers, farmers considered options for reducing external labour. They recognised the high costs of hired labour but could see no means for avoiding it. Conventional farmers were less committed to avoiding the hiring of labour. Some even expanded to enable the hiring of labour, and thereby relieved themselves from the daily bind of chores. Also conventional farmers were willing to participate in activities that did not allow for the full involvement of
family members such as spraying. Thus, relations with hired labour varied for ecological and conventional farms and there was an apparent relationship between choice of production methods and ability, or desire, to farm without hired help.

4.5.6 Off-farm work relations

Ecological and conventional farm families were equally engaged in off-farm work (Table 4.11). One third of conventional and ecological farm families interviewed had at least one member of the family that worked off the farm full-time. Approximately the same proportion had at least one member of the farm family engaged in part-time work and another third of the farm families had no off-farm work at all. Similar levels of involvement in off-farm work by ecological and conventional farm families were not expected. However, examination of the nature of the work that farm families participate in, examination of which member of the farm family is involved in the off-farm work and exploration of the reasons for involvement in off-farm work, will determine whether these similar levels of involvement in off-farm work are the result of similar decision-making processes on ecological and conventional farms.

Table 4.11 Amount and duration of off-farm work by farm family

<table>
<thead>
<tr>
<th></th>
<th>Full-time off-farm</th>
<th>Part-time off-farm</th>
<th>No off-farm work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>10 (33%)</td>
<td>11 (37%)</td>
<td>9 (30%)</td>
</tr>
<tr>
<td>Ecological</td>
<td>9 (30%)</td>
<td>10 (33%)</td>
<td>11 (37%)</td>
</tr>
</tbody>
</table>

Differences between conventional and ecological farm families were identified when who worked off the farm was examined (Table 4.12). On average, only one member of the family was engaged in off-farm work. The exceptions were three ecological and five conventional farm families where both members were engaged in part-time off-farm work, and one conventional farm family with both household partners having full-time off-farm jobs. Typically where one person worked off the farm, it was the household female, whether she was engaged in full-time or part-time work. There was, however, a greater presence of males.
from ecological farms who worked full-time off the farm. This was a state of residual employment from previous occupations. These farmers had originally worked off the farm and continued to do so after buying the farm. In effect, the farm was something of a "hobby" purchased after establishing themselves in another career with which they continued. Thus, in general, women are more likely to work off the farm in both ecological and conventional situations, but more males work full-time off the farm in the ecological group.

Table 4.12 Gender distribution of family members engaged in off-farm work

<table>
<thead>
<tr>
<th></th>
<th>Full-time</th>
<th></th>
<th>Part-time</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Both</td>
<td>Male</td>
</tr>
<tr>
<td>Ecological</td>
<td>4 (21%)</td>
<td>5 (26%)</td>
<td>0 (0%)</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Conventional</td>
<td>1 (5%)</td>
<td>8 (38%)</td>
<td>1 (5%)</td>
<td>2 (9%)</td>
</tr>
</tbody>
</table>

Note: Table only includes those farms with off-farm income (total = 40)

One farmer whose wife works full-time and is listed as such also does custom work.
One part-time conventional male and one part-time ecological female are single.

Differences were also identified in the nature of off-farm work for ecological and conventional farm families. Where both members worked off the farm, whether full-time or part-time, job schedules were always flexible. Generally the male was employed in some form of custom work or consulting work that enabled him to choose when to devote time to the farm and when to earn off-farm income. Women in this situation were involved in work from the home that was also flexible, although four of the women (one ecological and three conventional) had professional occupations that they worked at part-time. This enabled the farm family to perform both on-farm and off-farm tasks while maintaining an off-farm source of income. The majority of women who worked off the farm were engaged in professional occupations, whether working full-time or part-time. They had formal education to a tertiary level in their chosen occupation and continued to work primarily for personal satisfaction reasons. Off-farm income was welcomed but was not always the prime reason for off-farm work. Some ecological farm women who held off-farm jobs, however, were engaged in lower paid service occupations. This would suggest that the income contribution of their off-farm work was a
greater consideration. For males, work patterns were similar with those involved in full-time work in professional occupations and those who worked part-time usually in some farm related field. Thus, the nature of work varied slightly for ecological and conventional farm families with conventional farm family women mostly in professional occupations while some ecological farm family women were involved in service occupations. The opposite was the case for males involved in off-farm work. Ecological farm males were involved in professional off-farm jobs while conventional farmers often performed custom work.

For some farmers, the decision to work off the farm was one of resource availability. For conventional farmers, this took the form of custom work. Those farmers who were first in a community to purchase certain equipment found themselves doing custom work for other farmers. This was primarily a means of paying down the machinery faster by working more acres with it. The opportunity also existed as they had the machinery that many others did not. Thus, the off-farm work provided a means of getting more return on machinery investment and, therefore, was not really a means of acquiring additional income for the farm household. For ecological farmers, it took the form of consulting, a service provided to other ecological farmers or those contemplating the shift to ecological farming. Again, the reason was due to having the knowledge and imparting it to others rather than for economic reasons. These farm related activities need to be viewed in a different light to other off-farm activities as their rationales are different.

On the surface, reasons for off-farm work were similar for ecological and conventional farmers. Although the degree to which off-farm work was essential to the farm enterprise varied among all farmers, it was the primary reason given for off-farm work. Farm families spoke of wanting some “real money” or extra money to enrich their lives.

I can tell you what my strategy was. Marry a school teacher. You’ve got to have off-farm income these days to have, um a reasonably good standard of living. And I know a lot of farmers that, well they’re up to 85% of farmers do
eh? Have off farm income. And I know a few around, there’s a few of the quota guys that don’t have but a lot of them do have. [Conventional farmer]

If you want a decent standard of living then you have to work off the farm and everyone has someone that does. [Conventional farmer]

We couldn’t farm without off-farm income. We’ve lost a couple of thousand dollars this year. If it wasn’t for her working we couldn’t keep going. Just can’t seem to get things. We need more sales. [Ecological farmer]

I have a mortgage. If I did not have a mortgage I would be living off the farm. The only thing we don’t produce is electricity. Just about everything else we have there. We have wood. We have food. So we don’t need a whole lot of cash. But we do have a mortgage. [Ecological farmer]

Although the necessity of off-farm income was the primary motivation for ecological and conventional farmers working off the farm, as these quotations also illustrate, the definition of essential for the two farm groups differed. Ecological farmers wanted to be self-sufficient on the farm, but engaged in off-farm work to be able to participate in modern society and purchase certain essential services, such as health care. In contrast, conventional farmers worked off the farm to attain additional income to ensure a certain standard of living. They used the additional income for discretionary items rather than necessities.

Other reasons for off-farm work included personal satisfaction and training and giving each other some space. For many farm families, a combination of having trained for a particular career and not wanting to lose touch with it, and the additional income lead to one member of the farm family working off the farm. Others said that if both members of the household were on the farm they never had time apart. This could lead to conflicts and so one member of the family worked off the farm in some form. These reasons were cited equally by ecological and conventional farm families.

Situations leading to off-farm work also varied for conventional and ecological farmers and reflected differing views of off-farm work. The majority of conventional farmers grew up on farms. Off-farm work, particularly part-time work, was viewed as a temporary stage in their
farm occupation. For farmers who had just purchased farms, off-farm work enabled the speedier repayment of debt. Others began off-farm work after farming for some time, wishing to gain the extra income due to farm financial problems. In contrast, many ecological farmers, particularly those still with full-time off-farm work, did not grow up on farms. They started in non-farm occupations and entered farming later in life with a previously established career elsewhere. Their intention was to farm full-time at some point, but they continued their previous occupations in the meantime. While conventional farmers go from farm occupations to non-farm occupations while still farming, the reverse process appeared to be the case for those ecological farmers involved in full-time off-farm work. In the latter case off-farm work cannot be viewed as a survival strategy.

Where off-farm work was not a characteristic of farms, several strategies for avoiding it were identified. Diversification of the product base was the most common. One conventional farmer and five ecological farmers specifically mentioned diversifying rather than working off the farm. Diversification provided more income from on the farm and eliminated the need for off-farm income. Enlargement was another strategy.

Otherwise we were going to have to go out and work to pay off our debt and there was no way I was going to do that. As I said the only times I worked was just to help other people and, ah, not that I couldn’t do it but I didn’t like it. I’d go out and drive my truck tomorrow if he needed it, but I would not do it for six months or a year.

Three conventional farmers and one ecological farmer mentioned enlargement rather than working off the farm. Finally, one ecological farmer mentioned self-sufficiency, claiming that by saving money by producing most household needs, there was no need for off-farm work. The farmer believed that more could be saved than could be earned. The evidence suggests that while strategies to eliminate off-farm work were pursued by both ecological and conventional farms, ecological farmers were more likely to diversify while conventional farmers were more likely to enlarge. This is also reflected in farm size and enterprise structure characteristics.
Ecological and conventional farmers were engaged in similar levels of off-farm work, both full-time and part-time. Differences in gender of those who work off the farm and the nature of off-farm work suggest that different processes are at work. For ecological farm families where the male is involved in full-time off-farm work, there are indications that this is a residual state of previous employment. Conversely, conventional farm family males involved in off-farm work started in their farm occupation and acquired off-farm work as the financial need arose. For most women who work off the farm, the work is primarily professional in nature, and although the extra income is beneficial, personal satisfaction also contributes to the decision to take a job. However, some women from ecological farms work off the farm in nonprofessional occupations, indicating that income may be a more important motivating force.

These different motivating forces were also evident in reasons given for off-farm work. Both ecological and conventional farmers indicated that off-farm income was essential to the farm enterprise. However, for ecological farm families “essential” amounted to what was needed for living expenses and some level of integration with modern society. For conventional farmers, “essential” was defined as income needed to attain a certain standard of living, comparable with that of urban areas. Thus, ecological farmers appeared to have lower levels of expectation with respect to the monetary gains of off-farm income but often could not do without that income. In the long-term, these farmers were motivated toward self-sufficiency, and off-farm work was a temporary stage in achieving that goal. Consequently, similar levels of participation in off-farm work are a reflection of different processes.

4.5.7 Marketing

Marketing strategies for ecological and conventional farm families were different. The first and most basic distinction was that ecological farmers could, and generally did, sell under the “organic label.” Conventional farmers did not have the same option. The premium prices paid for certified produce were sufficient for most ecological farmers to adhere to the production
method stipulations and complete the paperwork required for certification. However, not all of the ecological farmers sold their produce under the organic label. Some were constrained from doing so due to strong marketing board control of their product, as is the case with eggs and dairy produce. However, in both of these cases, recent campaigns had been fought and won for the separate sale of organic produce. The product is still controlled by the marketing board and goes through the same processing channels as conventional produce, but separate runs for organic produce are conducted and the produce is sold as organic. Others chose not to market organically. Some felt that there was little demand for their product, particularly producers of red meat. Some did not want to complete the paperwork necessary for certification. For others, such as those with dairy goats, an organic processing facility was not available, and not wishing to bother with generating demand yet, they marketed through conventional channels. Thus where demand existed, premium prices could be attained, and marketing board structures allowed ecological farmers sell under the “organic label,” differentiating them from conventional farms.

The nature of links with the consumer and levels of control once the product left the farm gate also varied for ecological and conventional farmers (Table 4.13). Again, the nature of the product had an important influence on marketing channels, but overall ecological farmers were more likely to sell directly to the consumer. Only where the product was strictly controlled (as happens with the dairy industry), and where the product from the farm-gate required processing (as with grains), or further feeding (as with live cattle and other livestock), did other forms of marketing dominate. This clearly shows a preference from ecological farmers for close contact with the consumer. In contrast, only two conventional farmers sold direct to the consumer, the majority preferring to utilise regular marketing channels. Regular channels were simple and, having sold through them for many years, farmers were wary of change.
### Table 4.13 Primary method of marketing by product type and production method

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Direct Consumer</th>
<th>Direct Retail</th>
<th>Coop</th>
<th>Contract</th>
<th>Free Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables</td>
<td>Ecological</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>Ecological</td>
<td></td>
<td></td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td></td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Cash crop</td>
<td>Ecological</td>
<td>1</td>
<td>8</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td></td>
<td></td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>Red meats</td>
<td>Ecological</td>
<td>7</td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Chickens etc</td>
<td>Ecological</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td>Ecological</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Lamb</td>
<td>Ecological</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Live cattle</td>
<td>Ecological</td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td></td>
<td></td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Note: Farmers with diversified farms may be involved in more than one marketing channel. The primary marketing channel for each different product is provided in the table.

The use of differing marketing channels gave farmers differing levels of control over the retailing aspects of the commodity chain. By using direct sales to the consumer, ecological farmers maintained greater control of their product and were, therefore, able to acquire greater profits from it. Likewise, in grain processing and marketing the ecological farmers had...
organised themselves to form the cooperative. Only two ecological grain farmers did not belong to the coop, one being a farmer who had a small processing facility and sold direct to the consumer, and the other who chose to sell to other organic grain buyers. The cooperative allowed the farmers to be in control of the product right to the end user. Interestingly, though, for many ecological farmers, Ontarbio was their primary grain market, but it was not their sole market. Several mentioned selling crops, particularly soybeans, to other private processors as the prices were higher. Although this leads to gains in the short-term, it raises questions about the farmers' commitment to cooperative marketing and the future of the cooperative. It also suggests that greater control in marketing was not the motivation for most ecological farmers in joining the cooperative. Rather they sold through Ontarbio because at one point it was the only market for their ecological produce and provided premium prices. Thus, it was more a matter of convenience than commitment to controlling the chain.

Although conventional farmers still marketed through traditional channels, all of those who sold crops mentioned changes to their marketing and emphasised the importance of marketing to the success of their enterprise. The main changes to marketing were in terms of timing. Instead of selling straight from the field at the time of harvest, farmers now forward contracted some and stored part of their crop for later sales. This was where money could be made, and some had purchased computer systems to aid them with decision-making. Cash croppers believed that gains from good marketing outweighed savings in production and, therefore, dedicated more time to the marketing aspect of their product. However, marketing still occurred in a highly organised manner, time investment in marketing was minimal and the distance between the farmer and the consumer remained large.

Marketing strategies for ecological farmers had also changed but the tendency was toward closer links with the consumer, and means of reestablishing a link between the consumer and the land. Although direct selling had always been a feature of these farms, many had adjusted their relations with consumers within that. Only one farmer interviewed currently ma...
produce through a Community Shared Agriculture (CSA) arrangement, but three other farmers stated that they were closely considering this option. In a CSA, the consumer buys shares in the agricultural product prior to planting, thereby taking on some of the risk associated with production. When the crop is harvested they receive a share of the harvest in relation to what they paid at the start of the season. This marketing strategy only really works for vegetable growers, but would appear to be on the cutting edge of marketing strategies for ecological growers. At its heart is reestablishing close links with the consumer and giving the consumer greater knowledge of the physical aspects of farm production. Four others chose to market the farm experience, bringing consumers to the farm to buy their produce. Ecological farmers believed in doing so that a greater understanding of agricultural production was created.

Two aspects of marketing are, therefore, striking. First, direct marketing is only prevalent in certain farm types and these are not the farm types in which conventional farmers are heavily involved. This would suggest again that ecological farmers choose product types that lend themselves better to direct marketing. Second, there is a greater level of commitment and time involved with direct marketing. Many of those who sold directly spoke about conflicts between harvesting and marketing in terms of coincidence in time. Some had changed particular marketing methods within the overall structure to accommodate that. For example, three farmers spoke about time conflicts between harvesting and marketing, and the need to change from off-farm direct markets to on-farm markets to allow both activities to be performed. The greater levels of time and commitment required for direct marketing therefore deter other farmers from marketing in this way.

Conventional farmers' adherence to regular marketing channels suggests that they have a different philosophical base to ecological farmers. This was also evident in an analysis of farmer attitudes (see Section 6.5). Ecological farmers favoured local and regional markets, whereas conventional farmers were not particularly concerned about the nature of markets. These attitudes are also reflected in the differing realities of marketing for ecological and
conventional farmers. Thus, the reasons for choice of a particular marketing strategy were largely philosophical. Ecological farmers tended toward local marketing and maintaining control of the product to the consumer. Many of these farmers were from non-farm backgrounds and so were aware of potential consumers from past experiences. As well, the greater environmental emphasis meant they did not like the energy consumption involved with long-distance marketing.

Marketing strategies clearly differentiate ecological and conventional farms. Conventional farmers tend to adhere to regular channels for their marketing, adjusting their strategies within those channels, but not actively seeking or participating in alternative markets for their produce. They subsequently do not have close links with their consumers, and have little control over the final destination of their produce. In contrast, ecological farmers have actively sought to create closer links with the consumer by directly selling their product where practical and cooperative processing and marketing of other products. They are, therefore, better able to respond to consumer demand and maintain greater control right to the consumer. Of course, the promise of premium prices has a bearing on how much variation from regular channels farm families are willing to take but there are some ecological farmers who sell directly for regular prices. This would indicate a deep belief in local marketing and contact with consumers, not present with the conventional farmers. For their greater investment in marketing, ecological farmers know there will be higher return, whereas conventional farmer opting to market in an alternative fashion may believe there are higher risks associated with it.

4.6 Conclusion

Ecological and conventional farm families operate within different social and structural frameworks for decision-making (Table 4.14). Although all of the farms were family owned and operated, other aspects of social and structural organisation differed considerably. Ecological farmers represented a different social set, with high numbers coming from non-
farm backgrounds. Different backgrounds and social groupings were reinforced by high membership and participation in ecological organisations which did not include conventional farmers. Ecological farmers also brought different value sets to the farm enterprise, with lifestyle and environment, not economy, holding high priority.

Table 4.14 Summary social and structural characteristics of ecological and conventional operations

<table>
<thead>
<tr>
<th></th>
<th>ECOLOGICAL</th>
<th>CONVENTIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer background</td>
<td>Farm or non-farm</td>
<td>Predominantly farm</td>
</tr>
<tr>
<td>Reasons for farming</td>
<td>Lifestyle/Environmental</td>
<td>Lifestyle/Economic</td>
</tr>
<tr>
<td>Organisation membership</td>
<td>EFAO</td>
<td>OFA or other national organisation</td>
</tr>
<tr>
<td>Tenure</td>
<td>Family farm owned and operated</td>
<td>Family farm owned and operated</td>
</tr>
<tr>
<td></td>
<td>Little rental activity</td>
<td>Rental activity common</td>
</tr>
<tr>
<td>Business structure</td>
<td>Diversified inclusion of non-agricultural activities</td>
<td>Little non-agricultural activity</td>
</tr>
<tr>
<td>Agricultural products</td>
<td>Diversified</td>
<td>Specialised</td>
</tr>
<tr>
<td>Scale of operation</td>
<td>Small-medium</td>
<td>Medium-large</td>
</tr>
<tr>
<td>Equipment investment</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Labour supply</td>
<td>Predominantly family</td>
<td>Family and hired help</td>
</tr>
<tr>
<td>Levels of off-farm work</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Marketing</td>
<td>Direct, local marketing</td>
<td>Indirect, regular channels</td>
</tr>
</tbody>
</table>

Similarly, the structural characteristics of ecological farms were distinctive. Ecological farms were small to medium sized, had diversified product bases (including both agricultural and non-agricultural products), had low levels of equipment investment, used primarily family labour and were actively engaged in off-farm work. Local markets and direct selling to the consumer were also common. Conventional farms were medium to large in size, had
specialised product bases (often entirely agricultural), high levels of equipment investment, used family labour but frequently hired (albeit on a custom basis), and also were actively engaged in off-farm work. Their markets were often national and international and there was a large distance between consumer and producer.

These different social and structural characteristics are representative of the sample farms as they are today. They suggest a divide between ecological and conventional enterprises not only in terms of production practices, but in terms of the way that they are organised socially and economically. This would in turn suggest that a change in production system would be difficult for many conventional enterprises, as their current enterprise trajectory carries them further away from the operating characteristics of ecological enterprises. However, evident amongst the ecological farmers were a number of farmers who themselves were on the path towards a large, highly specialised, highly capitalised enterprise before deciding to switch production practices. These, plus the ecological dairy farmers who are close to their conventional counterparts on many aspects of social and economic organisation, indicate that the transition is not impossible.
CHAPTER FIVE  ON-FARM PRODUCTION PRACTICES

5.1 Introduction

While in Chapter Four differences have been identified in the social and structural organisation of ecological and conventional operations, it is production practices that are often used to define ecological production systems by certifying agencies (December 1992). In the literature, ecological farming is defined as a system of farm management practices based on sound ecological principles (Martin 1992, Bowler 1992). Specific practices include diversified land use, integration of cropping and livestock, increased use of crop rotations, organic manures, nutrient recycling, biological disease control, balanced host/predator relationships, and cover crops (Bowler 1992, Martin 1992). Detailed coverage of the range of practices available to ecological farmers can be found in several books and studies (Lampkin 1990, Canadian Organic Growers 1992b). However, the use of particular practices varies from area to area, due to strong relationships with the natural land base. Description of the specific production characteristics of ecological farm operations in Southwestern Ontario, and distinctiveness when compared with conventional operations in the same area, is therefore provided in this chapter. Determination of the extent of difference in the production systems is sought. In particular, tillage systems, land use, crop rotation, fertiliser management, insect and weed management and livestock management will be considered.

Production practices are continually evolving. Farmers make adjustments, some fundamental and permanent, and some in response to particular seasonal characteristics. Changes to specific production practices, and farmers’ reasons for the changes, are also examined in this chapter. Analysis of reasons for use of particular practices provides an indication of the levels of entrenched in certain production systems, and therefore the likelihood of change. Analysis of change will also determine whether the production practices of ecological and conventional farms are diverging or converging. Recent concern for the environment might
lead one to presuppose that there would be some indication of convergence in terms of production practices on ecological and conventional operations

5.2 Tillage systems

Important differences can be identified in the tillage systems employed by ecological and conventional farmers (Table 5.1) The majority of farmers interviewed used conventional tillage systems However, the choice of alternatives to conventional tillage varied between the two groups While conventional farmers used no-till systems or combinations of no-till and conventional tillage, none of the ecological operations were using no-till Where ecological farmers had changed from conventional tillage, mulch tillage or minimum tillage were the preferred options

Table 5.1 Tillage systems of conventional and ecological farms

<table>
<thead>
<tr>
<th>Type of farm</th>
<th>Conventional till</th>
<th>Minimum till</th>
<th>Conventional/ No till combination</th>
<th>No-till</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecological</td>
<td>17 (59%)</td>
<td>12 (41%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Conventional</td>
<td>14 (47%)</td>
<td>2 (6%)</td>
<td>10 (33%)</td>
<td>4 (13%)</td>
</tr>
</tbody>
</table>

Note One ecological farmer did not crop any land and was not included in the table

Reasons or justifications for particular tillage systems were provided by many farmers interviewed All farmers expressed interest in reducing the amount of tillage used on their operation Soil erosion problems in Southwestern Ontario and the recognition of these by government agencies contributed to increased awareness of the relationship between tillage systems and soil erosion However, farmers varied widely in the extent to which their practices reflected that understanding For example, the switch to no-till systems, which was widely encouraged by government programs, was confined to conventional operations It was also mostly undertaken by cash crop operations
Reasons for the switch to no-till were well specified by those who had made the change. Originally soil conservation, and government programs and incentives, provided the impetus for change. After using no-till, the farmers also found that there were other benefits such as reduced time spent in the field, reduced labour demands, and reduced fuel use due to fewer passes of the field. These benefits, combined with negligible or no yield declines, contributed to economic gains with the adoption of no-till. Those who had converted were pleased with the results of no-till and showed no indication that they would return to their former tillage system at some later point.

Most other conventional farmers assessed their current production system against the no-till system. Pressures of change to no-till led many of these farmers to feel the need to justify their decision not to change to no-till.

"It's (no-till) almost impossible when you are trying to bring sod into crops."

And with our land here because we use a high percentage of forage in our rotations and because it's not a particularly well drained loam, it's pretty dicey to try. I've fooled around with it, with chisel plowing and I've tried no-till but the leading farmers around here don't bother with that. It just doesn't seem to work as well on the clay ground. You can get away with moldboard plowing too, a bit more, if the organic matter is fairly good because we are using a lot of forages eh? If you were moldboard plowing that land for seven years in a row or something you would have real trouble. We plow it two-three years and then it's back down into forages and that keeps it in good shape.

Clearly no-till is not currently suitable for either of these operations, yet both felt the need to justify their decision not to use it. This was typical of conventional farmers, most of whom admitted that they were "keeping an eye" on the farmers who were using no-till in the area. Thus, no-till was the alternative tillage choice that captured the attention of many of the conventional farmers interviewed.
In contrast, ecological farmers were emphatic in their belief that no-till systems were not compatible with ecological farming. No-till was dismissed as an impossibility if one were to continue farming ecologically. The need for tillage systems as a weed control strategy was the primary basis for the incompatibility of ecological farming and no-till. Tillage systems on ecological operations also needed high degrees of flexibility so that farmers could adjust to the field conditions at any given time. When asked what tillage system he used one ecological farmer replied:

"Every situation dictates what I do, like I don’t have a system that it’s always this way. I’ll look at the situation and that’s how I deal with it. If it’s nice and dry in the fall, I’ll use my slipper hoe. If it is a little wet I prefer to plow. If it doesn’t need another cultivation I’ll use one cultivation. When I put those faba beans in I cultivated and planted in the same day. I don’t have a set system where it is always the same. Whatever the need is, I’ll meet it."

Thus, a cropping system without tillage at all was not possible for ecological farmers. This did not stop them from adopting minimum tillage options where possible, but ecological farmers recognized that the need for early control of weeds by tillage forced them to continue with some form of tillage. The presence of livestock on most farms and the consequent high levels of forages in the rotation were seen as means of ensuring control against soil erosion problems.

Analysis of tillage systems shows that ecological and conventional farmers are both considering methods of reducing the amount of tillage on the farm. However, the choices on how to do so differ. Barriers exist in ecological farming to the use of no-till, with suggestions from the farmers that it is counter to their whole system of farming and practices. Its recent widespread adoption and consideration by conventional farmers suggests that this is one aspect of production where ecological and conventional operations are diverging. The use of a particular tillage system is likely to become a key dividing factor between ecological and conventional operations.
5.3 Land Use and Crop Rotation

5.3.1 Land use Distribution

Ecological farmers crop less land than conventional farmers (Table 5.2) This difference is more pronounced in the southern area than the northern area. This result is not surprising given that most of the conventional farms in the southern area have cash cropping as one aspect of their operation. Ten such farmers cropped more than 90 percent of their land. In contrast, in the southern area only five ecological farmers cropped more than 50 percent of their land, and some cropped as little as 10 percent. In the northern area, both conventional and ecological farms were predominantly livestock operations, which accounts for the smaller difference in percentage cropped between the two farm systems in comparison to observed differences in the southern area.

Table 5.2 Cropping summary for ecological and conventional farmers

<table>
<thead>
<tr>
<th></th>
<th>Southern Area</th>
<th></th>
<th>Northern Area</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conventional</td>
<td>Ecological</td>
<td>Conventional</td>
<td>Ecological</td>
</tr>
<tr>
<td>Average acres cropped</td>
<td>492</td>
<td>49</td>
<td>260</td>
<td>103</td>
</tr>
<tr>
<td>Proportion cropped</td>
<td>89%</td>
<td>34%</td>
<td>54%</td>
<td>35%</td>
</tr>
<tr>
<td>(average)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion cropped</td>
<td>67%-100%</td>
<td>0%-90%</td>
<td>12%-100%</td>
<td>0%-66%</td>
</tr>
<tr>
<td>(range)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range of crops</td>
<td>2-6</td>
<td>2-10</td>
<td>2-6</td>
<td>1-6</td>
</tr>
</tbody>
</table>

Note: Cropped acreages in the table do not include vegetables, fruit and hay.

The influence of farm type on land use patterns may be the key determining factor of these differences. In order to determine whether similar land use patterns are found on ecological and conventional operations with the same product base, ecological and conventional livestock operations in the northern area were compared. There is evidence of a slight
difference in percentages cropped. Ecological livestock farmers cropped 35% of the land and conventional farmers cropped 43% of the land. Although this difference may not be statistically significant, it does suggest that differences in acreages cropped are more dependent on the type of enterprise than whether or not a farm is ecological. The fact that many conventional farmers have cash crop components means that they continue to crop more of the land than ecological farmers.

5.3.2 Crop Rotations

The length of crop rotations on ecological and conventional farms did not vary greatly (Table 5.2). Except for one ecological farmer who had a ten-year rotation cycle, most of the crop rotations for all farms were between two and six years. However, crop rotations did differ in their content and in the importance placed on crop rotation in farm management. For conventional farmers, crop rotations were easily specified and well defined. Farmers generally followed similar crop rotations which closely resembled those encouraged by agricultural administrators. Ecological farmers showed more flexibility in their crop rotations and had difficulty specifying the exact nature of their rotation.

For ecological farmers, crop rotation was the pillar of their system of production. This resulted in a variety of crop rotations specified by the farmers interviewed. Ecological dairy farmers specified crop rotations which included varying combinations of mixed grain, oats, spelt, barley, corn and soybeans, plus the one consistent feature which was three to four years of hay. Corn was present in some rotations, but many farmers said that they had abandoned it because growing it ecologically was difficult. Other livestock farmers had a more standard rotation, growing three to four years of hay, then corn, spelt, barley, rye, barley and back to grass. Vegetable farmers rotated crops at a plot level with no set rotation, but making sure that they did not plant the same vegetable on the same plot of ground for two years in a row. Some alternated their vegetable patch with growing crops.
These rotations were never rigid. Ecological farmers needed to be able to adjust the crop rotation depending on the field conditions at the time of planting. One ecological farmer, when asked what his crop rotation was responded:

I find that organic people don’t have a set rotation and that was really surprising to me. It’s just that they seemed to look at what’s happening in the field and say, well, I can’t seed this down or I have to seed this down this year. Or they either have a weed problem or a fertility problem or something. Then they say well this field, no matter what I know should happen, needs this. They change the rotation and do it, you know.

Another responded:

It all depends on the weather in the spring what you are going to plant. If you can’t get on early to put your oats in then you always have a chance to put soyabees in later and sunflowers aren’t planted early either. They need warm weather.

In this way, crop rotations were used as a management strategy for weeds and fertility and were responsive to ground conditions at the time of planting. Consequently, although ecological farmers may have had some idea of what they would like to put in a particular field, this might change if conditions were unsuitable.

In contrast, conventional farmers had well-defined crop rotations. These varied by farm type. Cash crop operations typically had some combination of corn, soyabeans and wheat. Some excluded wheat, some included a second year of soyabeans and some grew continuous corn in certain fields but these three crops were the basis of the rotation. This corn-soybean-wheat combination maximised the returns to no-till, and so was a constant feature of these operations. Livestock operators differed in that they included hay in the rotation, but the standard corn-soybeans-wheat rotation usually accompanied three to four years of hay. In the northern area, soyabeans were often excluded and wheat was replaced by barley, but there was still a definite cropping cycle. Some of these farmers increased the cropping cycle while...
others had decreased it, as forages were the most important to their enterprise. The two vegetable growers interviewed had different crop rotation strategies. One rotated on a plot basis in similar fashion to the ecological farmers. The other grew fields of one particular vegetable and the vegetable fields formed part of the overall crop cycle.

Conventional farmers did not indicate that they allowed for the same degree of flexibility in their crop rotations. One conventional cash cropper said that if it were wet in the spring and he could not get the wheat in then he would plant a second year of beans. However, this was the only concession to ground conditions encountered in the conventional interviews. Conventional farmers consistently imposed their predetermined crop rotations on the land regardless of field conditions. This was an important distinction between ecological and conventional farming practices.

One other differentiating characteristic of crop rotations is worthy of comment. The choice of crops for conventional producers was market driven. All crops included in conventional crop rotations were produced directly for the market. Ecological crop rotations often included crops that did not have direct market value. In order to overcome weed problems, several ecological farmers said that they substituted rye, buckwheat, or oil radish for other crops in the rotation. Others might decide to turn the field back into sod early if weeds, particularly twitch, were a problem. Adjustments to improve fertility included planting barley, buckwheat, beans or red clover. This insertion of non-market crops into rotations, for fertility and weed management reasons, adds to the diversity of ecological crop rotations and contributes to the need for flexibility in crop rotations.

While crop rotation is a feature of both ecological and conventional farming practices, the way in which it is practised is distinctive. Conventional farmers tend to have a crop rotation that they follow stepwise, irrespective of ground conditions. In contrast, ecological farmers show high degrees of flexibility in their crop rotation. The crop rotation is an important pillar of the ecological production system and as such may be adjusted to contribute to fertility and
weed management. As such, it can not be determined before the farmer assesses the condition of the land. Ecological farmers may thus have an ideal or desired crop rotation but it may be amended or adjusted annually as particular fields are found to require certain treatment. While conventional farmers impose their crop rotation on the land, ecological farmers respond to land conditions. This different approach to determining crop rotation would indicate an operational constraint to the use of ecological production practices by conventional farmers who are engrained in their set rotation choice.

5.4 Fertiliser Management

Ecological and conventional farmers used different sources of fertiliser. Conventional farmers obtained their fertiliser requirements from one or more of the following sources: synthetic chemicals, manure or plowdown crops. A typical operation with both livestock and crops would use the manure from their livestock supplemented by chemical fertilisers. Where livestock were not present, farmers used solely chemical fertilisers, although one farmer did use plowdown crops on occasion to supplement chemical fertilisers. Soil tests were conducted to determine the most efficient amount of fertiliser and fertiliser was applied accordingly. Ecological farmers’ options for fertiliser supply were reduced as they did not have the chemical option. Therefore, ecological farmers primarily used manure and plowdown crops to supply their fertiliser requirements. Three farmers said that they also purchased some natural fertilisers, such as kelp and lime, to supplement their on-farm supply, but in general they attempted to maintain fertility within the boundaries of the farm. The recycling of nutrients was at the heart of this approach.

The most common method of fertiliser supply on ecological farms was plowdown crops. All farmers said that they used plowdown crops. Crops used included sod, rye, oil radish, red clover, field peas and buckwheat. Each of these had a specific purpose when included in the rotation. For example, hay or alfalfa, red clover and field peas all provided nitrogen so usually preceded the planting of a crop requiring high levels of nitrogen. Oil radish was used as a
green manure. It grew quickly and was able to store nitrogen while it grew and was later plowed down to add that nitrogen back to the soil. These crops were deliberately inserted into crop rotations for fertility purposes.

Manure was the other standard fertiliser source for ecological farmers. Unlike conventional farmers, however, most ecological farmers composted the manure before applying it to the ground. Only two ecological farmers using manure did not compost. Methods of composting varied but in general farmers followed the European tradition of taking manure from the yard and placing it in windrows which were turned every few months. The manure was left in the windrow until the smell had disappeared and it had the texture of dirt and was then put on the fields. In this way nutrients in the manure would not be leached as quickly as when raw manure is applied to the field. This took more time than spreading of raw manure but was considered an important process in good land management by ecological farmers.

Some ecological farmers were innovative in obtaining manure or other supplies for their compost pile. Some of the farmers purchased additional manure from neighbours that was composted and applied. Two of the farmers had arrangements with urban municipalities to acquire the leaves from the city for composting. The use of leaves was seen as a good option where material for composting was not available on the farm as the leaves were thought to be less likely to have been exposed to chemicals than other potential sources of composting materials. Thus, even where material for compost was not readily available on the farm, ecological farmers sought other sources to maintain fertility through this source.

The key concept in ecological fertiliser management was the recycling of nutrients and maintenance of soil life. Farmers could not rely on purchased chemical inputs to contend with nutrient imbalances in the soil and had developed a range of proactive measures for ensuring soil balance. One other important feature of soil fertility was the maintenance of soil life. When one ecological farmer was asked about his soil fertility management he responded
What are you going to do with it to encourage soil life? Are you going to shut it down? Once you shut down the life you’re going to have to supply the fertiliser. You are going to have to supply the nutrients. My desire is to encourage the soil life and when it dies and lives in balance and harmony then it can provide nutrition to the crop.

In this way ecological farmers strive to interfere with the soil’s natural processes as little as possible. Although many still conducted soil tests, they also considered the presence of soil life such as earthworms and other microbes as indicators of the health of the soil. The need for application of purchased fertiliser, even if natural, was seen as a failure to take care of soil life properly.

The decision-making process regarding fertiliser management was much simpler for conventional farmers. Their decision-making generally revolved around which brand of fertiliser to buy, whether to use a liquid or granular fertiliser and how many times fertiliser should be applied. The decision to use a particular fertiliser was made on economic grounds. Few farmers based their fertiliser management on land stewardship grounds and none mentioned the preservation of soil life. Simplicity was the key to soil management, and this was enabled by the ability to purchase whatever mineral or nutrient that was missing.

Although conventional farmers relied on chemical inputs as a key fertiliser source, there were indications that many of these farmers were attempting to reduce the amount of fertiliser that they applied. Levels of reduction varied significantly from many no-till farmers who had made no attempt to reduce chemical applications, to many livestock farmers who were looking at making more efficient use of their manure supply, to four farmers who had experimented with alternative fertiliser programs. Even where alternative fertiliser programs were used, elimination was not the end goal, but reduction of chemical applications. In one case, the farmer using the alternative claimed that eventually elimination would occur, as the soil retained its natural balance, but no other farmers suggested that elimination of chemical fertilisers was an aim of the enterprise.
Two main reasons were given for reduced use of chemical fertilisers: cost and fear of regulation. The primary reason for reducing chemical use was cost, as indicated in the following statement:

We put in a manure system out here too and we are storing all our manure to spread it once a year and hopefully that’s going to cut down a little more of the fertiliser cost since they tell me fertiliser costs are going up next year too I just read that in a magazine. For instance this year I added up our corn, we had an average of over $60 an acre in fertiliser costs on corn. So it’s getting up there. And if they are going up another 15% you have got to start doing something different.

There is no evidence of land stewardship entering into this farmer’s decision-making process with respect to chemicals but rather a desire to reduce the cost of inputs. Reasons of this nature were particularly apparent on livestock operations where the manure source was available, but farmers were increasingly conscious that perhaps manure could meet their fertiliser requirements.

The primary barrier to elimination of chemicals was the belief that some chemical use was necessary. One conventional farmer when asked about fertiliser use stated:

In theory I could do without any added fertiliser (chemical) just looking at you know the crop rotation and the values of the manure. I would like to be able to put manure on crops you know, especially corn. When the corn is up, go through with the tanker and drop manure in between, but logistically it does not work out for me. That way I would be getting much more utilisation of the nitrogen in the manure.

Clearly in some cases conventional farmers may be able to supply all the fertiliser needs from the farm, but practical forces, such as the inability to spread manure when the crop is up act against the ability to eliminate chemicals. For others, the idea that chemical fertiliser is needed to give crops “a good start” acts against the complete elimination of chemical fertilisers. Thus, mind set rather than lack of availability acts as a key barrier to elimination of chemical
fertilisers for some conventional farmers. Lack of availability is an issue with cash crop operations, though.

Alternatives to chemical fertiliser application were further reduced for those who had adopted no-till. No-till forced farmers to use chemical fertilisers because the other options for fertiliser provision require plowing of some form. Ideally manure should be worked under the ground soon after application but if the soil is not plowed, then there is no opportunity to do so. Likewise, plow-down crops as the name implies, require plowing to incorporate them into the soil. Thus, by choosing no-till, these farmers exclude any alternatives to chemical fertilisers. Some practitioners of no-till would, however, argue that no-till systems build up organic matter in the soil naturally due to the mulch left from corn and bean stalks and consequently in the long term fertiliser requirements may be reduced. It is yet to be determined whether this will be the case as no-till is a relatively new practice in the study area.

There is evidence that fertility management is another area of practice where ecological and conventional farmers differ. However, differences were reconcilable with conventional farmers expressing interest in methods for reducing their reliance on purchased chemicals, mostly for economic reasons. Some had even experimented with the use of manure only, but reverted back to chemical applications. Where the differences in fertiliser supply were irreconcilable was on conventional farms where there was no supply of manure and no-till was practised, with no alternative to purchased chemicals. There was no indication from these farmers that they were interested in pursuing alternatives. Thus, a divide can be identified among the conventional farmers, with some farmers attempting to reduce chemical fertiliser applications, and others making other production practice choices that necessitate chemical fertiliser use.
5.5 Weed and Insect Management

Insect and weed management strategies of ecological and conventional farmers differed significantly. Without exception, conventional farmers used chemical sprays to control weeds. The timing and types of chemicals used varied for different farmers in different locations and for different crops but essentially the first “line of defence” against weeds was spraying. Some farmers combined their spray program with other methods of weed control such as interrow cultivation. Not all conventional farmers used sprays to control insects, however. The use of crop rotation was a common insect management strategy. In contrast, ecological farmers used a wide range of strategies, usually in combination, to control weeds and insects. Common weed control methods were tillage, crop rotation, maintaining soil balances, timing of planting, plant health, and composting of manure. For insects, these practices were again important elements, but some farmers also encouraged the presence of predators or “beneficial insects” or used various hand methods of removing bugs and insects, such as picking them off the plant and killing them.

The complexity of ecological farmers’ weed and insect management strategies is worthy of some attention. Again, this bears stark contrast to the simplicity of the spray programs utilised by conventional farmers. While conventional farmers make decisions regarding the type of spray to be used and the timing of the spray application, ecological farmers are faced with a more complex set of decisions on which their whole system of production rests. They do not have recourse to one method as conventional farmers do and it is the successful combination of methods that leads to successful weed and insect control. They must act proactively in this area, while conventional farmers can spray to eliminate problems once they arise.

Crop rotation was one of the key insect and weed management strategies identified by ecological farmers. Farmers stated that their crop rotation was the aspect of farm operation that they relied most heavily on in terms of insect control, and it also helped to break the cycle of weeds. Farmers would not grow the same crop for more than one year in a particular field.
which broke the cycle of insects which might have overwintered in the field. Similarly certain crops might be planted into the rotation as a form of weed control. Rye, buckwheat and oil radish were the most common crops used for this purpose. Rye acts as a natural fumigant and has a toxic effect on weeds and so was often used as a cover crop whenever there were weed problems. Buckwheat was another crop used to control weeds. There was some confusion as to whether or not it also had a toxic effect on weeds or whether the thick matting it provided shaded out any potential weeds. Oil radish was described as a very versatile crop. Most farmers used it as a cover crop to provide a matting over the soil and thus shade out weeds. One farmer said that is also acted as a fumigant, ridding the soil of nematodes. Thus, crop rotation assisted with weed and insect control in two ways. The fact that crops were continually rotated broke the insect cycle by removing their food source. As well, certain crops were planted for their weed control abilities, thus sacrificing marketable production for weed control.

Another key weed control method was tillage or cultivation. Ecological farmers cultivated the land prior to planting to provide a relatively weed-free environment for the seeds. Following planting, farmers would scuffle or interrow cultivate to kill the weeds and give the crop a start on the weed population. Ecological farmers recognised, however, that scuffling could damage the crop if not done properly. As one farmer responded when asked about his weed control strategy:

*"I can see why people want to spray corn. It’s a nerve-racking business trying to cultivate it. Because you are always sitting on the tractor afraid to look back because if you look back you are going get off the rows, and if you don’t look back you’re going to be doing something back there you should have seen, and it’s a novel nerve-racking job. but with a rolling cultivator it’s not quite so bad and you can go pretty fast. We did it but the yields weren’t too good. That’s what people, everybody wanted more and more."

Corn crops are easily damaged and this meant that ecological farmers liked to cultivate as little as possible once the crop was planted. Those that did interrow cultivate generally
stopped once the crop had risen above the weeds as the weeds were no longer considered a problem. Interestingly, the farmer who made this comment also said that he was lucky to have the use of the rolling cultivator as it made the job easier. This piece of equipment was produced about the same time as spray technology became the norm and so was not widely available. Consequently, few ecological farmers had access to it. Yet, they were forced to cultivate for weeds as the spray alternative was not an option.

Timing of planting was another weed control strategy. Many farmers planted according to the biodynamic calendar. This calendar states days in any given year when different crops should be planted and is based on earth and moon cycles. Farmers stated that they had reasonable success planting by the calendar with crops generally doing well if planted on the correct day. They also liked the sense of order of planting that the calendar gave them. For many other farmers, timing of planting equated to delaying planting until the soil warmed up. When asked about weed management strategies, some farmers gave the following as part of their response:

If you plant your corn really early and it is cold and wet, it does not come up for about two weeks and then it’s very slow and in the meantime the weeds get going. And the first thing you know you have got more weeds than corn. And it’s too wet and too cold to control them, so we have learnt to lay off for that whole week on planting even when it seems it should be ready to plant.

Particularly in the case of corn, all the experts say if you are not planting corn on the first of May you might as well go and dig yourself a grave and jump in because you are too stupid for words. But I definitely have concluded that for me, I’m better to wait until the soil gets warm so that the corn comes up quickly and gets ahead of the weeds and it gives me a chance to kill some of the weeds that are newly germinating weeds. The only hope I’ve got of keeping ahead of weeds in corn is that one.

One thing that really works well for us now is what we call delayed planting, so especially for corn and soybeans we plant them maybe five to six days later than the neighbours do and that gives us a chance to work the fields earlier on in the season and then leave them for about a week so a lot of the weed seeds that are available germinate and then we cultivate it again really
shallow and all those weeds that have germinated are killed before we plant the crop.

Central to these delayed planting strategies is the idea that cultivation is one of the only forms of weed control once the crop is in the ground. Thus delaying of planting allows farmers to rid the soil of weeds before planting and gives the ground a chance to warm up thus allowing the crop to get a head start on the weeds. These strategies were highly successful and pivotal in weed control for ecological farmers. Yet, delayed planting was counter to normal practice and required patience and confidence of success on the part of the farmer.

Two other proactive weed and insect control strategies were used by ecological farmers. First, farmers tried to ensure that the plant was healthy. It was found that where the plant was healthy insects were not a problem and so measures were taken to observe plant growth and attempt to ensure healthy plants. A second related aspect was the need to maintain soil balances. Soil balances were essential to healthy plants and as such played a key role in insect and weed management strategies. One farmer identified a balanced soil as the number one weed and insect management strategy because soil balances determined how weeds and crops would grow relative to one another. Soil balance, therefore, was an aim which was achieved via a variety of means.

Integration of a variety of practices to manage weeds and insects was very evident. Two farmers' responses to how they controlled weeds and insects are instructive on the complexity of weed and insect control systems.

If you are an organic farmer, or want to be an organic farmer, you have to accept that you get a certain amount of weeds, but the funny thing is if you make sure you have a healthy soil life and you maintain that with a proper crop rotation, by handling and applying your manure at the right places, weeds don't run out of control. Like maybe if you talk to other farmers everybody knows that if you put a lot of raw manure on a field in the spring you’re going to plant corn and the pigweed and the lambs quarters will grow just as strong as your corn grows. So if we did that then we would run into the same...
problem because its just a reaction of nature to the fact that you have applied too much ammonia to the soil. It wants to get rid of that. The fastest way to get rid of ammonia is to grow a lot of weeds. So you really have to manage the fertility of the field and then it comes through the mineral. Like last year we had some corn actually all of our corn was cleaner than a lot of the fields of the neighbours that were sprayed twice. That was really amazing and that was done the proper way with the right management.

Most of it is just being a good observer of the conditions and getting a good seedbed established and getting a real good stand of every crop established in a timely manner to keep ahead of the weeds. Otherwise you can grow corn for three years in a row and the third year is going to be a disaster you know. It's just the way you manage the rotation with the tillage. And the manure application. You know the whole shibang. It all fits together. It's kind of all integrated.

The integrative nature of ecological farmers' weed and insect management strategies points to the complexity of management decisions. Farmers cannot use one method to overcome weed problems but must be proactive and utilise a variety of means to ensure crop growth. A mistake in one element can lead to weed and insect problems and these are not easily overcome in ecological systems of production where spraying is not acceptable.

There was one other feature of weed and insect management that was particular to ecological farmers. Ecological farmers recognised that elimination of weeds was unlikely under their present management system but strove to reduce weed pressure as much as possible. They admitted that they could never say that they did not have weeds, as everyone had weeds, but it was keeping these weeds at levels where a crop could still survive. Weeds had to be managed proactively using the practices outlined above, but where they were not kept under control ecological farmers did not have many courses of action. One course of action was to handpick or burn off weeds but these were time consuming. Some even admitted that at times they plowed down the crop and weeds as it was too weed infested and used it as manure for the soil. Thus, although these strategies when executed correctly can minimise weed and insect problems, ecological farmers acknowledge that they do not have the security that conventional farmers have that weed and insect problems can be completely controlled.
Clearly ecological farmers attempted to handle weeds and insects in a proactive way. Rather than dealing with weeds and insects once they had occurred, farmers tried to minimise the risk of weed and insect pressure through crop rotations, fertility management and cultivation. For those problems that did occur, farmers were limited in their availability of options. Some farmers used manual labour such as hand weeding in garden crops and picking insects off various crops but clearly this could not be applied at a field level without becoming prohibitively expensive. Some of the farmers that were vegetable growers used organic sprays, such as rotenone and BT spray, on specific crops, but this was generally considered a failure to maintain correct balances. These reactive practices were primarily last resorts and were not encouraged.

In comparison, conventional farmers’ weed and insect management strategies were largely reactive. Sprays were the primary form of weed control. This gave farmers security from crop failure, and allowed them to maintain “weed-free” fields, which were a matter of status in the farm community, and high yields without having to adjust crop rotations and other aspects of the operation. However, there was some evidence that conventional farmers were reassessing their use of chemical sprays.

Generally, conventional farmers had different perceptions of herbicides and insecticides. While all farmers used herbicides to control for weeds, only five of the thirty conventional farmers used insecticides on any of their crops. The insecticides used were to control corn rootworm or corn borer. The majority, however, felt that the dangers of insecticides were too great to continue with continuous corn and had changed their crop rotations accordingly. Some farmers’ perceptions of insecticides were very strong.

I did not want to be putting that crap out in the stream. You can avoid it by growing corn in rotation, only one year in. Cos I don’t want to handle it and I don’t like putting it on the ground. I can live with 24D and MTC and things like that but your weedkillers are generally, in my opinion, a lot less dangerous to the land. But something that can kill me I don’t particularly like.
We don’t use any insecticides. With one year corn you don’t need to. When a teaspoon will kill a human being we just don’t want to touch it. I have a friend that when he used to drive the corn planter it made him sick every spring. Just from smelling it in the field. So that was enough to scare us.

And we are glad of it because it [insecticide] is just a terrible product to use. I’m sure it is more harmful to the operator than anyone else.

Conventional farmers were, thus, well aware of the toxicity of insecticides and were loathe to use them. For most farmers, crop rotation had allowed them to eliminate the use of insecticides altogether, but there were some who continued to use them.

Although there was no evidence of complete elimination of herbicides on any of the enterprises interviewed, conventional farmers expressed interest in reducing spray application rates. When asked why they had attempted to reduce spray rates, the following responses were typical:

Before you used to just toss it up and down, fork it up, put a crop in it and just go ahead and just spray. Now we will probably be forced to pay more attention to it. It’s not a very likeable subject, spraying. You know, people are starting to get more concerned about the environment and stuff like that. And I guess as farmers you have got to, they are the ones that are going to be targeted so they are the ones that are going to have to change. And it is better to look after it now than to be told to look after it. That is harder to do.

And now we are becoming more concerned with, well wasting money, you know. At $9-$10 an acre. And we have to start testing our water, see what the pH level is. But last year we spent basically an extra $20 an acre on the corn and I might as well have given the elevator the twenty bucks and saved my time because it did not do anything.

Increasing costs of sprays, which are sometimes ineffective, and a rising environmental consciousness seem to be the main motivations for farmers to reduce chemical use. Having decided to do so, some farmers had experimented with reducing spray concentrations and found this to be as effective as the full dose so had continued with it. There was no indication that they would forgo the security of spray programs, however. At present, the cost of
chemicals is still sufficiently low that conventional farmers continue with them but it would be interesting to examine farmers’ responses to price increases and whether this would prompt them to reconsider the use of chemicals at all.

Despite these encouraging accounts of desire to reduce spray rates, resistance by some farmers was also evident. Conventional farmers were loathe to give up the security of their spray program. This was well evident in one farmer’s comment about the choice between post- and pre-emergent sprays.

I have not gone to a lot of post-emergent sprays simply because I like to have the weeds controlled before they get a chance to get away on you. But there are people that go more towards the post-emerge program and only spray the weeds that are there. More specific. But sometimes the weather and stuff like that may reduce your window and you may end up with problems. Like last year I don’t know if you were following the agricultural media, that new herbicide that they bought out, Altham on the corn. And it was hot when they put it on. And of course it says right there on the label, you know, don’t use over certain temperatures. And they said, well, if it has got to go on it has got to go on sort of thing. That’s one of the down sides of post-emergent herbicides.

This desire to have weeds under control before they even appear was characteristic of many conventional farmers. Weed control was considered necessary even when a weed problem had not yet been identified. Thus, the security of predetermined spray programs strongly influenced conventional farmers’ decision-making. These farmers feared the narrowing of their production windows and were not prepared to take the risk of a weed problem and lower yields.

Although indirect, the conversion to no-till was another facet of resistance to elimination of chemicals. Farmers using no-till needed to use a burn down spray to rid the field of any weeds normally removed by cultivation. This burn down, usually Roundup, was non-specific killing all vegetation in the soil and was believed by ecological farmers to contribute to higher
applications of chemicals. While this may have been the case in the early stages of the no-till system, farmers using no-till were confident that they could reduce spray application rates

But even with the herbicides with the no-till you can end up reducing the herbicides a little bit, because you’ve got mulch over the top of the soil most of the time and you are no longer turning the soil over as much so the weed seeds that are in the soil profile lower down never get bought up to the surface anymore. And as long as you keep depleting that amount of weed seeds in that top inch or two inches and don’t add any more to it, in theory over time you should get to the stage where you don’t need much extra control. Like sure you still have to use a certain amount of herbicides unless you go ‘organic’

Up until now we have been using pretty much the same sprays, you know, but now I think we are starting to do more spot spraying on some of them. I don’t see that it is going to be a big drop all of a sudden, but I believe with our rotation and the way we are going to be putting more, we’ll probably be able to cut back rates. Hopefully anyhow

Although these statements portray optimism that spray rates will ultimately be reducible with no-till, they also show a great deal of uncertainty about whether this will in fact be the case. They also indicate that elimination would be impossible. Thus, no-till locks farmers into a spray program as there are no alternatives to the burn down to prepare the soil for planting. There is an argument that the weed spectrum decreases but that does not eliminate the need for sprays.

The contrasting styles of weed and insect management for conventional and ecological farmers underpin the distance between the two farm systems. Ecological farmers are proactive in their weed and insect control strategies, using the overall production system including crop rotation, manure management and fertiliser management and tillage system to reduce weed and insect pressure. Conventional farmers are more reactive, generally using chemicals to eliminate weed and insect problems. Although conventional farmers have been willing to adopt crop rotations to eliminate the need for insecticides, they clearly do not perceive herbicides to be as toxic and are, therefore, unlikely to eliminate them. Increasing chemical
costs could cause conventional farmers to rethink spray programs, however. The variety and complexity of methods used by ecological farmers are not compatible with the conventional model of production. Conventional farmers want the security of knowing the weed population is subdued before it even arrives. Thus, there is resistance to wholesale change from conventional farmers, but evidence of attempts to reduce quantities sprayed.

5.6 Harvesting

Farmers were asked about their methods for harvesting crops. No differences were identified in harvesting methods. Harvesting differed for different crops but not between ecological and conventional farmers. An identifiable difference was that several ecological farmers had the fields swathed before harvesting to get rid of some weeds if there was a weed problem. Another difference was that two ecological farmers used horses for harvesting, but this was the exception rather than the rule. Both ecological and conventional farmers showed similar harvesting practices.

5.7 Livestock management

5.7.1 Feed supply

Feed supply sources were similar for all ecological enterprises, but there were notable differences by farm type for conventional operations. All ecological farmers obtained the majority of their feed from the farm. In accordance with organic regulations (Demeter 1992), ecological farmers were able to supplement on-farm supplies with natural vitamins and minerals where necessary. Dairy farmers also supplemented their on-farm feed supplies with off-farm sources as there was no separate market for organic milk and, therefore, no need to adhere to organic regulations strictly. Some ecological farmers with other types of livestock also purchased some feed but stressed that they would prefer to produce all feed requirements on the farm. Conventional dairy farmers supplied the majority of their feed from the farm and
supplemented this with vitamins and minerals, in similar fashion to the ecological dairy farmers. However, three of the conventional livestock farmers (two chickens and one hogs) purchased all of their feed. These three farmers used their land for growing cash crops for market and purchased premixed rations from feed companies for their livestock. They said that the feed company business was so competitive due to an oversupply of the raw products for feed that the price to purchase was less than the cost to produce their own feed. It was also considered easier than mixing one’s own feed. On these farms there was a clear division between livestock and cropping enterprises, not present on the integrated ecological farm.

Although sources of feed were similar, in many cases the feed programs of ecological and conventional farmers differed. This was particularly noticeable among dairy farmers. Conventional dairy farmers talked about “pushing the cow” and “maximising production per animal.” Ecological farmers were more willing to accept lower production figures if the cows were healthy and the quality of the milk was maintained. Thus, some conventional farmers had adopted, and others were considering, total mixed rations (TMR) and other highly specialised Holstein feeding regimes. TMR is a new system of feeding dairy cows where the farmer sends crops to the local miller and in return is provided with a ration which is supposed to be optimal for milk production. In contrast, ecological farmers were paying more attention to their ability to supply all of the cows’ needs from off the farm. These point to differing rationales for feed supply systems.

One other feed supply issue is worthy of attention. While conventional farmers spoke of the ease of securing feed from off the farm and often the economic benefits of doing so, for ecological farmers forced to look for off-farm supplies, this was not the case. The market for ecological feed was undeveloped in Ontario and consequently securing a supply was difficult and expensive. One farmer suggested that this was a real problem for ecological livestock farmers.
There's not enough people out there doing it and what people are out there producing, they are going for the top dollar. So they are growing soyabeans which they can put into the human market. So you either grow it yourself or you don't have it. And that's the reason why we are getting out of the pigs because they were sucking up an awful pile of feed that would have been better going to the chickens.

In fact the lack of a supply of ecological feed meant that farmers who were unable to produce all of their feed requirements had to reconsider their enterprise mix. This points to a reinforcement of organic regulations. Not only are ecological farmers required to produce the majority of their feed on the farm, but they are forced to by the lack of availability of alternative supplies. The comparatively cheap and accessible conventional supplies mean that for many conventional livestock farmers, the transition to ecological is unlikely.

5.7.2 Stocking strategies

Conventional and ecological farmers' stocking strategies were similar regardless of the livestock on the farm. There were some minor differences in certain types of livestock, such as chickens and beef cattle, but in general both groups of farmers were attempting to be as self-sufficient as possible. Dairy farmers in particular were striving to build up their own herds and sell excess cattle rather than having to buy replacement cows. As all of the ecological dairy farmers were in a position to replace from within their own herds, there was no problem with a supply of ecological dairy cattle.

Restrictions about what is organic places restrictions on ecological farmers with respect to chickens, hogs and beef cattle, however. Cattle were considered organic if they had been born on an ecological farm and had never eaten anything but organic feed. This meant that they could not even have spent one day off the ecological farm if they were to be sold organically. Thus, ecological farmers that had beef cattle were cow-calf operations and did not participate in other aspects of the beef cattle raising system as did some of the conventional farmers interviewed. Similarly chickens must be purchased as day-olds if they are to be raised.
organically. Interestingly, only two ecological farmers had a brooding flock from which they produced chickens and eggs. All other ecological farmers were integrated into the regular system of purchasing young chicks, but had to purchase earlier than conventional farmers.

5.7.3 Livestock housing

In general, indoor housing arrangements for conventional and ecological farms did not vary but there were variations in the extent to which animals were provided access to pasture and the length of time pasture was provided (Table 5.3). Typically, all farmers allowed livestock some access to pasture throughout the year but in eight cases animals were inside all year round. Livestock that were consistently housed indoors on conventional operations were chickens and hogs. For ecological operations, those housed indoors were also hogs and chickens. For conventional operations, these animals were in intensive confinement arrangements, whereas ecological farmers allowed their animals greater freedom to move around even when housed indoors year-round. Thus, ecological farming cannot allow for the level of intensity in housing which characterises factory farming.

Table 5.3 Access to pasture of ecological and conventional livestock

<table>
<thead>
<tr>
<th></th>
<th>Conventional</th>
<th>Ecological</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to pasture</td>
<td>18 (78%)</td>
<td>20 (86%)</td>
</tr>
<tr>
<td>No access to pasture</td>
<td>5 (22%)</td>
<td>3 (14%)</td>
</tr>
</tbody>
</table>

There were some subtle differences in the length of time livestock were outdoors between conventional and ecological operations. While conventional farmers tended to keep the livestock indoors throughout the winter months, ecological farmers ensured access to the outside throughout the calendar year. Animals may not necessarily choose to go outside but the option was there. Several dairy farmers commented on the additional work associated with letting the cattle out each day but felt that this was worthwhile as it improved the health.
of the animal. Organic regulations specify that in order for animals to be sold as organic, they must have access to the outdoors at all times. This had prompted one poultry farmer to provide an outdoor area, while many ecological farmers had movable hutches that chickens were placed in outdoors in the summer. Some producers even had completely free range chickens but this was the exception rather than the rule.

5.7.4 Herd Health Program

Farmers were asked whether their animals were on a herd health program and, if not, whether any medication was given to animals during their time on the farm. Conventional farmers were more likely than ecological farmers to have animals enlisted on a herd health program (Table 5.4). Only two conventional farmers did not use medication on their animals as part of a program, but those two would use medication where needed. In contrast, the majority of the ecological farmers chose not to use medication and did not have animals on a herd health program. The exceptions were three dairy farmers (two on a herd health program and one who used medication) and one beef cattle farmer whose animals were on a herd health program.

There was a clear difference in how ecological and conventional farmers believed that herd health should be maintained. Ecological farmers used different means of proactive disease control. They believed that healthy feed and high quality environments led to healthy animals and no need for medication. One farmer captured this belief in his response to the question relating to herd health:

Generally you might call it preventative I suppose. If you give the animal as high quality environment as possible and give them the choice of sources of feed really that is your best insurance for animal health. For instance right now my cows are on some pretty good pasture. I think it is anyway. I take my rained on hay, the stuff I was going to use maybe for bedding, put it in, and they eat it rather than go to the pasture. So if you give them a choice. If they want to eat it let them eat it. As soon as you pull an animal out of its natural
habitat or natural instinctive beginnings well then you are looking for trouble because you are trying to play god with this thing and none of us, none of the best nutritionists, know the perfect ration for any given animal and their certain confinement system. But the animal knows what is best for them if you give them a chance.

In some cases, healthy feed and quality environment was combined with homeopathic methods, usually also preventative in nature. On the other hand, conventional farmers wanted the security of the herd health program and constant checks that their animals were healthy.

Table 5.4 Use of herd health programs by ecological and conventional farmers

<table>
<thead>
<tr>
<th></th>
<th>Conventional</th>
<th>Ecological</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use medication</td>
<td>16 (89%)</td>
<td>4 (25%)</td>
</tr>
<tr>
<td>No medication</td>
<td>2 (11%)</td>
<td>12 (75%)</td>
</tr>
</tbody>
</table>

Note: Five ecological and five conventional operations did not provide information on whether or not they were on a herd health program.

The herd health program was a common feature of most dairy farms. Those that had opted out of the program did so for a variety of reasons. Ecological farmers believed that there was no need for the program as their feed and housing were high quality thus leading to healthy animals. The one conventional dairy farmer who had opted out of the system stated that frequent vet visits had become so expensive that he began to question whether the service he was receiving was worth the money. He concluded the following:

It's very nice to go into the barn knowing all these cows are pregnant or all these cows are open or who is sick and who is not but you milk the cows, or are around the cows as long as I have there's certain things you can see that will tell you that the cow is in calf and when a cow is sick or a cow needs whatever. I don't think it is impossible. Certainly it's not as efficient as it could be.
It is interesting that this farmer should note that "it is not as efficient as it could be." Given the efficiency motive driving most conventional farmers at present, it is unlikely that they would sacrifice efficiency in any way. Thus, despite expensive monthly bills from the vet, conventional farmers continued to get their animals health checked regularly. Few did as this farmer had done and decided to withdraw from the program.

There were suggestions from ecological farmers that not being part of a herd health program was a disadvantage in certain situations and modern marketing might force farmers who sold live animals to be on a program. One ecological farmer had not had his animals on a herd health program for some time but had recently reverted back to a regular program of medication. He gave the following reason:

"We went six years with no vaccinations and then last year there was a really big scare about BVD and there were people losing their complete herd. I sort of panicked. One reason for doing it was the kids have 4H calves and you couldn't take a calf to a fair that wasn't vaccinated, without a certificate saying it was vaccinated in the fall. A lot of fairs in fact didn't even have shows it was that bad. So we went into a panic and vaccinated everything last fall with a multi vaccine. I guess we are probably going to do it again this year. I think. One of the problems with selling cattle to other people who are on a vaccination program. We had some bad feedback from a couple of people who we sold heifers to because they went into their herds and were exposed to some things like IRV and so on and they took it pretty badly. So now people are sort of demanding that you vaccinate."

Where ecological farmers take the animal to the consumer as a food product, issues such as this might not be a problem. But where ecological farmers are trying to interact with the conventional marketplace for live animals, there may be occasions where vaccination is forced upon them. Herd health programs are built into the conventional system of production and ecological farmers who wish to interact with conventional farmers in this way may be forced to use medication.
5.7.5 Manure handling

Manure handling systems were similar for conventional and ecological farms. The major difference was that most ecological farmers compost manure before spreading it, while only one conventional farmer had done so. All farmers were concerned with the timing of applications and did their best to minimise runoff. Several conventional farmers in Bruce County had used CURB (Clean Up Rural Beaches) funding to update their storage pits at their milking sheds and believed that this would help to reduce manure handling problems. In general, though, the only real difference was in terms of composting used in ecological systems.

5.7.6 Overall livestock management

Differences between ecological and conventional farms in terms of livestock management are not as pronounced as the differences in land management. In broad terms, the only real difference is the wholesale use of medication as part of herd health programs for conventional farmers, and the preferred use of preventative health measures such as high quality feed and environment for ecological farmers. There are also some differences in stocking strategies and feed programs which are enforced by organic regulations. In general, both replacement livestock and feed for livestock should be produced on the farm.

The separation of livestock and cropping operations on several conventional farms is, however, an important point of contrast. With certain types of livestock, this separation is a feature of conventional farms. Land is used for cropping for market and feed is purchased. This runs counter to the whole philosophy of ecological farming, which is based on self-sufficiency and recycling of nutrients within the bounds of the farm. If the trend toward specialisation in this way continues on conventional farms, then they could be said to be moving in a different direction to the ecological enterprise. This would mean that livestock
operations would increasingly diverge from ecological operations, whereas at present they are relatively similar

5.8 Conclusion

Production practices on ecological and conventional farms are distinctive (Table 5.5). Although ecological farmers' production practice choices are constrained by organic regulations, they have adopted a rich variety of alternatives to chemical use. These alternatives are generally absent on conventional operations as they are unnecessary. The differences in production practices are not, however, limited to the absence or presence of chemicals, with tillage systems appearing to be a distinguishing characteristic of ecological and conventional operations also.

Differences in production practices are more pronounced for land management than livestock management. Where conventional farms have livestock, animals are cared for in a similar way to the way in which ecological animals are cared for. The key difference between the two systems of livestock management is the absence of medication on ecological farms and the general absence of purchased feeds. Although conventional farmers also predominantly grow the majority of the feed for their animals, some purchase their entire feed ration. Any movement from other conventional farmers toward purchasing feed in this way would indicate a divergence of the two systems of production.

In land management, ecological farmers' production systems are proactive and complex. Without chemical fertilisers and sprays, ecological farmers are forced to use production systems that do not need these elements. Crop rotation, tillage, composting of manure and choices of particular crops are all integral parts of this land management system. Chemical inputs are unnecessary if these other elements are used to maintain soil balances and plant health. In contrast, conventional farmers know that they can overcome any problems with inputs of chemicals and, therefore, do not have such complex crop production systems. If a
soil imbalance is identified, the appropriate chemicals are applied. This approach is much more reactive and simple.

Table 5.5 Summary of production characteristics of ecological and conventional farms in Southwestern Ontario

<table>
<thead>
<tr>
<th>PRODUCTION PRACTICE</th>
<th>ECOLOGICAL</th>
<th>CONVENTIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tillage system</td>
<td>Conventional, some minimum till</td>
<td>Conventional, movement toward no-till</td>
</tr>
<tr>
<td>Length of crop rotation</td>
<td>2-10 yrs</td>
<td>2-6 yrs</td>
</tr>
<tr>
<td>Choice of crops</td>
<td>Variable</td>
<td>Set pattern</td>
</tr>
<tr>
<td>Proportion cropped</td>
<td>Low-medium</td>
<td>Medium-high</td>
</tr>
<tr>
<td>Fertiliser management</td>
<td>Manure, plowdowns</td>
<td>Chemical, plus manure on livestock operations</td>
</tr>
<tr>
<td>Weed control</td>
<td>Crop rotation, timing of planting, soil balance,</td>
<td>Herbicide, pre-plant tillage</td>
</tr>
<tr>
<td></td>
<td>cultivation</td>
<td></td>
</tr>
<tr>
<td>Insect control</td>
<td>Crop rotation, healthy plants, beneficial insects</td>
<td>Crop rotation, occasional insecticides</td>
</tr>
<tr>
<td>Livestock housing</td>
<td>Loose indoor with access to outdoors</td>
<td>Indoor, more limited access to outdoors</td>
</tr>
<tr>
<td>Livestock feed</td>
<td>Farm produced</td>
<td>On farm sources for most Some total purchase</td>
</tr>
<tr>
<td>Stocking strategy</td>
<td>Mostly on farm, with the exception of chickens</td>
<td>No restrictions, both on-farm and off-farm sources.</td>
</tr>
<tr>
<td></td>
<td>which may be bought as day-olds</td>
<td></td>
</tr>
<tr>
<td>Animal health</td>
<td>Quality feed and environment and homeopathic remedies</td>
<td>Herd Health programs with regular checks and medication</td>
</tr>
</tbody>
</table>
Although similarities can be identified on certain production practices, and there was evidence in the sample that conventional farmers are considering ways of reducing chemical inputs, ecological and conventional production practices are diverging. There is no indication that elimination of chemical use is an aim of conventional farmers and the wholesale changes in production systems needed to achieve this would not appear to be forthcoming. Instead, conventional farmers are increasingly looking at the no-till system of production in order to curb soil erosion problems. This system of production requires chemicals and is incompatible with ecological production. If the high degree of adoption of no-till in recent years continues, then ecological and conventional production systems are likely to be heading on two different trajectories.
CHAPTER SIX DECISION-MAKING AND RESULTANT ATTITUDES

6.1 Introduction

The previous chapters outlined the different production systems and resultant social and structural organisation of ecological and conventional operations. Analyses in these chapters indicated that there were differences in the social and structural organisation of ecological and conventional farms. However, studies that take place after the production system decision has been made may be revealing differences due to the change in production system rather than differences contributing to that decision. Therefore, in this chapter the decision-making of ecological farm families is examined in order to determine the relative roles of attitudes and structure in the decision-making framework. Farmers were asked to provide an historical account of their transition to ecological agriculture. To provide a point of contrast, the decisions that conventional farmers made in order to establish their existing production system are also examined.

In the latter part of the chapter, the attitudes of ecological and conventional farm families are compared. These attitudes were reported when the farmers interviewed were already using their chosen production system. Therefore, it is difficult to determine the extent to which these attitudes reflect the attitudes that ecological farmers had prior to farming ecologically. However, they do provide an indication of the existing divide in attitudes between ecological and conventional farm operations, and consequently an indication of the likelihood of some sort of reconciliation in terms of production practices.

6.2 The decision to farm ecologically Paths and reasons

No single path to ecological agriculture was identified. Farmers had differing levels and types of farm experience prior to farming ecologically. Over two thirds of the ecological farmers had conventional farm experience. Of the nine farmers who had never farmed conventionally,
five were from non-farm backgrounds and two had always farmed ecologically. Thus, a high proportion of the ecological farmers had made a conversion decision.

These different pathways indicate that some farmers have made a transition to ecological agriculture whilst others have only ever farmed that way. Different reasons for decision-making are likely in these situations. Farmers from non-farm backgrounds who decide to farm ecologically from the start are not constrained by the structural characteristics of their enterprise as the decision to farm ecologically and the decision to farm are made simultaneously. Conversely, those that have farmed conventionally may show some structural regularities in type of enterprise. Thus, the decision-making of ecological and conventional operators are divided into three groups for analysis: (1) those who have always farmed and always farmed ecologically, (2) those who are from non-farm backgrounds and started farming ecologically when they started farming and (3) those who made a transition to ecological agriculture from conventional production systems.

6.2.1 Always ecological

The decision-making of the two ecological farmers from farm backgrounds who had never farmed conventionally was relatively simple. They continued on with the production system that they knew. When asked why she farmed ecologically, one farmer replied:

I've never known anything about spraying pesticides and stuff. I'd have to go out and learn that.

For these farmers the ecological production system was simple because that was what they knew. They felt comfortable with this system and it was compatible with their operations, one a dairy farm and the other a vegetable farm. Neither had seen any reason to question the validity of the ecological system, but both recognised environmental disadvantages of conventional production systems.
These farmers found themselves continually resisting conversion to the conventional style of farming. Their reasons for not changing were definite. One farmer claimed to have observed soil deterioration in neighbours' fields where chemicals were used and, therefore, resisted the dominant trend of chemical agriculture. He was pleased with the results on the farm, and did not want to lock into a system of buying inputs, which he believed did not do any good anyway. The other farmer had converted the home garden to a market garden and noted that the garden had always been ecological so it was a natural transition to continue with that. She said that the thought of conventional farming had never entered her mind.

6.2.2 Ecological farmers from non-farm backgrounds

Ecological farmers from non-farm backgrounds made the decision to farm ecologically at the same time as they made the decision to farm. For many, they would not have farmed any other way. Thus, they deliberately chose properties and enterprise mixes that enabled them to farm ecologically. Interestingly, the most recent entrants into ecological agriculture fell into this group. Four farmers had begun farming ecologically since 1990 and three of these were from non-farm backgrounds. This might suggest that the forces that motivate conventional farmers to switch and those that motivate non-farmers to start farming ecologically differ.

Three case studies will be used to illustrate the reasons that non-farmers have for farming ecologically. The first two case studies portray the typical reasons given for decision-making, while the latter is included to show that other reasons may enter into the decision to farm ecologically.

Farmer A

Farmer A purchased a 95 acre farm in 1984. She had taken agricultural courses and worked on both conventional and ecological farms before deciding to buy her own property, but was not raised on a farm. She and her husband deliberately chose the “back forty” of a farm which
had large acreages of trees and started growing vegetables for the local market. Although both husband and wife had off-farm jobs, the intention was that the farm would provide them with a self-sufficient lifestyle and would ultimately allow them to quit their off-farm jobs and earn all of their income from agriculture.

When asked about the decision to farm ecologically, Farmer A responded:

I'd worked on conventional farms, I've fed sprayers with atrazine and watched pesticides and stuff being sprayed on. It just never made any sense. You didn't have to do that. There must be a different way to do it where you weren't depending on incredible amounts of toxic stuff being piled on the land. And there was also, I never wanted to farm where it was like hundreds of acres of field, where you used big machinery and spent all day cultivating one corn field. Also with the amount of reading I had done I was just drawn to that way of doing things. It just always made sense.

There was never any question in this farmer's mind that she would farm ecologically. Large scale, chemical production was counter to her philosophical position. Her experience with farming provided her with the knowledge that ecological farming was possible, and her reading reinforced her desire to farm that way.

Farmer B

Farmer B purchased a mixed farm of 100 acres in 1994 and began farming ecologically. He chose a property in Bruce County that was surrounded by large conventional farms and began a mixed livestock operation with limited resources. A primary aim of the enterprise was self-sufficiency in food supplies as well as producing for the Toronto market. From previous experience, the farmer knew that a strong demand for organic meat products existed in Toronto and he intended to tap into it.

Farmer B was also asked what his reason for farming ecologically was. He gave the following reply.
I don't know off-hand why. It just seemed like that's the way it should be. I think when we first started with the pigs all we fed them was vegetables and fruit because we lived near a marsh, the Holland Marsh, and the farms out there have huge bins of excess. Every day there are piles so we would go there with a couple of barrels and with my hands pick through them and even keep some of the stuff for the house. Like pick up the good stuff. There was just so much of it. Just fed that to them. So then that whole idea of natural pork I guess began it all. And as I became more aware I realised this was not the norm. So it was just through reading and experience I realised, gee, I was doing something different. It seemed the only logical way I couldn't understand the other way. I guess that's why it was. It never occurred to me to do it any other way. I would never spray or anything. I wouldn't want to eat anything sprayed or anything so it was easy to say I'd just not. My mother in law was a bit of a herbalist as well and a homeopath always so maybe that did something. And you can fatten them on that but the university would never tell you that.

For Farmer B, again, there was never any intention to farm any way but ecologically. As he was not from a farm he did not have a predetermined idea of how farming should progress and worked out his own production system with the resources available to him which happened to be ecological.

Farmer C

Farmer C purchased a fifteen acre vegetable farm in 1992. He farmed ecologically from the start while maintaining a full-time, off-farm, professional job. He was very adamant in his reasons for farming ecologically.

I don't like handling chemicals. I don't like my family being exposed to chemicals. And I saw a market niche that was not being exploited to its fullest potential. And I thought there was an opportunity there.

This farmer is an exception to the rule in terms of non-farmers' reasons for farming ecologically. There is little evidence of a self-sufficiency motivation. Rather a dislike of chemicals and market forces have driven the decision. This particular farmer had no intention.
of leaving his profession and farming full-time. The farm is instead viewed as a sideline or hobby. In many ways, this farmer conforms to some of the popular misconceptions of ecological farmers as back-to-the-land, hobby farmers.

Some common decision-making themes emerge from the other case studies. First, four of the five non-farmers who purchased farms and decided to farm ecologically had self-sufficiency as a goal. They had purchased the farm with the intent of supplying all, or most, of their household food needs. Two of these had been involved in consumer cooperatives prior to buying the farm and growing all of their own food meshed with their overall philosophy with respect to human-land relations. The farm provided them with a setting for pursuit of their self-sufficiency goals, as well as a potential livelihood. Through their consumer cooperative experiences they were able to secure markets for their produce. It was interesting to note that none of these farmers had yet been able to make the farm their sole livelihood, still relying on their off-farm jobs for income.

Dislike of conventional production systems was also evident in the reasons given for farming ecologically. Not wishing to use chemicals was the primary reason and this coincided with the desire for securing a “clean” food supply. Others were not in favour of the large acreages and machinery that dominate modern agricultural production and wanted to prove that farming could occur in an alternative way. Most of these farmers (five of the seven) did not have experience with conventional agriculture but their urban experience and observation of agriculture had lead them to believe that there must be another way. The decision to farm ecologically was primarily attitudinal. These farmers were not constrained by existing enterprise structure or preconceptions from past experience about how farming should be practiced.
6 2 3 Conversion from conventional to ecological agriculture

Most of the ecological farmers had converted from conventional to ecological agriculture and most of these had grown up on farms. Only four farmers from non-farm backgrounds initially farmed conventionally and then converted to ecological production. Thus, for many ecological farmers, the decision to farm ecologically was a rejection of the system of farming that they had grown up with. These farmers' reasons for their decision, therefore, provide a good indication of the relative roles of attitudes and structure of the farm enterprise, as they converted existing farms to ecological production, and also must have had some reason for altering a production system that they were familiar with.

A variety of reasons for converting were identified for farmers who converted from conventional to ecological systems of production. These reasons were complex and often involved a variety of different issues. For some farmers there were certain triggers that prompted them to switch and the change was dramatic. For others, the conversion to ecological agriculture was a gradual process and something that they considered for a long time before actually converting. A series of case studies are used to illustrate these reasons.

Many of the conversions to ecological agriculture took place between 1985 and 1990 (twelve out of 21). It is, therefore, useful to examine the reasons for changing in a series of time periods. Three time periods are chosen. First, those who converted prior to 1985 are considered to determine their reasons for making the decision to farm ecologically. Then those who converted between 1985 and 1990 are considered to determine any specific events or broad structural realities leading to such high rates of conversion. Since that time period, only one conversion has occurred and so the reasons for that decision are considered to determine whether the trend of high rates of conversion in the late 1980s is broken.
Eight farmers converted to ecological agriculture prior to 1985. The earliest conversion occurred in 1962, two farmers converted in the early 1970s, three in the late 1970s and two in the early 1980s. When compared to the high rates of adoption in the 1985-1990 period, these conversions are sporadic and suggest that reasons for converting might be highly personal rather than broader in scope. Two cases provide typical accounts of the decision-making associated with this time period.

Farmer A

Farmer A grew up on a mixed farm. In 1959 he took over that farm and farmed conventionally for three years. At that time, conventional operations were still typically mixed. Chemical use was in its early stages and fertilisers were not as strong in concentration as they are today, but fertilisers, herbicides and insecticides were used on the crops and pesticides were often sprayed inside milking sheds. Chemical use was recommended by the agricultural representatives and magazines, and the farmer proceeded according to what everyone else was doing and what was recommended. He described the following conversion process:

So in 1959 I think it was my sister took sick and she was exposed to a lot of DDT and lindane on the farm. We milked cows and we sprayed the barn and DDT in the milkhouse and all and she got sick in 1959 and the next thing she was in hospital. She died in 1961. But in those two years going back and forth to the hospital is when I started thinking about all this. That it’s not just the best idea to do this, poisoning everything, so we decided in about 1962 to change. And about that time Rachel Carson’s book came out, Silent Spring. And that was the first book I read on it. That was one of the first books that really got me thinking about it. You know, I guess it was alright otherwise I wouldn’t have been willing to do what I had to do.

Anyway we decided to make a switch and slowly phased out some things. Pesticides we phased out right away and some of the insecticides because we were getting prejudiced against them because of my sister’s death. But fertilisers we still used some chemical fertilisers, but it was getting to the point...
where guys like ourselves needed a bigger truck every year to bring in the fertiliser and the more we fertilised the more weeds we got. So we had to buy herbicides besides that and kill the weeds you know. And the cost was getting pretty high and the truck was pretty deep to bring the fertiliser to both farms and then you had two small boys here. And you start thinking about the future and them and now there's grandsons as well. So we thought we would switch to something a little more sensible even if the costs are going to be higher. But if they had to start farming and use more and more like we were using the costs would have been prohibitive by now.

So in about 1964 we stopped using any chemical fertiliser and we started using more manure and green plowdown cover crops. But I guess we were a little slow at the start you know. You just didn't know whether you were doing the right thing or not. At the time the word 'ecology' was not a common term. We called ourselves just the Natural Farmers, the first organisation I belonged to in 1968. The aim was to farm naturally without toxic substances. It was as simple as that.

This farmer began farming ecologically at a time when full-scale use of chemicals was becoming the norm. His personal experience with his sister's illness and death initially opened his mind to alternatives. Then increasing input costs finally convinced the farmer of the complete change. He notes that when he changed a few farmers were farming 'naturally,' but the group was not well organised. Thus, those that chose to farm ecologically did so in an environment of uncertainty. There was little support for their decision in terms of information and various methods had to be discovered through experimentation.

Farmer B

Farmer B grew up on a mixed farm in Elgin County and purchased the family farm in 1955. He progressed through a number of farm changes typical of the time, converting from a mixed farm to a dairy operation and then switched from dairy to cash cropping. While cash cropping, he grew continuous corn as was the trend at the time. In 1972 he decided to make the transition to ecological production and he gave an account of the decision-making processes leading to this outcome.
When we went to continuous corn we could see what was happening to the soil because of the continuous corn. Because with the dairying we had a rotation. And then we went continuous corn and it was just the same crop one year after another and we were seeing how many problems we were having. You could do it a few years no problem and then you start to see the soil getting harder. The heavy soil got hard and started to turn into something like cement. The sandy soil started to blow and we were having a lot of trouble with blowing. And since we've gone back to a rotation we don't have this problem. The farms around us can be blowing and we won't be blowing. We can have bare fields and they don't blow the same as the neighbours. Just sort of nice to see the soil stay where it is supposed to.

That was part of it. We weren't making any money either. And you end up working for the chemical companies. That was my opinion anyway. Because you have such big chemical and fertiliser bills. The longer you stayed in it the more chemicals you seemed to have to put on to control weeds. Cos you seemed to get so many, you're getting different weeds sometimes. You put on a different spray and then you get another different weed next time. And it just seemed to be you're just setting the soil up for another kind of weed to come in. And you'd wonder where they would come from. But they just seem to pop up when you farm that way. It's all part of it. They keep coming up with new chemicals all the time to control them but I think that is why there are so many sick people. The food they are eating is sick to start with. Over processed.

That is basically why, working for the chemical companies and the soil. We were having trace mineral problems and the corn ended up funny colours. And I know I was trying to tell one of the field men that came out, I think it was from Ridgetown, that there was something that we were doing wrong. And we finally figured out we were putting on too much fertiliser. We were throwing everything out of balance trying to get high yields. We were following soil tests. And it works great at first and it really gets you kind of stuck in the system. So you get high yields but it does not pay over the years though. Better to be working for yourself. You're not going to make a lot of money but you might as well do it.

Work with nature, instead of against it. I know we had a spray I once put on. Cetane, we had to spray it and work it in and X was on the tractor and I was spraying it on and she was working it in with the tractor behind me and we both got sick from it. And just from the smell of it. And that was the only time we ever used it. That was one of the later years. We were having weed problems and they said to put that on and we'd control it. But it was terrible smelling stuff. But there were a lot of chemicals that were sort of real strong
and a lot of people get poisoned from them it seems. Hear it every once in a while. Something toxic. Or they get cancer or something.

Two separate observations of his existing production system seemed to convince Farmer B of the need for change. First, soil degradation and consequent crop problems were evident with the existing production system and Farmer B gradually came to attribute these problems to the use of chemicals. At the same time, Farmer B found that they were not making much money after purchasing all of the chemicals and wondered whether they would not be better off to quit using chemicals. These two observations on the farm led to the conversion process.

These two cases are illustrative of the factors contributing to the decision-making of ecological farmers prior to 1985. Other farmers who had converted during this time provided similar reasons and similar accounts of their decision-making. Personal experiences relating to health, concerns for the environment stemming from observation of their own properties and recognition of increasing amounts of money being paid to chemical companies for inputs were the main reasons for change. In each case, personal health or evidence of environmental problems on individual properties prompted the farmers to reconsider their production system. These triggers combined with observation of increasing input costs to lead farmers to switch to alternative production systems.

Another feature of these cases, and the other farmers who converted during this time period, was the lack of information farmers possessed when deciding to convert. They lacked information on production practices and were not aware of other farmers who were farming the same way but were sufficiently disgruntled with conventional production systems to make the change. Although Farmer A does mention involvement in the Natural Farmers group, he did not gain much knowledge from the group in terms of production practices. The group played a support role. However, one of the latter conversions, a farmer who converted in 1983, suggested that this information void had been partially overcome with the formation of Ecological Farmers of Ontario Association. He even stated that the presence of this group, and the example that they provided that ecological farming was possible, had been impetuses
for change on his farm. However, in general this group of farmers converted to ecological agriculture with little knowledge of what that system of production entailed and the impact it would have on their enterprise.

Most of the conversions during this period occurred before specialisation and enlargement had really taken a hold on agriculture. Thus, the structure of the farm enterprise prior to conversion did not act as a barrier to change. However, Farmer B does mention that he grew continuous corn before converting to ecological production, which could have been viewed as a constraint. However, he had only recently decided to grow continuous corn and was also familiar with crop rotations that he had used only a few years earlier. Thus, he was easily able to make the production adjustment. These farms suggest that, at that point, farm structure was not a barrier to conversion to ecological agriculture.

6 2 3 2 1985-1990

The processes of change leading to the use of ecological production systems between 1985 and 1990 are also examined using a series of case studies. High adoption rates during this time make this a particularly important era to examine and suggest that some other forces may be operating. Three case studies are used to provide typical examples of the conversion process. Although other cases may vary slightly in their combinations of reasons, these cases accurately show the typical reasons that ecological farmers gave for converting their operations.

Farmer A

Farmer A grew up on a mixed farm. When he returned home from College in 1980 his father was growing monoculture corn. He joined him in that system of production and the system was intensified for four to six years. At the same time, they were constantly increasing their
acreages, through renting or, if possible, purchasing. During that time soil erosion because a problem on the farm so reduction in tillage was initiated. The farmers made the switch from moldboard plowing to mulch conservation tillage and noted that the next logical step would have been the conversion to no-till. Instead the farmer decided to switch to ecological agriculture. He provided the following reasons for this decision:

I guess in the early 1980s I had a spiritual renewal and one that connected my stewardship responsibility with my faith. So that made it imperative to me to start taking steps to be a good steward of the land. So then when I started conserving the topsoil I guess that opened my awareness to the possibility of an organic system. When you start talking about the benefits to the soil I made the connection very easily then that prevention of erosion is what we should be doing, not band aid solutions. Yet my Dad’s way to stop erosion was to bulldoze the gully shut. And the next year after it washed out he’d bulldoze it shut again. That was his solution. Just so long as he didn’t break the tractor axle. There had to be a better way because eventually you are going to run out of topsoil. There will be nothing to fill the gully anymore.

At the same time as the farmer was experiencing environmental problems, he was under pressure from the bank. The farmer described trying to “beat the banker off his back” month by month and yet wanting to think in the long-term for the sake of his family. He described the great financial stress which ultimately triggered the conversion process:

So I guess when I think about the hell that we were living through with the banker. At times they were harassing us, harassing the family and just the pressure on your frame of mind, on your peace of mind. Probably it was the spirituality that led me to think there had to be a better way. You know there had to be a better way to do this, a better way to live, a better way to treat people, a better way to treat the soil and we got to find a way to do that. And that’s what maybe opened me up to looking for something. What can I do?

Financial stress had become so great that the farmer decided that he had nothing to lose in the switch to ecological agriculture. In the end, he believes that is what saved the farm from bankruptcy and enabled the family to continue on the land. Yet prior to the conversion
process this farm was structured toward conventional agriculture with continuous cropping and large acreages

Farmer B

Both husband and wife on Farm B grew up on mixed farms. After some time in other occupations they decided to take over the wife’s family farm in 1979 and started to grow berries and fruit conventionally. Although ecologically inclined from the outset, they continued to grow conventionally for ten years, enjoying the security that prophylactic spraying gave them. They had a home garden that was grown ecologically for personal health reasons, but felt that the public were not willing to pay premium prices for clean food and, therefore, growing fruit ecologically was not something they could afford to do. This conclusion was reached after their first year farming when they had tried to grow berries ecologically while both were working off the farm. They found this did not work as they had weeds up to their waists so they started using herbicides. Over the ten-year period before their switch to ecological agriculture they moved toward a blend of practices using compost and green manure crops and limited sprays but needed a couple of final pushes to quit spraying altogether. Farmer B outlined their decision to farm ecologically as follows:

In 1989 with the Alar scare the public concern and awareness seemed to pick up. It seemed like there was a willingness there and a market in organic fruits. Because we already leaned in that direction we decided to take the plunge and I think part of it was a challenge as well and I think a lot of farmers once they have accomplished a certain level of production they like a challenge. Just to keep life interesting.

So we did commit at that point and have done, obviously we are not growing peaches anymore. It’s taken its toll. It hasn’t been easy. But I’d say our commitment is such that I can’t see us going back. It’s sort of once you dive on you’re committed to it. It’s inconceivable to me at this point to start using chemicals again.

The other thing is X’s parents both died of cancer. And he’d spent a lot of time working at X’s spraying orchards and just from a personal point of view...
the farmer uses these concentrated doses of chemicals when they're applying the stuff. I mean it's potentially very dangerous. I think for the farmer who applies these pesticides despite the fact or in addition to eating fruits and vegetables. And then too the environmental concern. Just overall if you are concerned about your water and just pollution in general.

For farm family B, environmental concerns had always been there, but it took the Alar scare, increasing public demand for “clean” food, and the death of two farm parents from cancer to make the change. In this case it would seem that the decision to farm ecologically was triggered by the growth of the market, although the possibility had always been under consideration.

One other feature of this case study is interesting and that is the change to the original enterprise engendered by the decision to farm ecologically. These farmers found it impossible to produce peaches economically once they had made the decision to farm ecologically. This could be identified as a structural constraint to adoption as this indicates that some level of flexibility in farm enterprises is required if the farmer is committed to the transition. The enterprise mix that the farmers had previously needed to change in order to accommodate ecological production.

Farmer C

Farmer C grew up on a dairy farm and his wife on a nearby mixed farm. He took over the family farm in 1979 and farmed conventionally for nine years. During this time, the farmer grew around 100 acres of corn for the market and other forage crops for dairy cows which were fed at high performance levels. The farmer described a pressure-intensive system of production. Pressure to get the manure out, pressure to work the fields, pressure to spray at the right time, pressure from the spouse to spend more time at home and pressure from the banks to pay bills. He also acknowledged that the proposed changes to the dairy industry were also taking their toll with constant indecision about whether to buy more quota.
In 1988 they decided to quit spraying altogether and started producing ecologically. At the same time, they decided to sell their dairy quota and switch to dairy goats. This decision was not forced on the farmers by the decision to produce ecologically but rather they changed their livestock to accommodate some lifestyle goals. They wanted to reduce the pressure that they felt had been building in their system of production. At the same time, the crops grown changed to those sold on ecological markets. When asked about why he had decided to convert to ecological agriculture, the farmer replied:

It centred around the absurdity of buying chemicals, spraying them on your property and not being able to get rid of the spray containers after they had been triple rinsed. The dumps would not take them clean. Basically 99% clean containers and the paradox of something is supposed to be safe spread all over your land but dumps would not even take the empty containers didn’t make very much sense.

I think health had something to do with it too because we knew enough people that were getting cancer. I don’t know if we tied it in that soon though. My mum had it that year. She died in 1988. We talked about it definitely.

It sort of mushroomed after you started. You could see a lot of reasons once you got rolling. Financial. And pressure. You cut the workload as far as pressure of getting the spray on when you have to. The fertiliser arriving when you want it. When we went on our honeymoon, we had to hurry back so he could spray the corn. Those are things that happened after you started into it. The pressure of getting the crops in. Basically now all you have to do is cultivate it and seed it and you can have the seed sitting there. If you save your own seed it’s there from the crop before. You were trying to get fertiliser to land in at the right time and you’re competing with all the other farmers to get it there. Your neighbours all want it there at the same time too so the distributors can keep the crop, under pressure to spray it at exactly the right time and on and on. So those were factors that came along after. It didn’t take quite a lot of pressure off. And farm safety comes into it too.

Health concerns with agricultural chemical use were the primary reasons why the farmer chose to switch to ecological production but it was also part of a broader farm family decision with respect to lifestyle. The farm family felt that this current system of production was
placing them under too much pressure and decided that they wanted to break that chain. Ecological agriculture was seen as a means of accomplishing this. These farmers were not financially stressed in the same way as Farmer A but showed indications that they felt there must be a better alternative to their conventional production system. Having done so they also altered their product considerably although this was not forced upon them. Thus, attitudinal forces drove decision-making in this case. The structural constraints that their old enterprise base created were subsumed by the desire for change. Thus, this farmer changed from the capital intensive, pressurised system to ecological farming on the basis of a lifestyle decision.

Again these case studies are representative of the factors contributing to decision-making which lead to conversion to ecological agriculture during this time period. Although other farmers may have expressed their decision-making somewhat differently, the common themes that emerge are the same. It is interesting to note that the deeply personal experiences evident in the earlier conversion decisions are not as apparent in this group of cases. They still exist, but other forces seem to be operating.

The case studies indicate that two structural realities sparked the high levels of conversion in the late 1980s. First, the cost-price squeeze prompted more farmers to question their increasing expenditures on farm inputs when their returns were declining. This was a period of extremely depressed prices and the peak time period for bankruptcies. Some questioned high input costs before they were in extreme financial difficulty, like Farmer C, and decided to quit buying chemicals. Others, like Farmer A, were pushed to the brink of financial insecurity, and the conversion to ecological agriculture was a last attempt to save the farm. This sense of desperation was sufficient to convince large scale, capital intensive operators of the need for change.

Second, the Alar scare of 1989 led to consumer questioning of chemically supported agricultural production and to a willingness from many to pay a higher price for chemical free food. The premium prices thus afforded to ecological products prompted some farmers who
were already inclined toward ecological production to convert. They had previously been unconvinced of the economic viability of ecological production, primarily due to lack of consumer demand. These two changes in operating environment for farmers as a whole provided the large scale impetus for change in the late 1980s.

These structural realities were accompanied by increasing evidence encountered on individual farms that environmental degradation was occurring and thus, through personal experience, farmers believed that a change was necessary. Personal health reasons also played a role, as evident in the third case study. However, these personal observations and subsequent adjustments were not as apparent as the sole driving forces as they were for the previous group of farmers. There was a new sense of urgency to decision-making, almost to the point of desperation in many farmers rather than calm observation.

Another point of interest was that none of these farmers explicitly referred to problems in obtaining information. Several mentioned that the EFAO and the farm tours and courses that it offered were useful when they were considering the decision to convert. One farmer also said that he had converted because a close friend had been farming ecologically for some time and he had been convinced through his experience that it was a good idea. If information was available, as these farmers' accounts would suggest, this reflects the success of the EFAO in disseminating information to those farmers interested in the conversion process. Given the lack of institutional support for ecological practices, the EFAO thus, provides an important function.

In terms of farm structure, both Farmer A and Farmer C provide examples of highly capitalised, large, specialised farms that have converted to ecological production. These two farms would suggest that perceived enterprise structural constraints are overcome where attitudinal change is strong. Both of these cases also mention that they, and their operation, were under extreme pressure when they made the decision to convert to ecological.
production This may indicate that the experience necessary to change attitudes is very dramatic, but does show that structural constraints may be overcome

6 2 3 3 Since 1990

Only one ecological farmer interviewed had converted after 1990. This could be partially a reflection of the way in which the names of farmers to be included in the sample were compiled. However, other evidence of a decline in ecological farming numbers since 1990 can be cited. The EFAO keeps records of their membership numbers and they found that after a peak membership in 1989, numbers have declined (Beard, pers comm 1993). Thus, this farmer may hold some clues as to whether some of the structural realities that appeared to drive change in the late 1980s are still apparent, or whether the lower adoption levels indicate a decline in interest in ecological farming by the conventional farm population.

The farmer who converted since 1990 grew up on a dairy farm and purchased part of that farm in 1983. At this point he and his wife made the decision to continue with dairying, although this required that they build a milking shed and invest in quota as the family’s farm was being continued by a brother. They found starting with nothing very difficult financially and very time consuming and in 1986 became very discouraged with the dairy operation. They decided to sell the quota and started to grow strawberries, conventionally, on a small scale. They found that they really enjoyed growing strawberries and in 1987 decided to intensify this part of their operation, becoming full-scale berry growers.

Then in 1994 a combination of factors lead to the decision to experiment with ecological production. These reasons were provided by the farmer:

Part of the reason we got into organic was because our son died of liver damage and the doctors could not explain why he got sick and one of the possibilities was farm chemicals. They didn’t have hardly any answers for us and that was kind of the thing on the list of possibilities. And so since then,
which was three years ago, you just don’t forget about it. It’s kind of there all the time. And X has allergies so it had made us probably more conscious of the environment. We are more conscious than probably a typical farmer for those reasons. His allergies are worse as he is getting older. Anyway we were very conscious of the environment from that perspective.

The other thing is we’ve been around enough of the key strawberry growers long enough that we have a really good idea of how much chemical they are using. And I think as time goes on you really start to wonder why. For example, a lot of the best growers in Ontario have their checklist of chemicals that they use, just to guarantee that they don’t have crop failure. So even if you don’t have fruit bud rot that year and even if you don’t have an infestation of cinch bug or whatever they still use a certain percentage of chemical just to protect themselves. And that’s kind of where we have gone conventionally and I guess in time you just start asking yourself why. Some years yes you wish you had sprayed for something because you have crop failure there, but do you spray every year when you might only have that problem once every ten years? We do go to a couple of conferences a year and are on the Berry Growers Association so we’ve been around enough that we do have a good idea and we know what OMAF recommends. And we just feel that it’s kind of extreme and the other thing once you started using chemicals you always have to use chemicals to correct more problems. And you have to use a greater dose the next time to solve the problems.

And last fall X had an opportunity to go to the States and learn about composting. That was something else that was a concern for us. We’d been using chemical fertilisers and our land was starting to show it. We were losing fertility and our soil is clay to begin with and so we’d been talking about trying to buy manure and replenish the soil a little bit. So anyway X had an opportunity to go and learn about composting so he took a course on composting. And I guess that’s really the thing that got the ball rolling in terms of organic. So after taking the course you want to come home and try it. So that’s really this past year is the first year we really called ourselves organic farmers. We had been reducing chemicals since our son died but last year we went chemical free.

The cost price squeeze and consumer demand appear to play a smaller role in this farmer’s decision to convert to ecological production. Rather there is evidence of the personal reasons found in the earlier conversions. The death of their son lead them to question intensive chemical use. Initially, however, they were not convinced that it was possible to produce without fertilisers and sprays, and needed the composting course to convince them that this
were possible. If this case is representative of recent conversions, then it would indicate that the broad structural causes of high adoption have waned and reasons are more similar to those of sporadic adoption rates prior to 1985.

6.3 The decision to farm conventionally: paths and reasons

Conventional farmers were relatively uniform in their entry to conventional agriculture. The majority were from farm backgrounds and had conventional farm experience. Only two conventional farmers had experimented with ecological agriculture and had since returned to conventional production. Three others said that they had been reducing chemicals and observing farmers who practiced ecologically, but they had no intention of eliminating chemicals altogether. All others did not consider ecological production systems as an option in their decision-making frameworks. Thus, these farmers provide a relatively homogenous group from which to examine decision-making.

Conventional farmers in the sample have, however, evolved to slightly different production systems within the conventional spectrum, with some using no-till and others persisting with conventional tillage. The adopters of no-till provide a useful comparison with ecological farmers because they too have undergone a conversion process. The nature of the no-till conversion process can be examined for similarities and differences with the ecological conversion process. At the same time, it is useful to examine the conventional farmers who have not altered their production practices significantly to determine their reasons for continuing with their traditional system.

The reasons given for the decisions of those farmers who farmed conventionally, and had made no major changes to their production system, were similar. Many stated plainly that it was the system that they knew best and it had worked in the past so they saw no reason to change. Their present system was simple and they did not want to complicate it. Decisions were based on economic and productivity criteria. That is, the methods that they used were
proven in their productivity and efficiency and change would only occur if alternative methods were proven on this basis. They needed to see results before they would experiment with alternatives.

Some conventional farmers also mentioned the inflexibility of their present system as a barrier to change. High levels of capital invested in certain production systems meant that some farmers were loath to change and lose that investment. Thus, both attitudes with respect to what was important on the farm (productivity and economics) and structural constraints reinforced the conventional system of production. Two quotations from farmers asked about their choice of production practices provide useful illustrations of the reasons for continuing with conventional methods.

It's probably the system that we know best and it has worked for us. And we have that line of equipment. And it just seemed to work best for us to be in with the rotation when we come out of sod so much we seem to have to moldboard plow it. And I think our conventional tillage is still outyielding our no-till practices. But they have a lot less input costs. Because I could hire a no-till guy in for so much an acre and probably if I paid myself for moldboarding and cultivating that ground and you just add, I'd have to cross it three or four times and he'd just have to go across the ground once.

As far as the crops go the methods seem to be working so when they are working why change them. And I think the other thing, why we've stayed with it is because we are not heavy in machinery. We don't have a lot of equipment. We have an 80 hp tractor but most of our work is done by a 60 hp tractor so we don't have a big concern for soil compaction and stuff like that. I guess in that end we've stayed so small that we haven't created a problem. As far as the dairy production part of it I guess you sort of go with the practices that are supposed to be better and you see results. We're more oriented into the cattle end of it than we are into the crops. I guess if you see results you keep doing it in the dairy farming. 'Cos it costs a lot of money to keep a cow so the cow might as well be producing 50 lbs of milk than 30 lbs of milk.

Both of these farmers had taken over family dairy farms and had continued with the methods that had always been practiced. These systems seemed to be working so they were loath to
change and risk something that might not work as well. Significantly, if considering any alternative, these farmers were considering no-till.

As mentioned earlier, several conventional farmers were attempting to reduce chemicals on the farm for economic reasons, but even so did not view ecological agriculture as a viable alternative. Yield decreases, and inability to control weeds were the key barriers to the conversion to fully ecological practices. Thus, although they recognised savings in terms of inputs, these farmers were not prepared to accept the accompanying yield losses. This could also be interpreted as a lack of willingness to use other weed control methods which may not have meshed with the overall farm character. One farmer who had attempted to eliminate chemicals altogether provided the following reason for his return to the use of chemicals:

"Last year I tried to go a little bit more environmentally friendly, green, whatever you want to call it, but it did not work out. Like not spray as much or not spray period but I lost too much yields so I have to go back to the more scientific way of farming, of spraying weeds and things like that. It’s not that I want to do it, it’s just that I’m forced to do it. Forced in the sense that to get the yields I have to do it."

Ecological farmers would argue that one year is not sufficient time for soil balances to be restored and, therefore, is not a fair trial. However, conventional farmers feel they are forced to return to spraying if their experiment in reduced chemical use leads to a decline in yields. One year of yield losses is considered too great in their planning framework.

Other conventional farmers had adjusted their production practices, the most notable recent adjustment being the adoption of no-till. Of the twelve farmers who had converted to no-till, half did so between 1985 and 1990 and the other half had done so since 1990. This indicates the novelty of no-till systems in Southwestern Ontario, but the reasonably high numbers since 1990 might also suggest that it has replaced ecological agriculture as an option for consideration. However, it may be that those farmers who consider no-till would not be the
same farmers who consider ecological farming. A couple of case studies of farms will provide an indication of the types of enterprise adopting no-till and the reasons for the adoption.

Farmer A purchased the family mixed farm in 1960. After some time he converted to a beef cattle operation and then in 1988 Farmer A sold the beef cattle and started to grow cash crops only. That same year he started to experiment with no-till, keeping records of production to assess whether it was the right thing to do economically. When asked why he had converted to no-till, the farmer replied:

There’s a couple of reasons, but first I guess I am the type that’s not afraid to try something new. And my wife was on the committee set up by SWEEP. It was called TAP which is Technical somethingTechnical Assessment Program. So she went to a few meetings and of course she’d bring home what she heard and at these meetings there were government people as well and we just felt like the writing was on the wall. Maybe we will have to go to more environmentally friendly ways of doing things. And then we wanted to anyway. So I guess that’s the reason. And my back was acting up and it looked like it was easier physically.

For the first two or three years of no-till I guess I did it myself pretty well. You’re able to cover a lot of acres, one person. That was before the children were involved. And the other decision was the children, we approached them all and said are you interested in farming and one thing and another. And they all said they wanted the land but not the cattle. So we said to ourselves why are we doing this because the books did not show we made a lot of money on cattle so we, it took us six years to back down on the cattle business feedlot. With the help of the accountant because you don’t just go cold turkey. Well we had built up a fair bit of inventory over the years which we hadn’t paid tax on. You can’t just sell it all in one year. And then we got down to the last year and my wife was working so we decided that was the year we were going to pay the income tax and go out. We totally got finished with that. It turned out it was the right move.

We had a lot of rolling land that you really couldn’t work conventionally for very long, or shouldn’t. And we realised that. That when we planted all those acres of hay. Cos with no-till we can crop all our acreage. So everything kind of meshed, coming out of cattle and going into no-till. It just seemed to work—one progression into another.
We didn't go into no-till all at once. We kept real close records of whether it was the right thing economically. And it was so we just kept going. But it was about two years with very little cattle here that we were kind of working in the no-till. It's all kind of rolled one into the other. And we've listened to our books and a lot of farmers don't do that or at least over the years haven't done good books. And didn't listen to what they were telling them when they did get into the book-keeping end of things. It's hard to do you know, if you are used to doing something you like doing it and the records say it's not the thing to do and you have to argue with yourself. You can't exactly go by that altogether because farming is such a long-term thing. You can't make a decision on two or three years of something that might be looking really good.

This farmer decided to convert to no-till because with the switch to cash cropping they were aware that they would have an erosion problem if they cropped all of their acres. Their involvement in farm groups meant that they knew a great deal about no-till prior to the conversion decision and were aware that economically it was a good option. They also felt that regulation was likely to occur and would rather change before being forced to change.

Farmer B purchased 200 acres of the family farm in 1981. He now farms 150 acres. The enterprise is largely cash crop, but he also produces turkeys (raised on purchased feed) and some breeding cattle. Farmer B switched to no-till in 1987 and gave the following reasons for the conversion:

Lazy: No basically it was time and machinery. Because my machinery didn’t. was never first rate. Ah wheat, when I first started wheat was the big thing to do. It worked like crazy. In 1987, I think it was spring of 1987 we tried some beans and what a disaster. Now it seems like wheat and beans are fairly, not simple but they work pretty good. The corn is the tougher one. But it was basically to kind of, cos we farm some land that really blows and washes bad and we were starting to see this ground work a little better. In this part of the township it would be nice to be about three or four different farms at once. Because you worked the one and this one works good but by the time you get to the second or third one it's better. You still can't get on it any earlier, you know what I am saying. You still have to have the right timing but it doesn't seem to be as critical as when you're going in there with a harrow and a disk and ripping her up.
So its time-wise and timeliness and planning on my own farm I mean I work for a guy thats got 500-600 acres of sand ground You could do that just for ease But it’s to let the pressure off Because the yields I’m getting here are pretty well standard, what I’d get regardless Do you know what I’m saying? There’s no sense in me putting on, cos I’ll still only get this much So we’ve kind of gone backwards in the amount of time we’ve worked it and our yields haven’t fallen that much They’re not that greatest yields compared to some other peoples but we were not going to get them anyhow Like I had, one field I had pretty near 50 bushels of beans but that was an exception We just enjoy it

I only have to run the planter up and down the field Like I don’t own a disk or a cultivator I only own a corn planter and a bean drill So it gives me more time to work on the livestock, mostly the turkeys because the returns are better there And that’s where we have to really, you know we don’t want any of the things to suffer If I had to go out there and work that field three times I’d never get nothing done in the barn either and I’d have to rely on more hired help So it’s so we can do it more by ourselves As I said I don’t get along with a whole lot of people I do but you hire people you run it like its my machinery not yours They’re pretty rough

Farmer B’s wife added.

Well also when we started around here there seems to be a lot of, to think about buying a cultivator and a planter you know and no-till when he was so active in Soil and Crop it was easy for him to see he wanted to work on conservation of the land probably as number one, more than anything And it seemed easier for us to go no-till at the time and spend the money on a planter and a drill and forget about the cultivator

While soil conservation is one of the factors driving the decision to convert to no-till, it is certainly not the only decision-making variable, and indeed often not the major variable in farmers’ decision-making. It may have prompted the farmers to consider alternatives but, in reality, it was reduced equipment investment, decreased time and decreased labour that really sold conventional farmers on no-till systems. These savings added up to an economic advantage in using no-till especially as yields were maintained. For some, the government financial incentives were also a factor, but many said that these would not have been enough had the other economic and organisational benefits not been clear. Thus, conventional farmers adopted no-till primarily for economic reasons
Another feature of decision-making with respect to no-till is immediately apparent. Those making the decision to convert did so in an information rich environment. Farmers were aware of the range of advantages to the use of the system as well as some of the likely disadvantages. They were also able to attend courses and were provided with a great deal of information about the techniques themselves. It was certainly the method of choice for those involved in the Soil and Crop Association, which is a farmer association with links to OMAFRA which is concerned about soil conservation issues, and stands as an indication that no-till was what they were encouraging.

Almost exclusively those who had adopted no-till were large, capital intensive, cash crop operations. These farmers made the transition to no-till in coincidence with a machinery purchasing decision. They also did so knowing that their continually cropped land could be open to erosion problems if they did not adjust their production practices. They, therefore, needed a soil-conserving strategy and with their types of operation no-till was the best option.

6.4 A comparison of decision-making considerations

Consideration of the decision-making of ecological and conventional farmers reveal a number of differences. These differences contribute significantly to the small adoption rates of ecological agriculture in Southwestern Ontario. Some of them relate to differences in criteria used for decision-making and some of them relate to differences in support for a particular decision. These are considered in some detail.

Differing levels of support for decisions were found between conventional and ecological farmers. Ecological farmers, particularly those that converted prior to 1985, reported that they made the decision without a great deal of information about what lay ahead of them. They had decided that they wanted to change and had to do so with little institutional support. The growth of the EFAO seems to have overcome some of the lack of information, but the resources of the group are limited when compared to those of other government institutions.
In contrast, those farmers who converted to no-till from conventional tillage did so in an information rich context. Government programs were encouraging the use of no-till and this was reflected in farmer's high level of prior understanding of what the system would entail and the potential benefits of the system. This is an important distinction as ecological farmers tended to reason that they had found themselves in a situation where ecological farming was the only way out. In contrast, conventional farmers were relatively happy with their current system but reasoned that no-till would improve yields or long-term productivity.

The criteria used in decision-making also differed. Conventional farmers often reinforced the status quo saying that they farmed the way they did because that is what they knew and if it worked, why would they change? Those who had converted to no-till did so because of the benefits that they saw in terms of soil conservation, time savings, labour savings and the monetary benefits from government funding for conversion. In contrast, ecological farmers converted because they observed problems with the conventional system of production either in terms of soil degradation or poor health. Some also increasingly questioned the high cost of chemicals. Questioning of conventional production systems held the key and was often triggered by some dramatic event. Thus, much of the change to ecological systems could be associated with personal experiences.

The high rates of conversion in the late 1980s pointed to some structural regularities in the operating environments of farmers that encouraged the use of ecological systems. Consumer awareness and the cost price squeeze. Once consumer awareness is activated, it is a constant feature of the operating environment, so conversions of those who believed ecologically and were just waiting for the market will have already occurred. Thus, it would seem that for another large scale conversion to occur there would need to be another significant increase in input costs relative to farm gate prices. This would lead some farmers to question the high levels of spending on inputs and a possible opening of minds to ecological agriculture.
Finally differences in the structure of those converting to ecological and those adopting no-till practices were identified. Several of the ecological farmers had converted relatively large scale, capitalised and specialised operations to accommodate their ecological beliefs, but the majority were smaller, mixed operations. Those who had converted to no-till were exclusively large, capitalised, cash crop operations. This would indicate that those operations which have increased in scale and become more specialised and capital intensive are most likely to convert to no-till rather than ecological production practices. This does not mean that the conversion to ecological agriculture cannot be made, as several of the ecological farmers testify, but rather that it does not appear to be the adjustment of choice for these enterprises.

6.5 Perceived advantages and disadvantages of chosen production systems

Specification of the perceived advantages and disadvantages of different production systems contribute to an understanding of why farmers make certain decisions. Farmers’ decisions are reinforced by the advantages that they perceive are present in their current practices, while perceived disadvantages may lead to questioning of the current system. For a farmer to choose a particular system, they must perceive the advantages to outweigh the disadvantages. In this section, the perceived advantages and disadvantages of ecological and conventional production systems are considered. Conventional farmers are further subdivided into those who use no-till and those who do not. Analysis of perceived advantages and disadvantages will provide insights as to which criteria are important in different production system choices.

The comparison of perceived advantages of farmer’s chosen production systems indicates that certain perceived advantages are common to ecological and conventional practitioners while others are viewed as an advantage by one set of farmers only (Table 6.1). All farmers thought that their production system was the most profitable and that their production system had less risk of crop failure associated with it. This implies that profitability is a key criteria in all farmers’ decision-making, but it also raises an interesting contradiction which could be interpreted in two ways. One interpretation might be that some farmers mistakenly believe
that their system is more profitable than alternatives. The second interpretation is that profitability depends on the nature of the enterprise and for certain enterprises, ecological agriculture is more profitable, while for others conventional production systems are. This would suggest that certain structural conditions are important in farmer decision-making, as found in Chapter 4.

Most other perceived advantages were particular to either ecological or conventional systems of production, but not both. Many environmental advantages were perceived by ecological farmers while no-till farmers believed that their practices conserved the soil, and conventional farmers felt that they had healthy soil, but no other environmental advantages were identified by either conventional group. This is either a reflection of lack of concern for environmental issues or acknowledgement that their system of production is not as environmentally sensitive as the ecological model. Similarly ecological farmers mentioned a number of social advantages such as intergenerational continuity, more people farming, and self-sufficiency which were not mentioned by conventional farmers. In contrast conventional farmers cited several economic factors, such as efficiency, high yields and high productivity as the advantages of their production system. They also liked their methods because they were simple, proven and provided good weed control. No-till operators added time and labour savings to those mentioned by other conventional operators. These differing perceived advantages would suggest different criteria for decision-making for ecological and conventional farmers.
<table>
<thead>
<tr>
<th>ADVANTAGE</th>
<th>ECOLOGICAL</th>
<th>CONVENTIONAL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>till</td>
<td>No-till</td>
<td></td>
</tr>
<tr>
<td>Environmental preservation</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy soil</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Healthy people</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy livestock</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nice landscape form</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conserves soil</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No pollution</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality food</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low fuel costs</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sense of satisfaction</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empowerment</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less pressure/stress</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Many people farming</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection to consumer</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self sufficient</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intergenerational continuity</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm safety-no chemicals</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proven</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Simple</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>More profitable</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Less risk/crop failure</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Efficient</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Equipment available</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Table 6.1 Perceived advantages of farmers’ chosen production systems (continued)

<table>
<thead>
<tr>
<th>ADVANTAGE</th>
<th>ECOLOGICAL</th>
<th>CONVENTIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Till</td>
<td>No-till</td>
</tr>
<tr>
<td>Good yields/ high production</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Less time intensive</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Less labour intensive</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Good weed control</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Market niche</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In order to determine whether the differences in advantages are due to known sacrifices on the part of farmers or due to not even considering certain criteria in decision-making the perceived disadvantages of the production systems were also examined. If some of the perceived advantages of ecological agriculture are matched by disadvantages in conventional agriculture and vice versa, this would be an indication that farmers are aware of the disadvantages but advantages are considered to outweigh those disadvantages. Conversely, if advantages of one system are not reflected in disadvantages of another then that is unlikely to be a criteria in decision-making for that other group.

The perceived disadvantages of the different production systems are summarised in Table 6.2. Few of the perceived advantages were reciprocated in the perceived disadvantages. In other words, few of the advantages that ecological farmers had identified appeared as disadvantages identified by conventional farmers. Similarly few of the advantages perceived by conventional farmers appeared as disadvantages for ecological farmers. This would suggest that ecological and conventional farmers make decisions based on different criteria.
Table 6.2 Perceived disadvantages of chosen production systems

<table>
<thead>
<tr>
<th>Disadvantages</th>
<th>ECOLOGICAL</th>
<th>CONVENTIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Till</td>
<td>No-till</td>
</tr>
<tr>
<td>Smaller yields</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Harder work</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>More work</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>No quick solutions</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Weeds don't look good</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Don't have the facts</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Less status in the community</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>No institutional support or information</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Inability to expand</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Bank policies</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Tension with other farmers</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Expensive labour</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Marketing more time consuming</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Paperwork increase</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>High capital cost</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Chemical use</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Consumer skepticism</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Manure incorporation</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>More energy</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Field does not look nice</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

There were several cases however where perceived advantages of conventional systems did coincide with perceived disadvantages of ecological agriculture. The main one was in the extent of labour required. While conventional farmers, particularly no-till operators saw less labour and time as advantages of their production system, ecological farmers saw these as
disadvantages of their production system. This would suggest that increased labour and time are potential barriers to conversion by conventional farmers, who are changing practices to eliminate the need for labour and cutting down on time investment. They are, therefore, unlikely to adopt practices for which the reverse is true, such as ecological agriculture.

Second, ecological farmers recognise that decreased yields, particularly during the transition, are a feature of their system of production. In contrast, conventional farmers view high yields as an advantage of their production system. Interestingly, no-till farmers also mentioned declining yields on some crops in the early stages of conversion as a disadvantage. This would appear to contradict the earlier finding that high yields were an advantage of no-till production. However, decreasing yields were viewed as a temporary phenomena in the early stages of change to no-till, and therefore did not supercede the advantages.

Two points can be concluded from analysis of perceived advantages and disadvantages of different production systems. First, ecological and conventional farmers appear to make decisions based on different criteria. While ecological farmers perceived their production systems to be advantageous primarily for environmental reasons but also social and some economic reasons, conventional and no-till farmers perceived their practices to be advantageous almost solely on economic grounds. No-till farmers also recognised the soil conserving potential of their practices, but it was other criteria such as decreased labour and time investment that were perceived as the real advantages and which prompted farmers to continue with their system of production.

Second, there are several disadvantages of ecological agriculture which conventional farmers identified as advantages of their production practices and these likely act as barriers to change. Central amongst these were time and labour intensity. No-till operators in particular believed that the time savings and labour savings of their production system were important advantages. In contrast, ecological agriculturalists recognised that increased labour and time was required with their production practices but they were willing to accept these for the
other advantages. Ecological farmers, with typically smaller operations, may also have been able to better accommodate such disadvantages, but the no-till operators recognised the importance of time and labour savings to their large scale enterprises. Thus, the perceptions may be linked to structure.

6. Attitudes toward agricultural production

The attitudes of ecological and conventional farmers were compared using the scale developed by Beus and Dunlap (1990). In this part of the interview process farmers were asked to complete a questionnaire (Appendix 4) which contained a variety of questions relating to the agri-food system. Farmers were asked to circle a number on the scale that best represented their attitude towards that particular issue. To analyse this quantitative data an average of the individual responses was calculated for both conventional and ecological farmers. The survey instrument and analytical technique had been proven to be successful elsewhere (Beus and Dunlap 1995, Allen and Bernhardt 1995) and so it was felt that this was an appropriate quantitative addition to the research process. Qualitative data on farmers' main concerns was also collected and the issues raised closely reflected these more defined attitudes and, therefore, the scale was used in the thesis.

In agreement with Allen and Bernhardt (1995) ecological and conventional farmers could be differentiated on the basis of attitudes according to the scale, but there were several attitudes which were common to both groups (Table 6.3). Attitudes which were opposing were likely to contribute to continued divergence in terms of practices, while those that are similar point to areas of common ground.

On nine of the twenty-four questions, ecological and conventional responses fell on opposing sides of the scale. Conventional farmers responded with scores on the conventional agriculture side of the scale (scores less than three) on a number of questions relating to centralisation versus decentralisation, domination versus harmony with nature, and
exploitation versus restraint, as well as with respect to dependence on large inputs of energy and that farming was first and foremost a business. These attitudes stand out for their clear placement of farmers into ecological and conventional groups, but are also important because the difference between attitudes is large. This is particularly noticeable in the domination versus harmony with nature section where ecological farmers were strongly against efforts to develop biotechnologies and thought that modern agriculture was a major cause of ecological problems, while conventional views were in favour of the development of biotechnologies and felt that modern farming was not a major cause of ecological problems.

Table 6.3 Mean scores of farmers responses to questions relating to attitude

<table>
<thead>
<tr>
<th>ATTITUINAL QUESTIONS</th>
<th>Conventional</th>
<th>Ecological</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENTRALISATION VS DECENTRALISATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmland ownership should not be limited even if concentration occurs</td>
<td>28</td>
<td>40</td>
</tr>
<tr>
<td>Large to very large farms can best serve agricultural needs</td>
<td>38</td>
<td>47</td>
</tr>
<tr>
<td>Most people should live in cities and leave farming to the experts</td>
<td>26</td>
<td>40</td>
</tr>
<tr>
<td>Farmers should farm as much land as they profitably can</td>
<td>29</td>
<td>44</td>
</tr>
<tr>
<td>Production, processing and marketing are best done at international and national levels</td>
<td>33</td>
<td>45</td>
</tr>
<tr>
<td>DEPENDENCE AND INDEPENDENCE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large inputs of energy should be continued if profitable</td>
<td>29</td>
<td>42</td>
</tr>
<tr>
<td>Good farming applies the findings of modern science</td>
<td>32</td>
<td>43</td>
</tr>
<tr>
<td>Farmers should purchase most of their goods and services</td>
<td>34</td>
<td>46</td>
</tr>
<tr>
<td>DOMINATION VERSUS HARMONY WITH NATURE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efforts to develop biotechnologies should be expanded</td>
<td>27</td>
<td>44</td>
</tr>
<tr>
<td>Farmers should use synthetic fertilisers and pesticides</td>
<td>32</td>
<td>49</td>
</tr>
<tr>
<td>Modern agriculture is a minor cause of ecological problems</td>
<td>19</td>
<td>44</td>
</tr>
<tr>
<td>Key to success is development of advanced technologies</td>
<td>32</td>
<td>46</td>
</tr>
</tbody>
</table>
Table 6.3 Mean scores of farmers responses to questions relating to attitude (contd)

<table>
<thead>
<tr>
<th>COMPETITION VS COMMUNITY</th>
<th>Conventional</th>
<th>Ecological</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting food needs with fewer farmers is a positive outcome of technological progress</td>
<td>3.6</td>
<td>4.7</td>
</tr>
<tr>
<td>Primary goal is to maximise productivity, efficiency and profits</td>
<td>3.2</td>
<td>4.5</td>
</tr>
<tr>
<td>Agriculture will not be affected if rural communities decline</td>
<td>3.9</td>
<td>4.8</td>
</tr>
<tr>
<td>Farm traditions/culture are of little use in modern agriculture</td>
<td>4.1</td>
<td>4.6</td>
</tr>
<tr>
<td>Farming is first and foremost a business</td>
<td>2.2</td>
<td>4.5</td>
</tr>
<tr>
<td>Technology should substitute for farm labour when possible</td>
<td>3.3</td>
<td>4.3</td>
</tr>
<tr>
<td>Key to success is development of advanced technologies</td>
<td>3.2</td>
<td>4.6</td>
</tr>
</tbody>
</table>

| SPECIALISATION VS DIVERSITY                                                              |              |            |
| Farms should be specialised in one or at most a few crops                               | 3.7          | 4.6        |
| Farms should specialise in either crops or livestock                                     | 4.0          | 4.7        |

| EXPLOITATION VS RESTRAINT                                                               |              |            |
| Land should be farmed to maximise profits                                               | 4.1          | 5.0        |
| Soil and water are factors in production                                                | 3.6          | 4.6        |
| The successful farmer earns above-average standard of living                            | 2.5          | 4.0        |
| Canadian agriculture is the most successful in the world                                 | 2.2          | 4.4        |

Note (1) Scores below 2.5 indicate most respondents agreed with the statement (which corresponds with the conventional view) whereas scores of 3.5 and above indicate most respondents disagreed with the statement. Scores between 2.5 and 3.5 could indicate that the responses are either concentrated in the undecided category (3) or there is a relatively equal distribution of responses between agreement and disagreement with the statement. Questions and rating scheme are presented in Appendix 4.

On all other questions, responses of both ecological and conventional farmers tended towards the alternative agriculture side of the scale, although many of the conventional responses were close to three, indicating some ambivalence toward the issue, while ecological farmers were firmer in their beliefs. On only four attitudes did conventional farmers scores exceed four, while all ecological farmers scores were four or higher. These attitudes on which ecological and conventional farmers were the most similar are worthy of note. The attitudinal questions
that engendered strong alternative responses from conventional farmers were agriculture will not be affected if rural communities de-line, farm traditions and culture are of little use in modern agriculture, farms should specialise in either crops or livestock and land should be farmed to maximise profits Some of these results are interesting in that they may not actually reflect behaviour For example, although conventional farmers felt that livestock and crops should be combined on an enterprise, many of them did not actually do so Thus, these responses give some common attitudinal ground to ecological and conventional operations

It would, however, appear that the most telling questions in the survey of attitudes were with respect to domination versus harmony over nature Ecological farmers scored strongly in favour of harmony with nature while conventional farmers scored either in favour of domination over nature or close to three indicating that they were relatively undecided Harmony with nature is the underpinning of ecological production systems and divergent views in this area would suggest that production practices are not likely to converge in the near future Even though other aspects of the overall food system are increasingly being viewed in common by ecological and conventional farmers, these will likely be insufficient to fundamentally change production relations at the farm For a change in production practices to occur, attitudes towards the relationship with nature would need to be similar

6.7 Conclusion

Examination of the factors contributing to decision-making processes of ecological and conventional farmers provides information as to the relative roles of structure and attitude in production system choices Attitudinal changes, triggered by various personal experiences, motivated the decision to farm ecologically Once the change in attitude had occurred, with increased emphasis on environmental concerns and farming in harmony with nature, structural characteristics of the farm enterprise did not appear to matter Ecological farmers felt strongly enough that they would adjust other aspects of their operation in order to achieve their environmental goals Even those who had been cash cropping on moderately large acreages
felt strongly enough to change their overall farm structure to accommodate ecological objectives. Similarly, new entrants to farming who used ecological production systems chose enterprises that allowed them to farm ecologically.

Attitudinal forces also shaped conventional farmers’ decision-making. With a greater emphasis on productivity, results and economics, conventional farmers did not generally view ecological agriculture as an option. Their faith in the power of biotechnologies and agricultural science allowed them to place less emphasis on natural production systems and environmental preservation. These farmers recognised structural constraints to the adoption of ecological practices such as large equipment investment and labour requirements, as well as production constraints such as inability to control weeds. Thus, from a conventional point of view, attitudes were sufficiently different to ecological farmers that various structural aspects entered into decision-making.
CHAPTER SEVEN CONCLUSIONS

In Chapter one the two major aims of this thesis were identified. The first was to explore the compatibility of ecologically sound production techniques and alternative farming systems with the existing organisational structure of agricultural production in Southwestern Ontario. As part of this aim, it was intended to assess the likelihood of a general change to ecological systems of production in Southwestern Ontario. Alongside this empirical aim was a second conceptual aim. This aim was to improve the understanding of farmer decision-making by widening the range of participants to include ecological farmers. In particular, it was intended to examine whether the structural forces, which are known to constrain conventional decision-making, also played a key role in ecological decision-making, or whether attitudinal considerations were more important.

Ecological and conventional farms in Southwestern Ontario were found to vary considerably on a number of different bases. Not only were the production practices of ecological and conventional farmers distinctive, but the enterprises also varied in their social and structural characteristics, and farmers varied in their attitudes toward different aspects of agricultural production. It is useful to reconsider some of the main differences between the two production systems, in order to explore the question of the compatibility of the two production systems.

The specific production practices used by ecological and conventional farmers in Southwestern Ontario were found to differ considerably. Ecological farmers were found to adopt a range of production practices typical of ecological operations which have been examined elsewhere (Lampkin 1990). Crop rotation was the pillar of the land management system, accompanied by a variety of other fertility management, and weed and insect control measures. These same practices were not found on conventional farms, where they had been replaced by chemicals. Further, the emergence of no-till on some of the conventional farms led to more noticeable differences in production strategies. Those who had adopted no-till had
to rely on herbicides for weed control, which is incompatible with ecological production. Similarly, there were differences in the livestock management of ecological and conventional farms, particularly with respect to beef and hogs where factory type farming was common amongst the conventional group and absent from ecological farms. Thus, the analysis of individual production practices revealed that there is little overlap in terms of production strategy on ecological and conventional farms, and if anything the two systems of production are perhaps becoming less compatible as conventional farmers convert to no-till.

There was one main exception to this incompatibility, however. Ecological and conventional dairy farmers were generally similar in their production systems. Although conventional dairy farmers were able to use chemicals and usually did, their dependence on chemicals was less than that of other conventional farmers. They also generally supplied all of the feed for their animals from the farm. The one main difference between the two was the presence of herd health programs on conventional farms, while ecological farms usually used alternative health remedies. Thus, although in general ecological and conventional farmers had distinctive, and irreconcilable production systems, for dairy farms the differences were less pronounced.

The thesis also confirmed a number of differences in the enterprise structure of ecological and conventional farms. Conventional farmers tended to farm large, capital intensive, specialised operations with family involvement often limited to one family member only. Conventional farms usually produced agricultural products only, which were sold through national and international markets. In contrast, ecological farmers tended to farm smaller, labour intensive, diversified operations with high levels of family involvement from all members of the farm family. They often produced a number of non-agricultural products, which were sold alongside their agricultural products at local markets or directly to the consumer. These findings are similar to those found in comparisons of ecological and conventional farms elsewhere (Saltiel et al. 1994, Lockeretz 1975a). However, prior to this study no systematic analysis had been conducted comparing the two production systems in Southwestern Ontario.
Thus, not only are production practices of ecological and conventional farmers incompatible, but the structure of farm enterprises also appears to be incompatible.

A comparison of the attitudes of ecological and conventional farmers in Southwestern Ontario also identified considerable differences. Few, if any, of the conventional farmers shared the goals, objectives and attitudes which make ecological agriculture attractive to those who practice it. Although the research revealed that ecological and conventional farmers had common attitudes with respect to some aspects of the agri-food system, they had opposing attitudes with respect to their relationship toward nature. While conventional farmers believed that they could dominate over nature, ecological farmers felt that farming should be conducted in harmony with nature. This is consistent with findings elsewhere (Beus and Dunlap 1994a, 1994b, Allen and Bernhardt 1995), although the precise attitudes which differ vary somewhat.

Thus, the thesis clearly defines ecological and conventional production systems in Southwestern Ontario. It was found that ecological and conventional operations differed not only in their production practice choices, but in their social and structural organisation and attitudes toward the environment. These differences were pronounced enough to suggest that ecological production systems are incompatible with the existing organisational structure of agriculture in Southwestern Ontario. This being the case, it is unlikely that more widespread adoption of ecological production systems will occur in the area.

The production changes that farmers made to their enterprise would also suggest that there is little likelihood of increased rates of adoption of ecological production systems in Southwestern Ontario. Although conventional farmers recognised, and were aware of, environmental problems with conventional production systems, they believed that these problems could be overcome within the conventional model of production. The emergence of no-till as the answer to soil erosion is a primary current example of the modifications that conventional farmers are making to alleviate environmental concerns. No-till, in particular,
was widely adopted in the late 1980s and early 1990s, while conversions to ecological agriculture declined during the 1990s. Further, the newcomers to ecological agriculture in the 1990s were primarily from non-farm backgrounds, and so entered ecological farming without conventional farm experience. Thus, it would appear that in Southwestern Ontario, if a widespread shift in agricultural practice is going to occur in order to alleviate environmental concerns, no-till will be the chosen option, rather than ecological production.

Finally, the analysis of farm family decision-making also indicated that there was little likelihood of a change to ecological production practices. Conceptually, the thesis extended previous analyses of decision-making by explicitly including ecological farmers in the study, and also by looking at the relationships between various farm decisions. Traditional models of farmer decision-making with respect to environmental concerns have been static in nature, and have considered the adoption of one conventional innovation or practice (Rogers 1973, Duff et al. 1992). Yet, ecological production systems involve more than a change in production practices, and this needs to be taken into account.

Several key differences in the relative roles of criteria in decision-making processes of ecological farmers emerged from the study. First, although both structure and agency play a role in any farm decision, agency (attitude) was the key determining variable in ecological production system decision-making. Farmers who had converted to ecological production systems did so after a substantial shift in their attitudes, and were willing to do so despite existing structural constraints. These farmers were willing to change the structure of their enterprise to accommodate their newfound ecological goals. However, structure appeared to play a more important role in constraining the choices of conventional farmers, a finding which is consistent with other studies (Lighthall 1995). Examination of farmers who had converted to no-till provided evidence of this as their operations were similar structurally, but the farmers did not necessarily share a common set of attitudes. The change to no-till was, therefore, less an attitudinal response but one made more in order to accommodate the structure of the farm enterprise.
Second, when making a decision to convert, ecological and conventional farmers are provided with different levels of institutional support. Conventional farmers, contemplating the conversion to no-till for example, are provided with considerable information, education and technical assistance by various government and agricultural institutions. In contrast, ecological farmers make their decision to convert to ecological production systems with little or no institutional support. Their primary source of information is other farmers who have previously made the decision to convert. The recent high rates of conversion to no-till would suggest that conventional farmers do respond to programs that encourage a particular innovation, and, therefore, as long as ecological agriculture remains on the fringes of these programs, or is excluded from them, it will remain a minority activity in the area.

Third, while information and promotion appear to play a key role in shaping the attitudes of conventional farmers, ecological farmers describing their conversion processes, mentioned personal experiences which lead them to question conventional production systems, and change their attitude toward their relationship with nature. This is an important development from the existing literature which does not consider changes in attitudes and the influences on such change, but rather compares attitudes at one particular time (e.g., Beus and Dunlap 1994a). The main triggers for change identified by ecological farmers included experiencing the death of a relative due to chemical use, extreme financial hardship, and extreme environmental problems on the individual farm. It is not possible to determine whether conventional farmers will also experience these triggers, but it is important to recognize that these appear to play an important role in attitudinal change leading to use of ecological production systems.

Also several of the ecological farmers had entered ecological agriculture from non-farm backgrounds. Their reasons for entering ecological agriculture differed from those of other farm families. Generally they saw an opportunity in terms of producing for a niche market, which they knew existed from their experience as consumers. They also wanted to secure an
ecological food supply for themselves and their families. Thus, they did not enter ecological farming from the same perspective and are worthy of special mention.

These differences in the decision-making of ecological and conventional farmers point to the need to use research approaches that allow for them. It is believed that the research approach used in this thesis is a useful development in this direction. The approach used differs from traditional approaches in two main ways. First, decisions with respect to production systems are considered in their dynamic context. This proved to be an important aspect of the study, as it was found that the characteristics of ecological farm families often changed after their decision to convert to ecological production systems. Traditional analyses, which consider the characteristics of difference enterprises at one point in time, would not be able to uncover this dynamic. Second, decisions with respect to production systems were considered in relation to decisions with respect to other aspects of enterprise structure, but also in a dynamic context. By examining changes in production systems and enterprise changes, it was possible to determine any linkages between these changes. In this way, where structural differences were identified, it was possible to determine whether these differences were because of a change in production system, or had contributed to a change in production system. This was found to be particularly important in ecological farm family decision-making, where the decision to use ecological production systems was not only a production decision, but also incorporated other elements of farm organisation.

Finally, while this thesis was able to meet the research objectives that were set, it also raised a number of issues worthy of future investigation. Two, in particular, are notable. First, an investigation of the role of information in farmers' decision-making could be explored. Ecological farmers make decisions in information poor environments, while conventional farmers make decisions in information-rich environments. The research suggested that the lack of institutional support, and, therefore, information, with respect to ecological production contributed to the low rates of adoption, but this was not examined definitively.
Second, the thesis focussed on the production aspects of ecological farming, rather than consumption aspects. There appears to be a lack of consumer driven demand in Southwestern Ontario. At present the producers of ecological produce appear to be generating the demand for their products, rather than responding to a demand. Although ecological farmers have no difficulty finding markets for their current products, there is little to suggest that ecological produce will enter mainstream markets. The context of ecological farming would change significantly if there were increased consumer demand and would be an interesting focus of future research.
APPENDIX THREE INTERVIEW SCHEDULE

Farmer Code
Location
Phone number
Contact Date
Interview Time
SECTION ONE  FARM AND FARM FAMILY CHARACTERISTICS

1  Farm characteristics

a) Total farm size

b) Dominant product type
   1  Dairy farm
   2  Beef cattle
   3  Pigs or poultry
   4  Wheat and other small grains
   5  Other field crops
   6  Market gardening- vegetables
   7  Orchard- fruit
   8  Miscellaneous speciality and mixed farming
   9  Other  Specify

c) How much land which you farm is in the following land uses

<table>
<thead>
<tr>
<th>Land use</th>
<th>Owned (ha)</th>
<th>Rented (ha)</th>
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</thead>
<tbody>
<tr>
<td>Grains/ oilseeds and speciality crops</td>
<td></td>
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<tr>
<td>Forage crops</td>
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<tr>
<td>Summer fallow</td>
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<td></td>
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<tr>
<td>Wetland and woodland - used or unused</td>
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<tr>
<td>Vegetables</td>
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<td></td>
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<tr>
<td>Fruit</td>
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<tr>
<td>Other  Specify</td>
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d) Livestock component

<table>
<thead>
<tr>
<th>Livestock</th>
<th>Number</th>
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<tbody>
<tr>
<td>Dairy cows</td>
<td></td>
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<tr>
<td>Beef cattle</td>
<td></td>
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<tr>
<td>Hogs</td>
<td></td>
</tr>
<tr>
<td>Chickens</td>
<td></td>
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<tr>
<td>Other  Specify</td>
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</table>
e) Year of purchase of the farm

f) Legal ownership status
   1 Sole proprietorship
   2 Partnership (family)
   3 Partnership (non-family)
   4 Company (family)
   5 Company (non-family)
   6 Cooperative
   7 Other Specify

g) What were your production figures for the last season?

Milk
Meat
Crops

2. Farm Family Characteristics

a) Family composition

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age</th>
<th>Education</th>
<th>On-farm employment</th>
<th>Off-farm employment</th>
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</thead>
<tbody>
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</tbody>
</table>
b) What was your background prior to purchase of this farm?

c) How did you become involved in farming?

d) Were you involved in this farm prior to the purchase?

e) What do you want to get out of farming? What do you hope to achieve in farming? (Probe)

f) What aspect of agriculture in your area are you most concerned about now and in the next few years?

h) What do you think is the best way of overcoming these concerns?

3 External Relationships

a) Are there any non-family members employed on the farm?

b) If so, how many are there and are they full-time, part-time or seasonal employees?
c) How do you market your produce?

d) Do you or any members of your family presently have any off-farm investments?

e) If so what is the nature of the investment?

f) What farm organisations do you belong to?
SECTION TWO PRODUCTION METHODS

1. Could you tell me about the production methods that you currently use on the farm?

Crops

a) Tillage system (equipment and practices)

b) Crop rotation (crops used and rotation order)

c) Fertiliser management (sources, use of synthetics, use of plow down methods)

d) Pest management (use of insecticides, herbicides or pesticides and/or use of alternative methods)

e) Harvesting (equipment used and practices)

Livestock

a) Sources of feed

b) Stocking strategy (new stock purchases and use of off-spring)

c) Housing arrangements

d) Manure handling

e) Herd Health methods
2 Organisation of labour on the farm

I would like to know how labour is organised on the farm unit, who performs various tasks, how often they are performed and how much time is spent on these activities. As I am aware that different activities are undertaken at different times of year I have chosen four time periods and I would like you to describe the time spent in a typical day at various activities.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Who performs it</th>
<th>Time spent</th>
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<tbody>
<tr>
<td>Planting</td>
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<td>Summer</td>
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<tr>
<td>Harvesting</td>
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<td>Winter</td>
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</table>
SECTION THREE THE CHOICE OF PRODUCTION PRACTICES (ECOLOGICAL VERSUS CONVENTIONAL)

In the previous section you described your current production practices in detail and how you allocated labour to these different activities. In this section I want you to think back to why you chose the production system that you now use, whether you have farmed this way since you purchased the farm or have changed practices in some way.

1. Have your production practices changed since you purchased the farm? If yes can you tell me when you made the changes and what was changed?

2. What options did you consider when you decided to farm as you do now?

3. Why did you choose these particular production methods? (Probe)

4. What do you think are the advantages of the production methods you chose?

5. What do you think are the disadvantages?

6. Have you had any problems in using these production methods?

7. Where did you receive the information about these particular methods?

8. How useful was the information?

9. Have you recently considered any alternatives to your present production methods? If yes
   a) Which alternatives did you consider?
   b) Why did you choose not to pursue them?
SECTION FOUR

We have discussed the production practices of the farm enterprise in detail. I would now like you to find out which other kinds of strategies are being used and how they relate to the production methods you discussed.

1. Product combinations

a) Have you changed your product combinations since the purchase of your farm?

b) If yes, what changes did you make?

c) Why did you make these changes?

d) How do these changes relate to the production practices of the farm enterprise?

2. Tenure arrangements

a) Has the ownership of the farm operation changed since your purchase?

b) If yes, how has it changed?

c) Why did you make these changes?

d) How do they relate to the production practices of the farm enterprise?

3. Capital investments

a) Have you made any major capital investments in the farm enterprise since your purchase?

b) If so, what were those investments?

c) Why did you invest in those assets?

4. Labour/management relations

a) Have you made any changes to the labour employed on the farm since your purchase of the farm? (Include change from hired labour to family labour)
b) If so what changes have you made?

c) Why did you make these changes to the labour employed?

d) How do these changes relate to production practice choices?

5 Business structure

a) Are there any extra activities (forestry, tourism) that are now part of the farm enterprise?

b) If so, what are these activities?

c) Why did you decide to diversify in this way?

d) Were there any special opportunities that allowed you to pursue this strategy?

6 Scale of operation

a) Have there been any changes to the size of the property since you purchased the farm?

b) What is the nature of these changes and when did you make them?

c) Why did you decide to sell/purchase land?

d) Would you consider enlargement a necessary element of farming these days or do you think there are alternatives?

7 Marketing methods

a) Has the way you market your products changed since you purchased the farm?

b) If so, how has it changed?

c) Why did you make the changes?

d) Do you think they have been successful?

8 Economic centrality
a) Has off-farm employment always been part of the farm operation?

b) If no when did someone start working off the farm?

c) Why did a family member start working off the farm?

d) Do your methods of production aid or hinder someone working off the farm?

e) Have you always had off-farm investments?

f) If not, when did you invest off the farm?

g) Why did you decide to invest off the farm?

9 Intergenerational transfer

a) Do you intend to transfer the farm to one of your children?

b) Has this influenced your production practices in any way?

10 Are there any other strategies that you believe you have used to ensure the economic viability of the farm?
APPENDIX FOUR  QUESTIONNAIRE FORMAT

SCALE OF ATTITUDES

Listed below are many pairs of contrasting views regarding agriculture in Canada. For each pair please indicate which one of the two views you most agree with (the one in the left hand column or the one in the right hand column) by circling the appropriate number on the line between them

1 STRONGLY AGREE WITH VIEW IN LEFT HAND COLUMN
2 MILDLY AGREE WITH VIEW IN LEFT HAND COLUMN
3 UNDECIDED
4 MILDLY AGREE WITH VIEW IN THE RIGHT HAND COLUMN
5 STRONGLY AGREE WITH VIEW IN THE RIGHT HAND COLUMN

Please circle one number only!

Meeting Canadian food needs with fewer and fewer farmers is a positive outcome of technological progress  1 2 3 4 5  Meeting Canadian food needs with fewer farmers is a negative outcome of our free market system.

Farmland should be farmed so as to protect the long-term productive capacity of the land, even if this means lower production and profits  1 2 3 4 5  Farmland should be farmed so as to maximise annual profits, even if this threatens the long-term productive capacity of the land.

High energy use makes Canadian agriculture vulnerable and should be greatly reduced  1 2 3 4 5  Large inputs of energy into agriculture should be continued as long as it is profitable to do so

The primary goal of farmers should be to maximise the productivity, efficiency and profitability of their farms  1 2 3 4 5  The primary goal of farmers should be to improve the quality of their products and to enhance the long-term condition of their farms

The amount of farmland owned by an individual or corporation should NOT be limited, even if the ownership of land becomes much more concentrated than present  1 2 3 4 5  The amount of farmland owned by an individual or corporation should be limited in order to encourage land ownership by as many people as possible
Agricultural scientists and policy-makers should recognise that there are limits to what nature can provide and adjust their expectations accordingly.

Good farming depends mainly on personal experience and knowledge of the land.

The future success of Canadian agriculture will NOT be affected if rural communities continue to decline.

Small to medium sized farms can best serve Canada's agricultural needs.

Farm traditions and culture are outdated and of little use in modern agriculture.

Farming is first and foremost a business like any other.

Farmers should use primarily natural fertilisers and production methods such as manure, crop rotations, compost and biological pest control.

Most people should live in cities and leave farming to those who do it best.

Modern agriculture is a major cause of ecological problems and must be greatly modified to become ecologically sound.

Farmers should farm only as much as they can personally care for.

Agricultural scientists and policy-makers should expand efforts to develop biotechnologies and other innovations in order to increase food supplies.

Healthy rural communities are absolutely essential for Canadian agriculture's future success.

Large to very large farms can best serve Canada's agricultural needs.

Farm traditions and culture help maintain respect for the land and are essential to good farming.

Farming is first of all a way of life and second a business.

Farmers should use primarily synthetic fertilisers and pesticides in order to maintain adequate levels of production.

Many more people should live on farms and in rural areas than do so at present.

Modern agriculture is a minor cause of ecological problems and needs to be only fine-tuned periodically in order to be ecologically sound.

Farmers should farm as much land as they profitably can.
Farms should be specialised in one or at most a few crops

Soil and water are the sources of all life and should therefore be strictly conserved

Farmers should purchase most of their goods and services just as other consumers do

The key to agriculture's future success lies in learning to imitate natural ecosystems and farm in harmony with nature

Most farms should specialise in either crops or livestock

Production, processing and marketing of agricultural products is best done at local and regional levels

The successful farmer is one who earns enough from farming to enjoy an above average standard of living

Technology should be used to make farm labour more rewarding and enjoyable, but not to replace it

The abundance and relatively low prices of food in Canada are evidence that Canadian agriculture is the most successful in the world.

Farms should be diversified and include a large variety of crops

Soil and water are the basic factors of production and should be used so as to maximise production

Farmers should produce as many of their own goods and services as possible

The key to agriculture's future success lies in the continued development of advanced technologies and will overcome natures limits

Most farms should include crops and livestock

Production, processing and marketing of agricultural products is best done at national and international levels

The successful farmer is one who truly enjoys farming even if it only a below average standard of living

Farm labour should be replaced whenever possible by more efficient machines and other technologies

High energy use, soil erosion, water pollution etc. are evidence that Canadian agriculture is not nearly as successful as many believe it to be
WORKS CITED


Barlett, P F, 1986 Part-time farming Saving the farm or saving the lifestyle? *Rural Sociology* 51(3) p 289-313


Brklacich, M , C Bryant and B Smit 1991 Review and Appraisal of Concept of Sustainable food Production Systems, Environmental Management. 15(1) p 1-14


Canadian Organic Growers 1992a Directory of Organic Agriculture


Crosson, P 1991 Sustainable Agriculture in North America Issues and Challenges, Canadian Journal of Agricultural Economics. 39(4) p 553-565

Demeter 1992 International Guidelines for the Certification of Products from Biodynamic Agriculture


Federal Provincial Agricultural Committee on Environmental Sustainability 1990 Growing Together. Report to Ministers of Agriculture

Filstead W J 1970 Qualitative Methodology: Firsthand Involvement With the Social World. Markham Publishing Co, Chicago


Hoopes, J 1979 Oral History: An introduction to students. The University of North Carolina Press, U S A


Jick, T 1979 Mixing Qualitative and Quantitative Methods. Triangulation in Action. Administrative Science Quarterly 24, p 602-611

Kramer, D 1984 Problems Facing Canadian Farmers Using Organic Agricultural Methods, paper presented by Canadian Organic Growers to Friends of the Earth


Lighthall, D 1995 Farm Structure and Chemical Use in the Corn Belt, Rural Sociology 60(3), p 505-520

Lockeartz, W R, Klepper, B Commoner, M Gertler, S Fast, D O'Leary and R Blobaum 1975b A Comparison of Production, Economic Returns and Energy Intensiveness of Corn Belt Farms that do and do not use inorganic fertilisers and pesticides. Centre for Biology of Natural Systems, Washington University, Missouri

Lockeartz, W 1990 What have we learned about who conserves the soil? Journal of Soil and Water Conservation. September/October 1990


London Free Press 1994 Advertisement for organic farmers


MacRae R S B Hill, J Henning and A Bentley 1990 Policies, Programs and regulations to support the transition to sustainable agriculture in Canada. American Journal of Alternative Agriculture. Vol 5(2). p76-92


Marsden, T, R Munton, S Whatmore and J Little 1989 Strategies for Coping in capitalist agriculture an examination of the responses of farm families in British Agriculture. Geoforum 20(1) 1-14


Martin, H 1992 Organic Farming in Ontario

Martin, H 1992 personal communication. Middlesex/ Elgin OMAFRA office


Moran W, G Blunden and J Greenwood 1993 The Role of Family Farming in Agrarian Change. Progress in Human Geography. 17(1), p22-42

National Research Council 1991 Alternative Agriculture

Nowak, P J 1983 Adoption and Diffusion of Soil and Water Conservation Practices. The Rural Sociologist. 3(2), p83-91

Nowak, P J 1987 The Adoption of Agricultural Conservation Technologies Economic and Diffusion Explanations. Rural Sociology 52(2). p 208-220


Pampel F And J C van Es 1977 Environmental Quality and Issues of Adoption Research. Rural Sociology. 42(1). p 57-71

Patton, M Q 1990 Qualitative Evaluation and Research Methods. Sage Publications, California


Poincelot R. 1986 Toward a More Sustainable Agriculture. AV1, Westport, Connecticut


Riechardt C and T Cook 1979 Beyond Qualitative and Quantitative Methods, in Cook, T and C Riechardt (eds), Qualitative and Quantitative Methods in Evaluation Research, Beverly Hills, Sage Publications. p 7-32


Sparrow H O 1984 Soil At Risk: Canada's Eroding Future. The Senate of Canada, Ottawa, Ontario

Statistics Canada 1994 Canadian Agriculture At A Glance. Ministry of Industry, Science and Technology, Ottawa, Canada


Whatmore S., R Munton, J Little and T Marsden 1987 Towards a typology of farm business in advanced capitalist agriculture, *Sociologica Ruralis* 27, 21-37

Youngberg and Buttel 1983 Public Policy and Socio-political Factors Affecting the Future of Sustainable Farming Systems, *ASA Publication # 46, Organic Farming*, KRAL