EFFECTS OF A TRANSITION TO ECOLOGICAL-ORGANIC AGRICULTURE ON LIVESTOCK PRODUCTION IN MANITOBA

by
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In Partial Fulfillment of the
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ABSTRACT

Low farm product prices, high input costs, and concern for the long term sustainability of modern agricultural systems are making farmers consider alternate farming methods. Ecological-organic agriculture is based on ecological principles, the vital role soil humus plays in maintaining soil fertility, the relationship between fertile humus rich soil and healthy crops and animals, and the elimination of highly soluble fertilizers, pesticides, and growth stimulants. It may offer a low input production system based on long term sustainability.

The objectives of the study were to determine the role livestock plays in ecological-organic agriculture, to examine the transition period in detail, and to determine the effects of a transition to ecological-organic agriculture on Manitoba's feed and livestock industries. Twelve agricultural professionals, forty-four farmers, and six feed and livestock industry representatives were interviewed using the descriptive survey method.

The results indicated that livestock are useful in mixed farming to utilize forage crops and stabilize farm income. They are particularly important on ecological-organic farms as sources of manure. They were found to be very important in ecological-organic

agriculture. Whether they are essential on every ecological-organic farm was still a debated issue. Green manures and alternate practices substituted for livestock at the farm level only with difficulty. The transition to ecological-organic agriculture is presently being hindered by lack of reliable information. Details concerning the economics of ecological-organic farming are needed before conventional producers can assess this form of agriculture. Crop production practices usually change first in the transitional process. The feed and livestock industries will be among the last sectors of the agricultural industries to be affected by a transition to ecological-organic agriculture. Livestock production will tend to become more decentralized and less intensive. This will reduce the need for off-farm feed sources.

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Whatever failings remain after all this assistance are, of course, the responsibility of the author.

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CHAPTER I INTRODUCTION

1.1 Preamble

Manitoba's agricultural industry generates 40% of the gross provincial product. The livestock industry represents one third of this. In 1980 the farm production value of Manitoba's livestock industry was $533,000,000 (15). In the past forty years livestock production has changed from being a part of mixed family farming enterprises to highly specialized production systems. Many farmers were happy to give up livestock and do not want to go back to the lifestyle they necessitate.

The Manitoba Department of Agriculture's (MDA) primary purpose is to serve the farm community. Up to date technological and managerial information is disseminated to farmers by extension personnel, technical services, and support programs. The MDA should be ready if and when farmers ask questions about ecological-organic agriculture. The present Manitoba Government has three major policy objectives in agriculture. These are to increase farm income, to maintain the livestock industry, and to sustain the production base through soil and water conservation. This study primarily concerns the livestock industry. Ecological-organic agriculture also has implications for farm income and soil and water conservation.

Modern agriculture requires large inputs of energy, pesticides, and inorganic fertilizers to achieve high production levels. They have increased dramatically in price over the past decade. When combined with low farm product prices and high interest rates, many farmers find themselves with cash flow problems. The long term effects of agricultural chemicals on the environment, the soil, and human health are not known with certainty. Concern is increasing about deteriorating environmental quality (3) and soil fertility (4), (12). Short term economic reality and long term environmental concerns are causing farmers to consider alternate farming methods.

Ecological-organic agriculture may be a viable alternative which does not depend on high priced inputs. Sustainable, healthful, and ecologically balanced agricultural production may be the promise of ecological-organic agriculture. Characterized by diversity and lower input costs, ecological-organic agriculture may be a more stable economic venture than conventional agriculture.

1.2 Problem Statement

Canadian agriculture may be at a turning point. High input, highly capitalized, specialized production systems are proving vulnerable to unstable global economic forces. Some farmers are searching for alternatives. They need reliable information on which to base decisions. Misinformation, idealism, confusion, and even

antagonism characterize farmers' knowledge of and attitudes toward ecological-organic agriculture. Farmers must be fully informed before they can rationally assess ecological-organic farming.

Ecological-organic agriculture usually combines crop and livestock production. Forages included in crop rotations are utilized by livestock. Their manure is the basis of ecological-organic soil fertility. In some areas of Manitoba livestock production is not appropriate. Is ecological-organic agriculture feasible in these areas? What special adaptations would be necessary to make it feasible? Is livestock production essential on all ecological-organic farms? If so, does this mean a return to extensive mixed farming?

The transition from conventional farming to ecological-organic farming is difficult. It may take years for the soil's microbiological activity and humus levels to be rebuilt. Weed problems may become unmanageable. Production may drop when cash is most needed to repay old debts, buy new equipment, gather more information, and try new cultural practices. Established ecological-organic farmers have made the transition. They can help forecast the problems involved and the available solutions.

If ecological-organic agriculture were adapted in a large way it would have important implications for the existing feed and livestock industries in Manitoba.

What are the industries' attitudes towards and perceptions of ecological-organic agriculture? Are they informed and prepared to adapt to ecological-organic agriculture?

1.3 Objectives

The primary objective of this study is to examine the effects of a transition to ecological-organic agriculture on livestock production in Manitoba.

Specific objectives are:

(1) To examine the relationship of a livestock enterprise to an ecological-organic farm. Feed and livestock production, marketing, and manure handling will be investigated.

(2) To examine the transition period from conventional to ecological-organic farming. Producer motivations, perceptions, expectations, and problems will be investigated.

(3) To examine the effects on the Manitoba livestock and feed industries of a transition to ecological-organic agriculture.

1.4 Definition of Terms

Ecological Agriculture:

Kiley-Worthington (9) defines it as:

> *"The establishment and maintenance of an ecologically self-sustaining low input, economically viable, small farming system managed to maximize production without causing large or long term changes to the environment, or being ethically or aesthetically unacceptable."*

Organic Agriculture:

The U.S.D.A. (17) defines it as:

> *". . . a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and feed additives. To the maximum extent feasible, organic farming systems rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients and to control insects, weeds, and other pests."*

This definition is not entirely satisfactory to some in the organic farming movement. They object to the emphasis put on the non-use of farm chemicals. Grussendorf (6) emphasizes:

> *"It is a form of agriculture that has as the central activity the replenishment of the soil with humus."*

Humus:

Buckman and Brady (4) define it this way:

> *"As the decomposition occurs two major kinds of organic compounds tend to remain in the soil: (1) resistant compounds of higher plant origin such as oils, fats, waxes and especially lignin; and (2) new compounds such as "polysaccharides" and "polyuronides" which are synthesized by micro-organisms and held as part of their tissue . . . these two groups of compounds, one modified from the original plant material and one newly synthesized by the micro-organisms, provide the framework for humus."*

Ecological-Organic Agriculture:

Before explaining what this term means in this

study it is useful to explain what it does not mean. Ecological-Organic Agriculture is not primitive farming practised in underdeveloped areas. Ecological-organic agriculture is not the farming practised on the Canadian prairies until the introduction of agricultural chemicals. This type of farming depleted the original store of soil humus by extensive summerfallowing. Ecological-organic agriculture is not that type of farming associated with peat soils.

Ecological-organic agriculture is a farming philosophy. It encompasses the definitions previously discussed. It is also something more. A definition is not enough because definitions do not explain the roots of a concept. What follows is not strictly speaking a definition of ecological-organic agriculture. Instead, ecological-organic agriculture is explained as being a farming philosophy.

Ecological-organic agriculture is a farming philosophy based on four components:

(1) Recognition of the vital role soil humus plays in maintaining soil fertility.

(2) Recognition of a relationship between fertile, humus-rich soils; healthy nutritious crops; and healthy animals (1), (8). Poor nutrition and environmental stress produce disease and attract pests (1), (8).

(3) Recognition of all ecological principles, including diversity and nutrient cycling. It attempts to work with nature, within nature, using nature's principles.

(4) Elimination of highly soluble chemical fertilizers, insecticides, herbicides, fungicides, growth stimulants, and feed medication is highly desirable.

Replenishing the soil with humus is the basis of ecological-organic agriculture. High soil humus levels are believed to result in vigorous, healthy, pest-free crops and livestock which make the use of chemical aides unnecessary (8).

1.5 Delimitations

(1) In this study the livestock industry is limited to beef, dairy, and swine production and marketing in Manitoba.

(2) The study will not attempt a detailed economic analysis of ecological-organic production in Manitoba.

CHAPTER II REVIEW OF THE RELATED LITERATURE

2.1 Introduction

The purpose of this chapter is to discuss briefly previous work done in this field that is relevant to this study. Two seminal works are discussed which give the historical roots of ecological-organic farming's philosophy. Several studies are reviewed which address the specific, central question, "What role does livestock play in ecological-organic agriculture?" Finally, studies addressing the marketing aspects of a transition to ecological-organic agriculture are discussed.

2.2 Seminal Works

The term "organic agriculture" first appeared in 1947 in *The Soil and Health* by Sir Albert Howard (8). A professional mycologist, he spent his entire career in the tropics documenting the relationships between soil fertility, nutrition, and health. While working in India he perfected the Indore composting method which depended on mixtures of animal manures and crop residues. He found that livestock raised on soil fertilized with this compost were less susceptible to disease than livestock raised on neighbouring land which was fertilized with chemicals. It is self-evident that this system of ecological-organic agriculture depended heavily on livestock production.

The Albrecht Papers, by Dr. W. A. Albrecht (1), is the American equivalent of *The Soil and Health*. Dr. Albrecht was Chairman of the Department of Soils at the University of Missouri. The series of papers were written between 1930 and 1965 and discussed problems associated with "new" chemical-oriented soil fertility. He emphasized the need for organic matter as a basis of soil fertility. He showed that soil fertility based solely on chemical principles produced crops which were not nutritious and that animals fed these crops had poor health and reproduced poorly. He laid the groundwork for the concept that insects and disease are the symptoms, not the cause, of a failing crop. Livestock production was essential because it provided manure which was the primary source of soil humus.

The significance of these seminal works is that they left an ecological-organic alternative open when the rest of the agricultural fraternity was discovering chemical fertilizers and pesticides. Their principles remain the basis of ecological-organic agriculture.

2.3 The Role of Livestock in Ecological-Organic Agriculture

No study in the area of ecological-organic agriculture specifically addressed what role livestock plays in ecological-organic agriculture. All the studies which were reviewed acknowledged in a direct or

indirect way that ecological-organic agriculture works best in a mixed farming situation. They did not state that livestock production is essential in all ecological-organic farming systems.

The U.S.D.A. report (17) concluded that livestock are an essential part of most ecological-organic farms, especially in areas with a balanced production of hay and feed grains. Most farmers in the study produced their own feed supplies and tried to balance livestock and feed production.

Klepper et al (10) compared the economics and energy use on organic and conventional farms in the U.S. corn belt. Although mixed crop-livestock farms were compared, organic farms had 60% more animal units than conventional farms. However, organic farmers applied less manure to the land because animals were kept on pasture for longer periods of time. No mention was made of organic farmers composting manure. Organic practices were concluded to be an alternative for the Corn Belt because of the availability of manure. Because hay and pasture were in organic farmers' crop rotations, row crops (corn and soybeans) averaged 52% of cropland on organic farms compared to 73% on the conventional farms. This was the primary reason why gross farm income was lower on organic farms.

Lockeretz et al (14), continuing this work,

commented:

> *"Management that relies on legume forage to supply nitrogen fertility naturally leads to a mixed crop and livestock operation, since it is simpler to use the forage for one's own livestock than to sell it . . ."*

In an economic study of organic crop production in the western corn belt of the U.S., Roberts et al (18) states:

> *". . . each of the organic farmers interviewed had a substantial livestock enterprise and 73% had two or more. That a clear majority of the organic farmers had some type of livestock enterprises reinforces the idea that livestock operations are an integral part of an organic operation . . ."*

Biodynamic agriculture (11) is an extension of ecological-organic agriculture. It employs special herbal preparations which, when added to compost heaps, speed breakdown of organic material to humus. This type of composting works best using livestock manures. It also emphasizes diversification and farm self-sufficiency as much as possible (i.e., on-farm feed sources). This type of ecological-organic agriculture relies heavily on an integrated livestock-crop enterprise.

Kiley-Worthington (9) also emphasizes that ecological agriculture relies on self-sustaining and diverse farming enterprises. Ecological agriculture goes one step further and emphasizes:

"It is implicit in the system that animals be kept as far as possible within the type of environment, both physically and socially in which they have evolved to live . . . it is ethically more acceptable than intensive highly capitalized high input animal husbandry."

Hanley (7) states that livestock are important for ecological agriculture because they consume forages grown during rotations and produce manure which is needed to maintain soil fertility. Centralized feed lot production and high grain, low forage rations are considered undesirable in an ecological sense.

2.4 Marketing Practices

An important claim of ecological-organic agriculture is that products produced "organically" have superior nutritive value to products produced conventionally. For this reason most ecological-organic farmers try to market their products outside of normal channels to consumers who also believe in the superior quality of "organic" produce.

Marketing of ecological-organic products was identified as a major problem for farmers in most of the studies. Wernick and Lockeretz (10) found that 22% of organic farmers thought finding markets for organic products was one of the three most important perceived disadvantages of organic farming. They found that 33% of organic producers used special marketing channels. Of those who did, 80% received a premium price. The premium

was charged because producers felt they had a superior product and because consumers were willing to pay for it. The U.S.D.A. report (17) found that most organic producers sold all or a large part of their products through conventional marketing channels. Roberts et al (18) found that less than 2% of organic crops were marketed outside normal channels. However, 33% of producers located direct markets for at least a part of their livestock production.

Oelhaf (16) found that most of the price difference between conventional and "organic" produce was due to higher transportation costs and higher costs associated with smaller quantities. It was not due to a higher cost per unit of production. Alexander (2) found these problems but also problems of short shelf life and higher spoilage losses because "organic" produce does not contain preservatives.

These studies challenge the perception that organic farmers need a premium price to survive and prosper.

2.5 Summary

The principles of ecological-organic agriculture are not new. Farmers around the world have shown that ecological-organic agriculture is feasible. The fact that they can survive in a system geared to conventional agriculture is evidence that ecological-organic farming

is worth a closer examination.

The role of livestock in ecological-organic agriculture is clear. Maintenance of a diverse farm ecosystem which relies on humus for soil fertility works best in mixed farming. Ecological-organic farming is appropriate without livestock only in exceptional circumstances.

A major gap in the literature is the lack of a study of ecological-organic agriculture in Western Canada that investigates the role of livestock. Western Canadian conditions are significantly different from the areas where ecological-organic research has been done. This study attempts to fill this gap.

CHAPTER III METHODS

3.1 Introduction

This study used the descriptive survey technique (13). This research method describes current phenomena and uses it as a basis to extrapolate future events. The study consisted of three activities: an agricultural professional survey, a producer survey, and a feed and livestock industry survey.

The methods used in this study are similar to those used by others. The U.S.D.A. report (17) used producer case studies and questionnaires. Lockeretz (14) paired organic and conventional producers and compared their performance. Questionnaires were used to obtain information from the producers. Roberts et al (18) used a personal interview survey technique with a lengthy (three-hour) questionnaire to determine the economics of ecological-organic crop production. Alexander (2) used similar techniques to survey organic farmers.

3.2 Agricultural Professional Survey

The objectives of this survey were to reach a consensus about (1) the role of livestock in ecological-organic agriculture, and (2) the effects of a transition on the feed and livestock industry.

Two groups were chosen. The first group was closely involved in some aspect of ecological-organic

agriculture. The second group was involved in Canadian Universities or Governments who had some personal interest in, or professional connection with, some aspect of ecological-organic agriculture which was addressed by this study. These groups of agricultural professionals will hereafter be called "ecological-organic experts," "conventional experts," or collectively as "experts."

The experts were first contacted by telephone. Upon agreeing to participate, the questionnaire (Appendix B) and a summary of the project (Appendix H) were mailed to them. Twelve of sixteen contacted returned the questionnaire. Appendix A lists those who replied.

3.3 Producer Survey

This survey was the heart of this study because it addressed all three study objectives. The role livestock plays in ecological-organic agriculture and the differences between ecological-organic and conventional crop (feed) and livestock production systems were investigated. Conventional producers and those actively involved in making the transition to ecological-organic farming were included in order to examine producers' motivations, expectations, and problems involved in making a transition to ecological-organic farming. The effects on the feed and livestock industry were also examined using the survey results.

Producers were selected for this survey in a number of ways. Most ecological-organic producers were selected from members of the "Ecological Farmers Association." Other names were gathered from experts, personal contacts, and by word of mouth. MDA extension personnel were contacted by letter and asked to send names of producers who were either interested in, making a transition to, or practising some form of ecological-organic agriculture. Conventional producers were chosen from names suggested by MDA personnel in Winnipeg. These are not a true representation of conventional producers in Manitoba. There was a bias towards conventional producers who were interested in various conservation practices.

Each producer was classified for the purposes of analysis into one of three groups: Conventional, Ecological-Organic, or Transitional. This presented problems and caused some distortions. Each producer had a unique combination of production practices which when taken together did not represent a linear transition from conventional to ecological-organic farming but rather a multi-dimensional matrix.

Producers were contacted by telephone. After agreeing to participate, a questionnaire (Appendix D) and summary sheet (Appendix H) were mailed to them. They were then visited and the questionnaire was completed.

Forty-six producers were contacted. Forty-four producers agreed to participate and were interviewed.

Because of non-random sample populations and small sample sizes, no attempt was made to analyze the data statistically. Attitudes and qualitative data are summarized in descriptive form. Quantitative data is tabulated.

3.4 Feed and Livestock Industry Survey

The objective of this survey was to determine the industry's familiarity with and attitudes toward ecological-organic agriculture. Appendix F is the list of industry representatives contacted. Appendix G is a sample questionnaire. Representatives were contacted by telephone and an interview was arranged. Like the agricultural professional survey the results are presented in a descriptive form.

CHAPTER IV RESULTS AND DISCUSSION

4.1 Introduction

The results are presented in five sections. The first section is a brief discussion of the problems of defining "Ecological-Organic Agriculture" after analyzing the results of the expert, producer, and industry surveys. Each of the next sections specifically addresses one objective of the study. Results from each of the three surveys which are relevant to that objective are presented in that section.

A small amount of producer background information and extraneous crop production data was gathered. This has been summarized and is included as Appendix E.

4.2 Defining Ecological-Organic Agriculture

4.2.1 Agricultural Professional Survey

Nowhere was the problem of defining "Ecological-Organic Agriculture" more clearly demonstrated than in the replies from the twelve experts. Only nine attempted any definition. Those who did usually gave very short definitions. Six said rigid definitions were not appropriate when defining these forms of agriculture. Two said they were useful but had to be flexible. Only two said rigid definitions were useful as benchmarks. They mentioned the need to protect both consumer and producer from dishonest marketing practices.

The experts involved in ecological or organic agriculture most frequently identified themselves with ecological agriculture (4 of 7). They defined it in these terms:

> *"based on ecological principles having primary goals of nourishment, fulfillment and sustainability"*
>
> *"minimizes the use of synthetic pesticides and fertilizers"*
>
> *"environmentally sound production systems"*
>
> *"integrative, holistic, open-ended"*

Biological and organic agriculture were defined as being more restrictive, militant, and self-sustaining. Bio-dynamic agriculture was recognized as being the most specific form, based on the principles of Rudolph Steiner.

The definition of "Ecological-Organic Agriculture" on the summary sheet was generally acceptable. There were some reservations about the sentence, "Poor nutrition and environmental stress produce disease and attract pests," and to the total elimination of highly soluble fertilizers, pesticides, and growth regulators.

The experts not involved in ecological or organic agriculture had a poor idea of what the terms ecological, biological, organic, and bio-dynamic agriculture meant. The broad connotations of these words did not help. Two of five made no attempt to define the terms. Two gave definitions which were very

different than those generally accepted. Only one knew what organic agriculture was. A new term was added to the list - "Sustainable Agriculture."

There was no consensus by the experts on precise definitions of ecological, biological and organic agriculture. Although experts generally agree on broad parameters it is very difficult to tie them down to specifics. Those involved in ecological-organic agriculture have a much better understanding of what the terms mean than those not involved.

4.2.2 Producer Survey

Each producer was asked to classify his production systems after reading the definition of Ecological-Organic Agriculture on the summary sheet included with the questionnaire. It was very obvious that no one would label themselves conventional and that everyone could point to some aspect of his operation which was ecological. For these reasons classification of each producer as conventional, ecological-organic, or transitional was based not only on his practices, but also on his attitudes and future plans.

It is interesting to compare each group of producers' use of inputs to the definition used in this study (Table 1). Ecological-organic producers rarely used highly soluble fertilizers. Although transitional producers continued to use premixed chemical fertilizers,

TABLE ONE USE OF CROP PRODUCTION INPUTS

Crop Production Input	Percentage of Group Which Used Input		
	Conventional	Ecological-Organic	Transitional
Super Phosphate (11-55-0)	76	9	29
Potash (0-0-60)	47	0	7
Anhydrous Ammonia	35	0	0
Other N.P.K. Fertilizers	65	0	50
Sulphur	35	0	29
Lime (Calcium)	0	0	7
Rock Phosphate	0	0	7
Trace Minerals	6	0	14
Foliar Spray	6	0	29
Sewage Sludge	6	0	0
Biological Soil Conditioner	0	9	36
Manure from off-farm	12	9	21
Manure from on-farm	86	100	100
Insecticides	41	0	43
Herbicides	100	9	71
Size of Group	17	11	14

they had eliminated use of anhydrous ammonia and potash. Lime, rock phosphate, trace minerals, and sewage sludge were rarely used by any group. Foliar sprays and biological soil conditioners were used primarily by transitional producers. This reflects a different attitude to "fertilizers" of newer ecological-organic producers. Manure from off-farm sources was used most frequently by transitional producers. Both transitional horticultural producers brought in large amounts of manure from off-farm sources. All producers who had significant livestock herds returned manure to their fields. The use of herbicides clearly separated the conventional from the ecological-organic producers. Transitional producers were generally still using pesticides.

Ecological-organic and transitional producers used mineral and vitamin supplements, iron injections, castration, and artificial insemination as frequently as conventional producers (Table 2). The absence of feed antibiotics and growth stimulants and the reduced frequency of vaccinations by ecological-organic producers is noteworthy. There is presently discussion within the ecological-organic movement about the acceptability of vaccine use. Transitional producers were using these inputs as frequently as conventional producers.

In summary the results from this survey indicate

TABLE TWO USE OF LIVESTOCK PRODUCTION INPUTS

Livestock Production Input	Conventional		Ecological-Organic		Transitional	
	Percentage of Group Which Used Input	Size of Group	Percentage of Group Which Used Input	Size of Group	Percentage of Group Which Used Input	Size of Group
Mineral Supplements	93	15	80	10	100	10
Vitamin Supplements	87	15	60	10	90	10
Antibiotics In the Feed	60	5	0	8	40	5
Growth Hormones	30	10	0	5	44	9
Iron Injections	67	3	33	6	100	2
Castration	79	14	80	10	75	8
Artificial Insemination	57	14	50	10	50	8
Vaccinations	73	15	30	10	89	9

that ecological-organic farming in Manitoba is presently characterized by the absence of highly soluble chemical fertilizers, pesticides, and growth stimulants. Generally, crop production inputs of ecological-organic and transitional producers are more distinct from those of conventional producers than are livestock production inputs. This may reflect the stage of transition ecological-organic and transitional producers are in. In the transition crop production changes first, livestock production changes last. This may also be a reflection of less sophisticated livestock production in Manitoba.

4.3 Livestock and Ecological-Organic Agriculture

4.3.1 Agricultural Professional Survey

The experts were questioned about the role of livestock in ecological-organic agriculture, whether it was possible to farm ecological-organically without livestock, and if so what special adaptations were necessary. All the experts agreed that livestock play an important role in ecological-organic agriculture. Forages produced in crop rotations are utilized by livestock which in turn become marketable products. Manure produced by the livestock is a major component of soil fertility maintenance on ecological-organic farms. The special role ruminants play in the utilization of cellulose was often mentioned.

The two experts familiar with mid-west U.S.

"organic" agriculture agreed that livestock are included on almost all organic farms. They noted that most conventional farms in the same area also had livestock. Those familiar with Canadian ecological-organic agriculture had seen much more variation in the importance of livestock on ecological-organic farms. In many cases livestock did not play a prominent role. In horticulture manure was often brought in from off-farm sources.

It was interesting that against this background seven of nine experts thought it was possible to farm ecological-organically without livestock. They suggested special adaptions such as growing grain legumes and forage seeds, selling forages as a cash crop, "importing" organic waste products from urban areas, using rock powders, and growing green manure crops.

The experts agreed that livestock play an important role in ecological-organic agriculture. Most agreed that livestock are not essential on every ecological-organic farm. It is more difficult to farm without them, but they thought special adaptations could overcome the restrictions imposed by lack of livestock.

4.3.2 Producer Survey

4.3.2.1 Role of Livestock

Several questions in the producer questionnaire probed the role of livestock on ecological-organic farms. The most common reason for having livestock was that the

land was suited for mixed farming (Table 3). Ecological-organic producers more frequently mentioned the importance of forage consumption from crop rotations, a source of manure, and a supply of animal products for on-farm consumption.

Producers were asked, "Did the role livestock play on your farm change after the transition to ecological-organic farming?" The role of livestock did change for three of seven ecological-organic, and four of ten transitional farmers. In all cases where the role of livestock changed, livestock grew in importance and the size of the herd increased after the transition.

The amount of pasture and hay available was the most important factor in producers' decisions on how many livestock they would have (Table 4). The conventional, ecological-organic and transitional producers surveyed used similar factors in their decision.

The response to the question, "Is an ecological-organic farm feasible without livestock? Why?", brought interesting responses. The conventional producers surveyed were most sure it was not feasible (five of seven said not feasible). Ecological-organic producers were divided. Five of ten said not feasible. Of the five who said it was feasible, two added it would be more difficult and did not recommend it. Producers making the transition were most sure it was feasible (eight of eleven

TABLE THREE REASONS FOR HAVING LIVESTOCK

Reason For Having Livestock	Percentage of Group Which Gave This Reason		
	Conventional	Ecological-Organic	Transitional
Land Suited For Livestock	36	30	50
Income Stabilization	27	20	40
Enjoys Livestock	27	20	30
Source of Income	27	20	30
Consumes Forages in Rotation	18	40	10
Supplies Animal Products	0	40	20
Tradition, Experience, Training	27	0	20
Source of Manure	0	30	20
Other	18	0	30
Size of Group	11	10	10

TABLE FOUR FACTORS IN DECIDING AMOUNT OF LIVESTOCK

Factor In Decision	Percentage of Group Which Mentioned Factor		
	Conventional	Ecological-Organic	Transitional
Amount of Pasture and Hay in Rotation	56	78	55
Feed Production Capacity	22	56	18
Labour Supply	22	11	36
Financial Considerations	33	0	36
Building Capacity	0	22	18
Other	22	22	18
Size of Group	9	9	11

said feasible). Of the thirteen producers who said "not feasible," six said manure or compost was essential on ecological-organic farms. Forages in crop rotations and green manure plow down crops were the alternatives suggested by producers to make it feasible without livestock. Ecological-organic and transitional producers who had no livestock said it was more difficult to farm ecological-organically without livestock (three of four responses). Lack of manure was the major handicap. They compensated by using green manure crops or biological soil inoculants. Whether these alternatives are adequate substitutes for livestock was not investigated. This is an area which needs further study.

The use of biological soil inoculants by transitional producers to reduce the need for livestock is a relatively new development in ecological-organic agriculture. The inoculants are microbiological cultures which break down raw organic matter (straw, stubble, green manures) into stable humus without ruminants or composting. These products have not been completely tested and further research is needed. If the enthusiastic claims of producers who use them are supported by research, they may aid the transition process by re-establishing the soil's microbial activity quickly. If the inoculants are proven to initiate the efficient conversion of raw organic matter into stable soil humus they will change the

importance and role of livestock in ecological-organic farming.

4.3.2.2 Crop Production

This study focuses on livestock production. A large amount of crop production information is included for several reasons. It was found that crop production practices were much more sophisticated than livestock production practices. Farmers were generally able to say a lot about their cropping practices and relatively little about their livestock operations. Most ecological-organic farmers were in an early stage of transition. As previously discussed cropping practices tend to change first. Many ecological-organic producers have not reached the stage of making major changes to their livestock production practices. On-farm feed production practices were investigated because they have important implications for the feed industry. Crop rotation information is vital to determine the role of forages and forage substitutes on farms with no livestock. Livestock production reflects and complements crop production on all mixed farms. This necessitates the inclusion of cropping practices as a base from which to evaluate livestock production practices.

A. Land Use and Farm Size

Conventional, ecological-organic, and transitional producers were subdivided into those with

significant livestock operations (Mixed), and those without (Grain) (Table 5). This indicated large differences in land use between the two types of farms. It is interesting to note differences in the types of oilseeds and special crops grown by the three groups. Buckwheat, peas, and peas-oats mixtures made up 29% of the special crops grown by the conventional producers surveyed. These same three crops made up 89% of ecological-organic and 75% of transitional producers' special crops. Canola was not grown by any ecological-organic producer and by only one transitional producer. Unsatisfactory non-chemical flea beetle control all but eliminates this crop from ecological-organic farms. This is presently a real disadvantage to ecological-organic farming. More research might develop non-chemical flea beetle control methods in canola.

Conventional grain producers had almost all their farmland in grains, oilseeds, and special crops (92%). Ecological-organic producers had 51% in grains, oilseeds, and special crops. Mixed producers in all three groups had very similar patterns of land use. The larger amount of summerfallow by ecological-organic and transitional producers was primarily the result of differences in the definition of summerfallow. Summerfallow to ecological-organic and transitional farmers includes land which had green manure or forages for half the summer. Conventional summerfallow practice leaves the land fallow

TABLE FIVE LAND USE

Land Use	Percentage of Total Farm Area In Each Land Use					
	Conventional		Ecological-Organic		Transitional	
	Grain	Mixed	Grain	Mixed	Grain	Mixed
Grains, Oilseeds, Special Crops	92	41	51	30	72	50
Summerfallow	2	4	18	7	7	9
Forage Crops	3	23	13	27	9	12
Permanent Pasture	0	19	7	26	2	16
Other	3	13	11	10	10	13
Size of Group	6	11	4	7	5	9

TABLE SIX CROP ROTATIONS

	Conventional	Ecological-Organic	Transitional
Average Length of Rotation	6.7 years	7.3 years	5.2 years
Size of Group	16	11	11
Rotations Include Legumes (%)	82	100	85
Size of Group	17	11	13
Average Length of Forage in Rotation	4.6 years	4.4 years	4.0 years
Size of Group	8	9	5
Producers Changing Rotations (%)	18	36	57
Size of Group	17	11	15
Includes Green Manure Crop (%)	6	64	64
Size of Group	17	11	14

for the entire summer.

Differences in farm size were interesting. The seventeen conventional farms averaged 330 hectares (814 acres). When four dairy operations were eliminated the average size rose to 387 hectares (957 acres). The eleven ecological-organic farms averaged 372 hectares (919 acres). When one dairy operation and one abnormally large beef operation (2057 hectares) were eliminated the average size dropped to 219 hectares (540 acres). The fifteen transitional farms averaged 567 hectares (1401 acres). When one hutterite colony (3320 hectares) and three small horticultural operations were eliminated the average size dropped to 468 hectares (1156 acres). These results suggest that although established ecological-organic farms are slightly smaller, ecological-organic farming is feasible on large scales.

B. Crop Rotations

The crop rotations of the conventional producers surveyed were very similar to the ecological-organic and transitional producers in terms of length of rotation and the inclusion and length of legumes in the rotation (Table 6). Comparatively few conventional producers and a great many transitional producers were in the process of changing their crop rotations. The largest difference was in the use of green manure crops. Only 6% of the conventional producers surveyed included a green manure crop in the

rotation whereas 64% of both ecological-organic and transitional producers used them. There were also differences in green manuring practices. Ecological-organic producers most frequently (four of nine) plowed down the second cut of forage for green manure whereas transitional producers most frequently (eight of twelve) plowed down sweet clover which had not been previously cut. The use of buckwheat plowdown was not common in either group. This may be caused by the high cost of buckwheat seed and by the fact that buckwheat does not fix nitrogen.

C. Insect and Disease Problems and Controls

Twenty-nine percent of the conventional producers surveyed mentioned at least one perceived insect problem. In all five cases flea beetles were included. Aphids were mentioned twice. Insects were controlled in all cases using insecticides as a seed treatment or as a spray. Ecological-organic producers mentioned a perceived insect problem in 27% of the cases (three of eleven). In two cases no control measure was used because the problem was not considered serious enough to warrant control. In one case grasshoppers were controlled by burning infested portions of the crop. Thirty-six percent of transitional producers mentioned perceived insect problems. Flea beetles and aphids were the major problems. In 60% of the cases insecticides were used for control.

Except for flea beetles insect problems were minor for most of the producers interviewed. Ecological-organic producers seemed very aware of low population levels of insects in their fields which did not pose problames. Transitional producers had no more insect problems than others. Two cases of insect problems were in horticultural crops. In one case cabbage worms were controlled effectively using bacillus thuringiensis.

Fifty-three percent of conventional, 27% of ecological-organic, and 29% of transitional producers mentioned at least one perceived crop disease problem. Conventional producers most frequently mentioned smut in barley and fungus in canola. Seed treatments and fungicides were used for control. Ecological-organic producers most often mentioned ergot as a problem. In no case was it serious enough to warrant control. Transitional producers most often mentioned smut in barley. This was most often controlled by a seed treatment.

D. Weed Problems and Control

Every producer interviewed had at least one problem weed. It is interesting to note that each group of producers had different perceived weed problems (Table 7). Wild oats, wild millet, and quack grass were the major problem weeds of conventional producers. Ecological-organic producers' major problem weed was wild mustard. Transitional producers had wild oats, wild

millet, and wild mustard problems. All three groups had thistle problems.

The most striking difference between the three groups was how weed problems were controlled (Table 8). The conventional producers surveyed relied almost exclusively on herbicides to control weed problems in the field. Ecological-organic producers' major control methods were delayed seeding, summerfallow, fall cultivation, and post-emergence cultivation. Transitional producers had the most serious weed problems. They used herbicides but also relied heavily on the same cultural methods as ecological-organic producers.

There was a dramatic difference between how the conventional and ecological-organic producers surveyed perceived weed problems. Conventional producers were much less tolerant of any weeds in their fields. They gave the impression that what they really would like was to have an absolutely clean field. Consequently they were much more likely to see any weed infestation as a problem that required control. Ecological-organic producers were much more tolerant of weeds in their fields. They felt that as long as weeds did not smother the crop, that it was not worth it trying to control them. They were willing to take a yield reduction because of them. They mentioned benefits such as improved ground cover to reduce water erosion, additional organic matter being

TABLE SEVEN SPECIFIC PROBLEM WEEDS

Problem Weed	Percentage of Group Which Had This Problem Weed		
	Conventional	Ecological-Organic	Transitional
Wild Oats	59	27	92
Wild Mustard	29	73	58
Wild Millet	71	18	58
Canada Thistle	41	55	42
Quack Grass	35	9	17
Pigweed	12	9	29
Wild Buckwheat	18	0	29
Others	58	36	60
Size of Group	17	11	12

TABLE EIGHT WEED CONTROL METHODS

Weed Control Method	Percentage of Group Which Use Control Method		
	Conventional	Ecological-Organic	Transitional
Herbicides	100	9	64
Delayed Seeding	0	55	36
Summerfallow	12	36	29
Fall Cultivation	6	27	36
Post Emergence Cultivation	6	27	21
Alfalfa in Rotation	6	27	7
Row Cultivation	6	9	14
Other	0	36	15
Size of Group	17	11	14

produced, food for insects, and nutrients brought up from the sub-soil. If the weeds got away on the crop (particularly wild oats and thistles in low areas) they would cut the crop green and bale it for cattle feed. One transitional farmer wanted information on what weed populations reduce yields by what amount and how weeds compete amongst themselves to control each other. This question requires further research. The problem of weed control is an excellent example of how attitudes differ between conventional and ecological-organic producers. More information is needed to clarify the situation and allow for rational weed control methods.

E. Cultivation Practices

When comparing the types of cultivation equipment used, it is striking how similar all three groups of producers are (Table 9). Most cultivation was done using a chisel plow (heavy duty cultivator, deep tiller). Spring cultivation was usually done with light cultivators and harrows. About one quarter of ecological-organic and transitional producers did not do any fall cultivation. This indicates that most producers were aware of the importance of maintaining crop residues on the ground surface to reduce erosion.

From stubble in the fall to spring planting each group of producers cultivated the same number of times (Table 10). Ecological-organic producers cultivated

TABLE NINE TYPE OF CULTIVATION EQUIPMENT USED

Type of Cultivation Equipment Used	Percentage of Total Number of Operations Utilizing Each Type of Equipment					
	Conventional		Ecological-Organic		Transitional	
	Fall	Spring	Fall	Spring	Fall	Spring
Chisel Plow	43	9	54	5	67	15
Tandem Disc	17	0	8	3	5	0
Moldboard Plow	10	0	15	0	5	0
Light Cultivator	13	22	0	18	0	25
Harrow	13	22	15	37	19	28
Discer	3	7	8	3	5	0
Rod Weeder	0	0	0	5	0	0
Discer Seeder	0	9	0	11	0	13
Other Seeders	0	13	0	5	0	15
Unspecified Seeder	0	17	0	13	0	5
Total Number of Operations	30	46	13	38	21	40
Size of Group	17		11		13	

TABLE TEN FALL AND SPRING FIELD CULTIVATION FREQUENCY

	Conventional	Ecological-Organic	Transitional
Average Number of Times Stubble Cultivated in Fall	1.8	1.2	1.6
Average Number of Times Fields Cultivated in Spring	2.7	3.5	3.1
Total Number of Cultivations Stubble - Spring Planting	4.5	4.7	4.7
Size of Group	17	11	13

less in the fall and more in the spring. The increased spring cultivation was due to cultural weed control such as delayed seeding.

Ecological-organic and transitional producers cultivated summerfallow less than conventional producers. There were two reasons for this. Land fallowed after a plowdown crop means the land was bare for only half the summer. Conventional producers summerfallowed for the entire season. Conventional producers also cultivated more frequently because they were more concerned with weed growth. Ecological-organic and transitional producers let the weeds grow because of the perceived benefits of weeds previously explained. They were less concerned with weed seed production. One ecological-organic producer even mentioned weeds as a green manure crop.

4.3.2.3 Livestock Production

Livestock production practices were analyzed only in cases where livestock were a significant part of the farm operation. Only swine, beef, and dairy operations were analyzed. Poultry operations were significant in several cases.

A. Herd Size and Diversity

It was very difficult to compare the size of the various livestock operations of each of the three groups of producers because of low sample sizes. Several things

can, however, be noted. Large, intensive swine operations were absent on ecological-organic farms. The one ecological-organic fluid milk producer interviewed was small by industry standards (20 milking cows). Beef operations were dominant on ecological-organic farms (five of seven cases). Beef herds on ecological-organic farms (average 60 cows) were larger than on the conventional farms surveyed (average 33 cows). Beef herds on transitional farms were also large (average 54 cows). A larger percentage of the calves were finished on ecological-organic farms than on either the conventional or transitional farms surveyed.

Ecological-organic producers had the most diverse livestock operations with an average of 2.6 different livestock operations per farm. Transitional producers were less diverse (2.0 operations) and conventional producers were least diverse (1.6 operations). This is considering the following five types of operations: weanling hogs, feeder hogs, cow-calf, beef finishing, and dairy. Ecological-organic and transitional operations were even more diverse when other types of livestock are included.

B. Feed Sources and Rations

Ecological-organic and transitional beef producers usually (six of seven cases) used only on-farm

sources of forages and grains. Three of five conventional beef producers used only on-farm feeds. Ecological-organic dairy and swine producers frequently bought protein supplements (three of four cases) as did transitional producers (three of five cases). Conventional dairy and swine producers always (nine of nine cases) bought protein supplements. Often (four of seven cases) complete feed rations were purchased.

These results indicate that ecological-organic producers often use off-farm sources of protein. They do not use off-farm feed sources as frequently or to the same degree as do conventional producers.

It was not possible to make any conclusions about feed rations between the three groups. Each producer has different quality feeds and different feeding systems. A much more extensive questionnaire would be necessary to study this complex area of livestock production. A few brief comments about beef finishing rations will be made in the next section.

C. Time To Market

Ecological-organic hog producers were primarily involved in hog weaner (13-16 kg.) production. These weaners were sold at about the same size and weight as were conventionally produced weaners. Transitional producers took an average of 6.5 months to produce a market hog. Conventional producers surveyed took an

average of 5.7 months.

In beef production the situation was different. Transitional and conventional producers required an average of 14.3 and 15.4 months to produce a slaughter steer. Ecological-organic producers required an average of 23.2 months to do the same. This long time to market may be related to finishing rations. Normally, feeder beef steers are fed grain on a free choice basis with free choice low quality forage. Ecological-organic producers fed a restricted grain ration; i.e., grain was not fed free choice. This factor plus the lack of growth stimulants resulted in a longer time to market. The ecological-organic producers doing this seemed very aware of the financial sacrifices involved with keeping animals a long time before marketing.

D. Housing and Confinement Facilities

Winter housing for beef cows consisted of three-sided sheds on the conventional and transitional farms surveyed. Facilities on ecological-organic farms ranged from no protection to barns with heated sections for calving. All beef producers seemed reluctant to invest in livestock housing. Ecological-organic and transitional producers' dairy housing was often (five of seven cases) tie stall barns. The conventional producers surveyed more often (three of four cases) provided free stall loafing barns.

Swine housing facilities were much less intensive on ecological-organic farms. There were no facilities with slatted floors or farrowing crates. Concrete flooring was most common. In one case feeder hogs were pastured on alfalfa and housed in open sheds with straw bedding. Swine housing facilities of conventional and transitional producers favoured slatted concrete floors and total confinement.

E. Livestock Health

Ecological-organic producers mentioned an average of 1.0 perceived pest or disease problem. Transitional producers mentioned 1.9 and conventional producers mentioned 2.8. Flies and warbles were the major problems of transitional and conventional producers.

There were also major differences in the methods used to control pests and disease. The ratio of chemical or drug treatment, to non-chemical treatments was 0.7 for ecological-organic, 3.0 for transitional, and 3.8 for conventional producers. This indicates that the conventional producers surveyed were much more likely to use chemicals and drugs to treat disease and control pests than were ecological-organic producers.

The breeding herd replacement rate in beef herds was slightly lower for ecological-organic (10.6%) and transitional (11.0%) than for the conventional producers

surveyed (13.8%). Because of the small number of ecological-organic dairy and swine herds it was not possible to make comparisons in these cases.

The reasons for culling animals were similar for all three groups. Low milk production in dairy cows, poor calf production and old age in beef cows, and poor weaner production in sows were the primary reasons animals were culled.

Ecological-organic producers had slightly greater success breeding beef cows the first time (88%) than either transitional (82%) or conventional producers (72%). These are very rough estimates usually based on calving records.

These results are inconclusive because of the small numbers of producers surveyed. Another problem was lack of a common benchmark as to what constituted a pest or disease problem. Unlike weeds, ecological-organic producers did not seem more tolerant of pest problems or disease in their herds. The results indicate that livestock health on ecological-organic farms does not suffer because of lack of vaccinations or medical treatment.

Ecological-organic producers have views about the nature, causes, and treatment of disease which in many ways conflict with conventional medical thought. Live-stock health is the acid test for the claim of ecological-

organic farmers that crops grown ecological-organically are of superior nutritional quality and that when fed to livestock produce animals with superior health. More study in this area is needed.

4.3.2.4 Manure Handling

The manure handling practices of the ecological-organic producers were very similar to those of the transitional and conventional producers surveyed. Beef producers generally cleaned out corrals and sheds annually. Swine and dairy producers cleaned out barns daily when concrete floors were used. Manure was loaded onto trucks or manure spreaders using front end loaders. Ecological-organic and transitional producers rarely used liquid manure systems. Conventional producers frequently did. This was a reflection of differences in their housing facilities.

Manure was most frequently applied directly to the field by all three groups of producers. Manure was rarely composted or even piled. Only two of seven ecological-organic farmers and one of nine transitional farmer composted manure by piling, turning, and curing. Many said they had plans to do it in the future. The destruction of weed seeds was the most frequently given reason for composting. The extra labour and cost involved were the most frequently given reasons for not composting.

There is a body of opinion within the ecological-organic movement which insists that the central requirement of an ecological-organic farmer is that he compost manure and farm waste products. Lack of information about the costs and benefits of composting is preventing its evaluation by all types of producers. This is an area that requires further study.

4.3.2.5 Marketing

Nine of twenty-five ecological-organic and transitional producers sold part of their produce "organically." Seven of these nine received a premium. Four of these seven producers sold the majority of their products for a premium. Three of these four were ecological-organic grain farmers who had developed specialty markets in health food stores for processed cereal products. One ecological-organic producer sold a significant portion of his livestock "organically." The eighteen other ecological-organic and transitional livestock producers sold the vast majority of their animals through conventional marketing channels.

It was not possible to get a good idea of the size of the premiums received because of the small number of responses. The premium was charged or received principally because of a perceived higher quality product. Several ecological-organic producers emphasized that

"organic" produce cost the consumer more because of higher marketing costs, not because of higher production costs. Two of ten ecological-organic and transitional producers said the premium was necessary in order to farm ecological-organically. Both said all farmers needed a higher price and that if product prices rose to a "reasonable" level then they would not need a premium.

Although much has been said about the need of ecological-organic producers for premiums on their products because of higher production costs, no evidence of this was found from the producers surveyed. The marketing of "organic" cereals is much more widespread and advanced than marketing "organic" meat products.

4.4 Transition Period

4.4.1 Producer Perceptions and Motivations

There are large differences between conventional, ecological-organic, and transitional producers' perceptions of the disadvantages of ecological-organic agriculture (Table 11). Conventional producers surveyed most frequently said "worse weed problems," "lower crop yields," and "lower net income" were the biggest disadvantages. This echoes the common view that ecological-organic farms are overrun with weeds which reduce yields and net income. Ecological-organic producers did not agree. They checked "more labour required" and "few sources of reliable information" as the most important problems. Transitional

TABLE ELEVEN DISADVANTAGES OF ECOLOGICAL-ORGANIC AGRICULTURE

Disadvantage Of Ecological-Organic Agriculture	Percentage Of Each Group Which Agreed		
	Conventional	Ecological-Organic	Transitional
Few Sources Of Reliable Information	44	73	80
Weed Problems Worse	72	27	67
More Labour Required	39	82	27
Greater Expertise Needed	33	45	73
Lower Crop Yields	67	18	13
Lower Net Income	56	0	0
Other	44	100	80
Size of Group	18	11	15

TABLE TWELVE ADVANTAGES OF ECOLOGICAL-ORGANIC AGRICULTURE

Advantage Of Ecological-Organic Agriculture	Percentage Of Each Group Which Agreed		
	Conventional	Ecological-Organic	Transitional
Healthier For Farmer And Family	72	82	80
Better For The Soil	72	73	67
Better For The Environment	44	45	93
Higher Quality Product	17	45	40
Healthier Livestock	11	30	44
Other	72	91	60
Size of Group	18	11	15

producers checked "few sources of reliable information," "greater expertise needed," and "weed problems worse" as the biggest disadvantages. These are probably related: because they have little information, more expertise is needed to fight the weeds they do not know how to control. It is interesting that weed problems are a more serious disadvantage to conventional and transitional producers than to ecological-organic producers. The biggest disadvantage for ecological-organic farmers is that more labour is required.

There is, however, a consensus about the perceived advantages of ecological-organic agriculture (Table 12). All three groups ranked "better for the soil," "healthier for farmer and family," and "better for the environment" as the top three perceived advantages. The conventional producers surveyed cannot think these perceived advantages are worth working toward when weighed against the perceived economic disadvantages of ecological-organic agriculture.

Ecological-organic and transitional producers were asked why they changed to ecological-organic farming. They gave five major reasons. The most frequently mentioned reason was concern for the long term sustainability of agricultural production. This included concern for soil conservation and environmental protection. The next most frequently mentioned reason was concern

that by working against nature, the present farming systems would eventually destroy the health of mankind. The third factor was that they felt that the rising cost of fertilizers and pesticides had made their use uneconomic. The fourth factor was that health problems were developing from the use of agricultural chemicals. They particularly mentioned increased sensitivity to herbicides after prolonged use. The fifth reason cited were for moral reasons.

When asked if they had made financial sacrifices because of a move to ecological-organic farming, 40% of both ecological-organic and transitional producers replied that they had. The same number said they had made no sacrifices. Two producers said that initially sacrifices were made but that over the long run it had evened out. Two producers said they had benefited financially from their move to ecological-organic farming.

4.4.2 Producer Transition Period

Conventional producers were asked if they had ever considered trying ecological-organic farming. Four of seventeen had but did not change because of lack of information, weed problems, extra labour required, and lack of "organic" markets. Eight of ten conventional producers wanted more information about ecological-organic agriculture. The eight other conventional

producers selected because of their interest in ecological-organic agriculture all wanted more information about it. Conventional producers most frequently wanted information about non-chemical weed control, the value of organic matter in the soil and the most efficient ways to apply it, and financial information from functioning ecological-organic farms.

Twenty of twenty-six ecological-organic and transitional producers had farmed conventionally before they made the change. They had an average of 9.7 years of conventional farming experience before they started the transition. Their sources of information used in making the transition were books and magazines (68%), neighbours (21%), and organic fertilizer dealers (18%). Hanley (7), Rodale Press, and Acres U.S.A. were the publications most frequently mentioned. Half the producers found the information unreliable. Their most frequent complaint was that the information was not applicable for Canadian conditions. Three quarters of the ecological-organic and transitional producers found the information available to them inadequate when making their transition. Information on non-chemical pest control techniques was requested by 53% of these producers. Information on crop rotations and green manuring techniques was requested by 29% of these producers, composting details by 24%, and soil microbiological

analysis by 18%.

The average length of the transition was 5.7 years. This included six ecological-organic producers whose transition period was one year. The major problem encountered during the transition period was a more severe weed problem. This was mentioned by 55% of the producers. Lower crop yields were mentioned by 30% and lack of knowledge and inexperience by 20%. Lower net income and increased labour requirements were both mentioned by 10% of these producers. All of the ecological-organic and transitional producers said they would make the change again.

4.4.3 Barriers To Wider Acceptance

All the producers were asked what major barriers were restricting wider acceptance of ecolcgical-organic agriculture (Table 13). The conventional producers surveyed perceived different barriers than the ecological-organic or transitional producers. Perceived financial sacrifices and other technical barriers were most important for conventional producers. Ecological-organic and transitional producers thought farmers had been brainwashed by chemical companies into thinking that chemicals were essential. The other barriers they perceived primarily involved institutions and attitudes. All three groups agreed on one thing, lack of information was a major barrier.

TABLE THIRTEEN MAJOR BARRIERS TO THE ACCEPTANCE OF ECOLOGICAL-ORGANIC AGRICULTURE

Factor Seen As A Major Barrier	Percentage Of Each Group Which Agreed		
	Conventional	Ecological-Organic	Transitional
Farmers have been convinced by chemical companies that there is no other way to farm except by using chemicals	22	64	53
Lack of information caused by the education system not recognizing ecological-organic agriculture	44	45	47
Inertia of society makes it difficult for attitudes to change	28	18	47
Financial sacrifices are required	67	18	7
Government policies such as cheap food, massive grain exports and emphasis on food quantity, not quality	6	27	20
Other "technical" barriers	67	18	40
Other "institution" or "attitude" barriers	28	50	40
Size of Group	18	11	15

These differences in perceived barriers were also evident in the expert survey. All six conventional experts saw economic factors as the major barrier. Ecological-organic experts felt government policies, vested interests in society, and lack of adequate information and research were the major barriers.

The industry survey also illustrated this split. Only one industry representative thought ecological-organic agriculture was viable. The other five cited economic barriers: reduced production and increased costs of production would lead to increased food costs. This was particularly clear to the livestock producer organizations who felt that growth stimulants were essential to reduce production costs and maintain their market share. The industry survey asked whether the organization served the needs of ecological-organic agriculture. Generally the answer was "no." Not because they would not, but because there were not a significant number of ecological-organic producers. They indicated they would be more supportive and accommodating if more producers made the change to ecological-organic farming.

Those within the agricultural industry point to economics as the barrier to wider adoption of ecological-organic farming. Those outside the industry say the present economic situation is the result of government policies which reflect the values of society. This

difference of opinion is the heart of the debate. Everyone surveyed agreed that more information is needed to resolve it.

4.5 Effects On Feed and Livestock Industry

The experts were asked what the effects of ecological-organic agriculture would be on the feed and livestock industry. Five of ten experts who answered this question thought livestock production would become more decentralized. Feed lots and intensive swine operations would be replaced by a return to mixed farms. Two of ten said the livestock industry would be better off. Two experts directly addressed the effects on the feed industry. Both predicted that the feed industry would be reduced in scope as producers became more self-sufficient in feed production. Both mentioned reduced grain consumption by ruminants as grasses and forages made up a larger portion of their ration. A reduced feed industry would also be the result of decentralized swine production.

These opinions are supported to a certain degree by the results of the producer survey. As previously discussed, the ecological-organic and transitional producers were less likely to purchase feed from feed companies. Their livestock operations were more diverse but not necessarily smaller. The absence of a total confinement farrow to finish swine operation by an

ecological-organic producer surveyed supports the opinion that these operations are not appropriate for ecological-organic agriculture. Large (40 and 400 sow) swine cperations were, however, operated by a few transitional producers.

Industry representatives were asked what the major effects on their organizations would be of a transition to ecological-organic agriculture. Producer organizations indicated willingness to adapt to the new demands of ecological-organic producers. Marketing agencies recognized that major changes would be required, including a separate grade of meat. Only a major shift to ecological-organic production would make this feasible. The feed industry representative clearly saw that a total transformation of the feed industry would be necessary to supply ecological-organically produced feeds without drug supplements and with natural supplements. The scale of the feed industry was not expected to decline.

Ecological-organic agriculture must first be clearly defined and understood. Then it must show dramatic growth before the feed and livestock industries will accommodate their special needs. Most representatives indicated their organizations would be willing to adapt.

CHAPTER V CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Modern agriculture is dependent on inputs of energy, fertilizers, and pesticides which have increased in price dramatically over the past decade. Low farm product prices combined with these high priced inputs are causing cash flow problems to mount for farmers. Concern is also increasing for environmental quality and soil fertility. These factors are causing farmers to consider alternative farming methods. Ecological-organic farming may be an alternative. Lack of reliable, adequate information is stopping farmers from making rational assessments of ecological-organic agriculture.

What role does livestock play in ecological-organic farming? What problems should be expected during the transition from conventional to ecological-organic farming? What would the effects of a transition be on Manitoba's feed and livestock industries? The objectives of this study were to help answer these questions.

The study consisted of three activities. Twelve agricultural professionals were surveyed concerning the role of livestock in ecological-organic farming and the effects of a transition to it on the existing feed and livestockstock industry. Forty-four farmers were interviewed in person. Conventional producers, conventional producers interested in ecological-organic farming, producers making

a transition to ecological-organic farming, and ecological-organic farmers were included. Six feed and livestock industry representatives were also interviewed. A brief summary of the results of these surveys follows.

5.2 Summary of Results

This section briefly summarizes the results presented in Chapter Four. Included from Chapter One is a discussion of the term ecological-organic agriculture. Discussion of the roles of livestock in ecological-organic agriculture and on ecological-organic farms includes information from Chapter Two.

Explaining ecological-organic agriculture was relatively successful. The explanation on the summary sheet (Appendix H) proved generally acceptable to the ecological-organic experts and farmers surveyed. During the course of the study this explanation was refined. For purposes of this study ecological-organic agriculture was explained this way:

Ecological-organic agriculture is a farming philosophy based on four components:

(1) Recognition of the vital role soil humus plays in maintaining soil fertility.

(2) Recognition of a relationship between fertile, humus-rich soils; healthy nutritious crops; and healthy animals (1), (8). Poor nutrition

and environmental stress produce disease and attract pests (1), (8).

(3) Recognition of all ecological principles, including diversity and nutrient cycling. It attempts to work with nature, within nature, using nature's principles.

(4) Elimination of highly soluble chemical fertilizers, insecticides, herbicides, fungicides, growth stimulants, and feed medication is highly desirable.

Most experts did not think a rigid definition of ecological-organic agriculture was appropriate. The need for one was, however, clearly demonstrated when people only partially familiar with the field were asked what ecological-organic agriculture was. Rigid definitions seem appropriate for discussion purposes and as marketing standards.

The literature review, expert survey, and producer survey agreed that livestock are important in ecological-organic agriculture. There was disagreement as to whether they were essential on every ecological-organic farm. Efficient use of green manures, biological soil inoculants, and rock powders were seen by some as being able to maintain adequate soil humus levels without livestock. This latter statement was not investigated by this study and needs further study. Conventional,

ecological-organic, and transitional producers kept livestock for the same reasons and used the same factors when deciding how much livestock to have. This suggests that the roles livestock play in conventional mixed agriculture and ecological-organic agriculture are similar.

Although ecological-organic farms were frequently small, there were cases of them being quite large. Transitional farms tended to be the same size as conventional farms. This indicated that ecological-organic agriculture is not limited to small scale operations. Crop rotations were similar in all three groups, although the use of green manure crops was much more common by ecological-organic and transitional producers. Except for flea beetles, insect problems were minor for all groups of producers. The lack of effective non-chemical flea beetle control all but eliminated canola from ecological-organic farms. All producers had weed problems. The problem weeds were different for each group. Transitional producers had more weed problems than either conventional or ecological-organic producers. There was a different attitude to weeds between the three groups. Conventional producers wanted them eliminated, ecological-organic producers wanted them controlled.

Livestock operations were more diverse on ecological-organic farms. Intensive swine operations were absent and fluid milk dairy operations were rare.

Ecological-organic producers tended to use more on-farm feed sources, although protein supplements were often purchased. It took transitional producers one month longer to raise market hogs than conventional producers. Ecological-organic producers fed a limited grain finishing ration and used no growth stimulants. Ecological-organic producers took an average of one year longer to produce a market steer than conventional producers. Livestock housing facilities were more intensive in conventional operations.

Manure handling practices were very similar in all three groups. Composting of manure was done by only a few ecological-organic producers. Lack of information about the costs and benefits of composting was the major barrier to a better understanding of composting.

Very little ecological-organically produced grain or livestock was marketed "organically," at a premium price. It did not appear that premiums were charged because of higher costs of production. They were charged to cover higher marketing costs and because of a perceived higher quality product.

The most vivid example of how conventional producers differed from ecological-organic and transitional producers was in their perceptions of the disadvantages of ecological-organic farming. Conventional producers believed lower crop yields, weed problems, and

lower net income made ecological-organic farming economically unattractive. They did agree on the advantages. The producer groups all thought ecological-organic farming was healthier for farmer and family and better for the soil and the environment. Ecological-organic and transitional producers made the transition to ecological-organic farming because of concern for the long term viability of our present food production systems. The average transition period was about five years. It was characterized by increased weed problems and lower crop yields. Lack of adequate and reliable information was also a major problem during the transition period.

The barriers to wider acceptance of ecological-organic agriculture were seen differently by each group. Conventional producers said financial problems were the heart of the problem. This reflected their perceptions of the disadvantages of ecological-organic farming. Ecological-organic and transitional producers saw the barriers as institutional inertia and difficulty in changing the attitudes of society. This split was reinforced by the expert survey. Conventional experts cited economic factors while ecological-organic experts said the problem was the institutions and attitudes that have created the present economic situation. Everyone agreed on one thing. Lack of information was hindering a fuller evaluation of ecological-organic

agriculture.

Results from the expert survey indicated that livestock production would become less intensive and more decentralized if ecological-organic agriculture were more widely practised. The feed industry would be reduced in scale as producers became more self-sufficient in feed production. This was supported by results of the producer survey. Industry representatives said major changes would be necessary in their organizations to accommodate ecological-organic agriculture. Changes would only be made when there was a significant number of ecological-organic producers.

5.3 Conclusions

(1) Livestock, particularly ruminants, can play a valuable role in ecological-organic agriculture utilizing soil-building forages, crop residues, and waste products. They can also stabilize farm incomes and diversify farm ecosystems. These roles are similar to those played by livestock in conventional mixed farming. There was disagreement as to whether livestock are essential on every ecological-organic farm. Whether green manure crops, grain legumes, rock powders, and soil inoculants can maintain adequate soil humus levels without livestock is still a matter of debate. It was agreed that

ecological-organic farming is much easier with livestock.

(2) The transition process from conventional to ecological-organic farming is difficult. Yields are often reduced and weed problems often get worse. Lack of adequate, reliable information is a major problem for farmers attempting the transition.

(3) The feed and livestock industry will be one of the last sectors of agriculture to be affected by a transition to ecological-organic agriculture. Changes in crop production practices often occur before changes in livestock production. If a widespread move to ecological-organic farming were to occur the livestock industry would have to accommodate new grades of meat. Livestock production would become more decentralized and less intensive. The feed industry would be more drastically affected. Ecological-organic farms tend to be more self-sufficient in feed production. A new attitude towards animal health would necessitate new health products and feed supplements.

(4) The lack of reliable information is the major barrier restricting a rational assessment of ecological-organic farming by the agricultural

industry. This lack of information causes the discussion to degenerate into emotionally charged, philosophical debates about attitudes. Areas for further study are discussed in section 5.5.

(5) A rigid definition of "Ecological-Organic Agriculture" is necessary as a benchmark for discussion, communication, and educational purposes. It would also be invaluable in the marketing of ecological-organically grown produce.

(6) The debate and assessment of ecological-organic agriculture should involve the general public. The nature of society's food production systems is a reflection of its values and attitudes. Ecological-organic agriculture reflects three values and attitudes. To be accepted, these values and attitudes must be understood by society. They are: (1) concern for a healthy and diverse rural environment, (2) more emphasis on food quality, (3) a long term economic planning horizon aimed at long range sustainable agricultural production.

5.4 Recommendations

(1) The MDA should appoint a task force to act as

the focal point for further evaluation of ecological-organic agriculture.

Its short term responsibilities should be as follows:

(i) Initiate the economic analysis of ecological-organic agriculture in Manitoba suggested in section 5.5.

(ii) Contact Agriculture Canada, other provincial agriculture departments, and the University of Manitoba to gather information and co-ordinate further activities. The Quebec Department of Agriculture currently has a special five-year program called "Pilot Ecological Farms." This type of program would be invaluable when developing demonstration projects in Manitoba.

(iii) After discussion with ecological-organic farmer organizations and marketing agencies, the task force should develop a definition of ecological-organic agriculture which will be used for further discussion and which will form the basis for ecological-organic marketing standards in Manitoba.

(iv) Initiate discussion and debate within the MDA. This will help to further uncover relevant information, define areas for further

study, and prepare staff for further participation.

(v) Collect information in the areas for further study outlined in section 5.5. A lot of research exists on ecological-organic agriculture particularly in Europe which has not been evaluated. Extensive literature reviews are necessary before gaps in the literature can be found.

The long term responsibilities of the task force should be as follows:

(i) Define information gaps which were outlined by the information search, and propose research projects to fill the gaps.

(ii) Propose mechanisms to disseminate information about ecological-organic agriculture to MDA extension staff and ultimately to the farmers.

(iii) Propose mechanisms to demonstrate ecological-organic farming techniques to the farming community. Emphasis should be placed on the transitional process and problems associated with it.

(2) The University of Manitoba should offer a course in Ecological-Organic Agriculture to diploma and degree students. Lack of ecological-organic training and knowledge due to an inadequate educational

system was seen as the second most important barrier to the acceptance of ecological-organic agriculture by all three groups of producers surveyed.

(3) This last recommendation is addressed to farmers interested in making a transition to ecological-organic farming. Proceed with caution, ecological-organic farming is not the solution for those who have financial problems and are looking for a fast way to cut costs.

Farmers should make the transition one field at a time. A soil humus building program should be started that fits each individual's situation. After this program is established, fertilizer rates and herbicide use can be slowly reduced. Elimination of highly soluble chemical fertilizers, herbicides, and pesticides is the last step in the transition, not the first.

Miracle "organic" products should not be expected to solve problems in one year. They may have a place in the transition process. It may be appropriate to try them on a small scale. An understanding of how and why they work is necessary before any large commitment is made.

Extension agents will respond to repeated requests for information. Individuals' interest in ecological-organic farming should be made known.

Keep asking basic questions. Pressure from the grass roots is the most effective way to change extension services.

Getting to know other ecological-organic farmers in the area and talking to them about their mistakes and successes may be an interested farmer's best source of information at the present time.

5.5 Areas For Further Study

Lack of reliable, adequate information was repeatedly mentioned as a major barrier limiting the rational assessment of ecological-organic agriculture. This suggests that there is need for further study. The areas suggested here for further study are not an exhaustive list. The list addresses those areas which were delineated by the study.

(1) Several aspects of ecological-organic "philosophy" have not been adequately proven. These questions must be answered:

- does soil rich in humus adequately supply nutrients for healthy crop production?
- are crops and livestock grown ecological-organically less attractive to and more resistant to pests and disease?
- are crops and livestock grown ecological-organically of superior nutritional quality?

(2) Lack of information on the financial aspect of

ecological-organic farming has resulted in a wide divergence of "opinion" regarding the economics of ecological-organic agriculture. An economic analysis of ecological-organic agriculture/farming in Manitoba is needed.

(3) The question of whether adequate soil humus levels can be maintained without livestock was not resolved. Research under Manitoba conditions should be initiated to clarify this important point.

(4) Farmers lack knowledge about soil microbiology. They need this information in order to grasp an integrated concept of soil fertility. The role soil microbes play must be understood before they can assess the importance of soil organic matter and possible harmful side effects of fertilizers, herbicides, and pesticides.

(5) Farmers lack knowledge about the costs and benefits of weeds. Information about weed-to-weed competition, effects on yields, and economic threshold populations of weeds is essential for rational weed control. Non-chemical weed control information was requested by many of the producers interviewed.

(6) Many of the producers interviewed requested information on the health aspects of herbicide and pesticide spraying and on handling chemically treated grain and seed.

(7) Information about the benefits and costs of compost was requested by many producers. Alternate composting systems for different types of manures and waste products should be studied.

(8) Canola is not grown by ecological-organic producers because of flea beetle problems. Non-chemical methods of flea beetle control in canola should be studied.

(9) The soil testing services available to ecological-organic farmers are not appropriate for their needs. Soil tests for microbiological activity and detailed soil organic matter analysis should be investigated.

(10) "Organic" fertilizers, foliar sprays, seed treatments, and biological soil inoculants should be tested and evaluated so farmers can choose those products which are appropriate for their needs.

(11) A consumer survey should be conducted to determine whether consumers are willing to pay a premium for meat which is produced "ecological-organically."

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of Soil Science
University of Alberta
Edmonton, Alberta

(2) Dr. O. W. Grussendorf
Biodynamic Farmer
Woodlands, Manitoba
R0C 3H0

(3) Dr. Stewart Hill
Ecological Agriculture
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(4) Dr. H. H. Koepf
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(5) Dr. W. Lockeretz
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APPENDIX B AGRICULTURAL PROFESSIONAL QUESTIONNAIRE

(1) Please define:

1. Ecological Agriculture
2. Biological Agriculture
3. Organic Agriculture
4. Bio-Dynamic Agriculture

Which term do you identify with?

Please comment on the definition of ecological-organic agriculture given on the attached summary sheet.

Are rigid definitions appropriate for these forms of agriculture?

(2) What is the role of livestock in these forms of agriculture and why?

(3) What role does livestock play in these forms of agriculture in areas you are familiar with?

(4) Is it possible to practice these forms of agriculture without livestock? If so, what special adaptations must farmers make? Is this happening in any areas you are familiar with?

(5) If these forms of agriculture were widely adapted, how would the existing livestock and feed industries be affected? How have they been affected by these forms of agriculture in your area?

(6) What is restricting wider acceptance of these forms of agriculture?

(7) What could governments do to facilitate a wider understanding and acceptance of these forms of agriculture? Have governments in your area taken any of these steps?

(8) Would you like a copy of the results of this study?

Thank you for your time.

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1. Francis Anderson
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   R0G 1E0
   746-8887
   Ecol-Org

2. Sam Appleby
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   326-2276
   Conventional

3. Joe Arthurs
   R. R. #2
   Dauphin, Manitoba
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   638-7415
   Conventional

4. Norman Beckman
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   Steinbach, Manitoba
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   326-2757
   Ecol-Org

5. Fred Bieber
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6. Real Brindle
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   Ecol-Org

8. George Coffey
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   Transitional

9. Rennie Desharmais
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   433-7261
   Conventional-interested

10. Alan Detrich
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    Ecol-Org

11. Gerard Dubé
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    Transitional

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    378-2716
    Transitional

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    268-3219
    Conventional-interested

15. Len Harpiak
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569-4821
Transitional

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Transitional

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Conventional-interested

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19. Fred Krym
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Conventional-interested

20. Claude Lord
Marchand, Manitoba
R0A 0Z0
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Ecol-Org

21. Hugh Mackay
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R7A 1A8
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Transitional

22. Al McCallum
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343-2077
Transitional

23. John Murta
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R0G 0T0
828-3388
Conventional

24. Owen Nicholson
General Delivery
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R7N 2T3
638-7542
Conventional-interested

25. Bill Olson
Box 234
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634-2429
Ecol-Org

26. Gordon Orchard
Box 188
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435-2059
Conventional

27. Lloyd Osbourne
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523-8536
Conventional-interested

28. Calvin Pitura
Domain, Manitoba
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736-2849
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29. Bob Pizey
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Ecol-Org

38. Al Scheresky
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S0C 0C0
1-306-425-4911
Ecol-Org

39. Alex Scott
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R0M 2C0
748-1778
Transitional

40. Bob Smith
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41. Richard Snider
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R0G 0A0
744-2444
Conventional-interested

42. Reg Stowe
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R0G 0J0
745-3252
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43. Paul Waldner
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Brandon, Manitoba
R7A 5Y4
728-3830
Transitional

44. John Whitehead
Box 61
Roland, Manitoba
R0G 1T0
343-2063
Conventional

APPENDIX D PRODUCER QUESTIONNAIRE

NAME: _____

INTERVIEW DATE: _____

SECTION A: CROP PRODUCTION

1) How much land which you farm is:

	OWNED (acres)	RENTED (acres)
(a) Grains, oilseeds and special crops	_____	_____
please specify: _____		
(b) Summerfallow	_____	_____
(c) Forage Crops	_____	_____
(d) Permanent Pasture	_____	_____
(e) Unused Wetland and Woodland	_____	_____
(f) Other (please specify):	_____	_____
(g) Total Acres Farmed (acres)	_____	_____

2) Do you farm the rented land differently from the land you own? If yes, how?

_____

_____

3) Briefly describe your field crop rotations:

_____

_____

_____

_____

_____

4) Do you use green manure (plow down) crops? If yes, briefly describe your practices:_____

_____

_____

_____

_____

5) Do you presently apply the following on your land? YES or NO

(a) Super Phosphate (11-55-0) _____

(b) Potash (0-0-60) _____

(c) Anhydrous Ammonia (82-0-0) _____

(d) Other nitrogen, phosphorous or potassium fertilizers _____

if yes, please specify: _____

_____

(e) Sulfur _____

if yes, please specify in what farm: _____ _____

_____

(f) Lime (calcium) _____

if yes, please specify in what farm: _____

_____

(g) Rock Phosphate _____

(h) Trace Minerals _____

if yes, please specify: _____

_____

(i) Foliar Spray _____

if yes, please specify: _____

_____

(j) continued next page

(j) Sewage Sludge _____

(k) Biological soil conditioner _____

if yes, please specify: _____

(l) Manure from an off farm source _____

if yes, please specify type: _____

(m) Manure from an on farm source _____

(n) Insecticides _____

if yes, please specify pest, insecticide and crop

applied to: _____

(o) Herbicides _____

_____ _____

(p) Other _____

6) Do you use soil tests? _____

if yes:

(a) Where are the samples analyzed? _____

(b) What are the samples analyzed for? _____

(c) Do you follow the recommendations? _____

7) Do you inoculate legume seeds before planting? _____

8) Where do you get your seed? _____

_____

_____

9) Do you use treated and or coated seed? If yes, please specify: _____

_____

10) Briefly describe any insect, weed and or crop disease problems you have and how they are controlled: _____

11) Briefly describe your tillage equipment and practices: _____

SECTION B: LIVESTOCK PRODUCTION

12) Briefly describe the size of your herd: _____

13) Are you presently using:

	YES OR NO
(a) Mineral Supplements	_____
(b) Vitamin Supplements	_____
(c) Antibiotics in the feed	_____
(d) Growth Hormones	_____
(e) Iron Injections	_____

(f) continued next page

(f) Castration _____

(g) Artificial Insemination _____

(h) Vaccinations _____

if yes, please specify: _____

_____

14) What are the sources of feed for your livestock? _____

_____

_____

_____

_____

15) Briefly describe your livestock feed rations throughout the year: _____

_____

_____

_____

_____

_____

16) How would you describe your livestock operation?

(a) Cow - Calf _____

(b) Stocker _____

(c) Finishing _____

(d) Cow - Calf to finishing _____

(e) Weaner _____

(f) Farrow to finish _____

(g) Dairy _____

(h) Other, please specify: _____

_____

17) At what age and weight are animals bought (if applicable) and sold? _____

_____

_____

_____

_____

18) Dairy Producers only:

(a) What is your "TAP"? _____ _____ _____

_____

(b) What is your "DE"? _____

(c) What is the herd's average milk production/cow?

(kg /cow) _____ _____ _____

(d) What is your herd's average milk butterfat content? (kg/hl)?

_____ _____

(e) What is your herd's average milk protein content? (kg/hl)?

_____ _____

19) Briefly describe your livestock housing and confinement facilities: _____

_____

_____

_____ _____

_____

20) Briefly describe your manure handling system: _____ _____

_____ _____

_____ _____

_____

_____ _____

21) Do you compost manure and or farm waste products? If not, why? _____

22) Briefly describe any pest and or disease problems you have and how they are controlled: _____

23) What is your breeding herd replacement rate? _____

24) What are the major reasons for culling animals? _____

25) What percentage of your herd conceives the first time bred? _____

SECTION C: PRODUCER ATTITUDES

26) Did you consider your production systems to be:

(a) Not Ecological-Organic _____

(b) Ecological-Organic _____

(c) In a transition to Ecological-Organic _____

(d) Other (please specify):_____ _____

_____ _____

27) What are the disadvatages of Ecological-Organic agriculture? (Please rank the four of most importance).

(a) Lower crop yields _____

(b) Few sources of reliable information _____

(c) More labour required _____

(d) Difficult to market Ecological-Organic products _____

(e) Harder to get loans _____

(f) Greater expertise needed _____

(g) Weed problems worse _____

(h) Lower net income _____

(i) Difficult to get enough manure _____

(j) People look down on Ecological-Organic farmers _____

(k) Specialized equipment not available _____

(l) Others (Please specify): _____

28) What are the advantages of Ecological-Organic agriculture? (Please rank the four of most importance)

(a) Consumes less energy _____

(b) Higher net income _____

(c) Healthier livestock _____

(d) continued on next page

(d) Better for the soil _____

(e) Less dependence on outside suppliers _____

(f) Tillage easier _____

(g) Healthier for farmer and family _____

(h) Yields suffer less under adverse conditions _____

(i) Better for the environment _____

(j) Closer to the type of farming encouraged by your religion _____

(k) Higher quality product _____

(l) Others (please specify): _____

Conventional Producers Only:

29) Have you ever considered making a transition to ecological-organic farming?

if yes, why did you decide to remain conventional? _____

_____

_____

_____

30) Would you like to know more about ecological-organic farming?

if yes, what information would you need in order to assess a transition to ecological-organic farming? _____

_____

_____

_____

SECTION D: TRANSITION PERIOD (Ecological-Organic and Transition Farmers Only)

31) Have you ever farmed conventionally? _____

32) If yes, where and when. _____

_____

33) Why did you decide to change to ecological-organic farming? _____

_____

_____

_____

34) Where did you get the information you used in deciding to farm ecologically-organically?

(a) neighbours _____

(b) extension agents _____

(c) organic fertilizer dealers _____

(d) books and magazines _____

(e) other (specify) _____

35) Was the information you received adequate and reliable? If not, what other information would have been useful? _____

_____

_____

_____

36) What stage of the transition are you in? _____

_____

37) When do you expect (did you) to complete the transition? _____

_____

38) How long was (or do you expect to be) your transition period? _____

_____

39) What problems have you experienced during the transition period? _____

_____

_____

_____

40) Have you made financial sacrifices because of your move to ecological-organic agriculture? _____

41) Would you make the decision to farm ecologically-organically again? _____

LIVESTOCK PRODUCERS ONLY:

42) Why do you have livestock? _____

43) Did the role livestock play on your farm change after you were farming ecologically-organically? If yes, how and why? _____

44) What factors did you consider when deciding how many livestock to have on your farm? _____

45) Is an ecological-organic farm feasible without livestock? Why? _____

PRODUCERS WITH NO LIVESTOCK ONLY:

46) Has the lack of livestock on your farm made ecological-organic farming more difficult? If yes, why and what have you done to compensate? _____

SECTION E: MARKETING

47) Briefly describe how your farm products are marketed:_____

_____ _____

_____

_____

_____ _____

If Ecological-Organic or Transitional:

48) Has your marketing pattern changed since the change to ecological-organic farming? If so, how and why? _____ _____

_____ _____

_____

49) Do you receive a premium for any of your products? _____

If yes,

(a) What products receive a premium? _____ _____

(b) What premium do you receive? _____

(c) Why do you charge the premium? _____

_____ _____

(d) Is the premium necessary in order to make ecological-organic farming economically viable? _____ _____ _____

_____

SECTION F: BACKGROUND

50) What is your age: (please check)

(a) under 30 _____

(b) 31 to 40 _____

(c) 41 to 50 _____

(d) 51 to 60 _____

(e) over 60 _____

51) How many years have you farmed?_____

52) What level of education do you have? (please check)

(a) some high school _____

(b) high school graduate _____

(c) diploma: agriculture _____ other _____

(d) some university: agriculture _____ other _____

(e) university graduate: agriculture _____other _____

53) Please state number of days/year of off-farm work done by yourself and spouse:

_____

54) Do you hire outside labour? If yes, please describe its nature and amount (days/year) _____

_____

_____

55) Please describe any additional (family or unpaid) labour which aids in the farm operation: _____

_____

56) Do you maintain detailed farm records of expenses, receipts and production? ____

_____

57) What are the major barriers restricting wider acceptance of ecological-organic farming? _____

_____

_____

58) How could government, universities, and the agricultural industries help in a better understanding of ecological-organic farming by the farm community? _____

_____

_____

59) Further comments: _____

_____ (over)

Thank you for your time.

APPENDIX E ADDITIONAL PRODUCER QUESTIONNAIRE DATA

1. Soil Testing (Question 6)

There were large differences in soil testing practices of the three groups of producers. The conventional producers surveyed had their soil tested regularly in 71% of the cases and followed the fertilizer recommendations in 75% of the cases. Only 36% had a complete test done. Almost all had the tests done by the Manitoba Soil Testing Laboratory. Ecological-organic producers had their soil tested regularly in 18% of the cases. They had complete analyses done by U.S. laboratories. They did not follow the fertilizer recommendations. Transitional producers had soil tested in 50% of the cases. They had complete analyses done in 86% of the cases. U.S. laboratories did the analyses in 43% of the cases. Only 14% followed the fertilizer recommendations.

These results should not suggest that ecological-organic producers are not interested in soil fertility. Available soil tests are just not appropriate for their needs. Ecological-organic producers want a detailed soil organic matter analysis including humus and microbiological activity tests. These tests are, at present, not readily available to them.

2. Legume Seed Inoculation (Question 7)

Legumes were inoculated by almost everyone: 80% of conventional producers, 82% of ecological-organic producers, and 86% of transitional producers.

3. Seed Sources (Question 8)

Seed Source	Percentage of Group		
	Conventional	Ecological-Organic	Transitional
Private Seed Company	45	24	29
Local Elevator	15	19	14
Registered Seed Growers	20	29	14
Breeder Seed	10	0	0
Producer's Own Seed	10	29	33
Neighbours and Relatives	0	0	10
Size of Group	17	11	14

4. Seed Treatments (Question 9)

Seed treatments on corn, barley, and canola were used by 59% of the conventional producers surveyed. Eighteen percent of ecological-organic producers used treated alfalfa seed. Forty-seven percent of transitional producers used seed treatments on corn, alfalfa, and barley. Agrispon,

Stim-gro, and seaweed extract were each used to treat seed in one case by transitional producers.

5. Age (Question 50)

Age Group	Frequency in Group		
	Conventional	Ecological-Organic	Transitional
Under 31	2	2	1
31 - 40	6	3	8
41 - 50	4	1	5
51 - 60	2	4	1
Over 60	4	1	0
Size of Group	18	11	15

6. Level of Education (Question 52)

Educational Classification	Frequency in Group		
	Conventional	Ecological-Organic	Transitional
Less Than Grade 9	3	1	2
Some High School	2	4	5
High School Graduate	5	2	2
Diploma - Agriculture	4	1	0
Diploma - Other	0	1	1
Some University - Agriculture	0	1	0
Some University - Other	2	2	1
University Graduate - Agriculture	2	0	1
University Graduate - Other	0	0	3
Size of Group	18	11	15

7. Miscellaneous Data (Questions 51, 53, 54, 55, 56)

	Conventional	Ecological-Organic	Transitional
(51) Mean number of years of farming experience	22.5	20.1	15.3
(53) Mean number of days of off-farm work done annually by farmer and wife	32	29	15
(54) Mean number of man-days/year of hired labour	240	40	78
(55) Percentage of producers who receive additional family or unpaid labour	22	36	46
(56) Percentage of producers who maintain detailed farm records	89	36	79

APPENDIX F FEED AND LIVESTOCK INDUSTRY REPRESENTATIVES

(1) Art Dilworth
Manager
Livestock Division
Manitoba Pool

(2) Bob Douglas
Executive Secretary
Manitoba Farm Bureau

(3) Ron Frieson
Manitoba Chairman
Canadian Feed Industry Association

(4) Charlene Graham
General Manager
Manitoba Cattle Producers Association

(5) Art Rampton
Chairman
Manitoba Milk Marketing Board

(6) Larry Segwick
Assistant Manager
Manitoba Hog Marketing Board

APPENDIX G FEED AND LIVESTOCK INDUSTRY QUESTIONNAIRE

Name of Organization:_____

Name and Position of Person Interviewed:_____

Date of Interview:_____

1) What does your organization understand "ecological-organic agriculture" to mean?

_____

_____

_____

_____

2) Is it a viable form of agriculture? Why or why not? _____

_____

_____

_____

_____

_____

3) Do you recognize and serve the needs of ecological-organic producers? If yes, how? If no, why? _____

_____

_____

4) What would be the major effects of a transition to ecological-organic agriculture on your organization? Could you accommodate these changes?

_____

_____

_____

_____

APPENDIX H SUMMARY SHEET

SUMMARY OF PRACTICUM PROPOSAL
"EFFECTS OF A TRANSITION TO ECOLOGICAL-ORGANIC
AGRICULTURE ON LIVESTOCK PRODUCTION IN MANITOBA"

PROBLEM STATEMENT

Modern agriculture requires large inputs of expensive fuel, pesticides and inorganic fertilizers to maintain high production levels. Low farm product prices and high interest rates have recently combined to put farmers in a cost-price squeeze. Concern is also increasing for deteriorating soil fertility and environmental quality. Short-term economic pressure and long-term conservation-environmental concern is making farmers consider alternate farming methods. Misinformation, confusion and often antagonism characterize farmers' knowledge of and attitudes toward ecological-organic agriculture. Farmers must be informed before they attempt a transition to ecological-organic agriculture.

Ecological-organic agriculture usually combines crop and livestock production. Forage produced in crop rotations are fed to livestock whose manure forms the basis of ecological-organic soil fertility. In some areas livestock production is not appropriate. Is ecological-organic agriculture feasible in these areas? If so, what special adaptations are necessary?

OBJECTIVES

1) To examine the relationship of a livestock enterprise to an ecological-organic farm. Feed and livestock production, manure handling, and marketing will be focused on.

2) To examine the transition period in detail. Producer motivations, expectations and problems will be examined.

3) To examine the effects on the Manitoba livestock and feed industries of a transition to ecological-organic agriculture.

ECOLOGICAL-ORGANIC AGRICULTURE DEFINED

A farming philosophy based on four components:

1) Recognition of ecological principles such as diversity, appropriateness, and nutrient cycling. It attempts to work within nature, using nature's principles.

2) Recognition of the vital role soil humus plays in maintaining the soil's biological, chemical and physical fertility.

3) Recognition of the relationships between fertile humus-rich soil, healthy nutritious crops and animal health. Poor nutrition and environmental stress produce disease and attract pests.

4) Consequently, elimination of highly soluble chemical fertilizers, pesticides and growth regulators, are highly desirable.

METHODS

1) Review of related literature.
2) Producer interviews.
3) Ecological-organic expert questionnaire.
4) Feed and livestock industry survey.