SOCIO-ECONOMIC PARAMETERS

IN FARM PERFORMANCE

SOCIO-ECONOMIC PARAMETERS IN FARM PERFORMANCE

A Study of Selected Farms in

Seneca Township

by

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A Thesis

Submitted to the Faculty of Graduate Studies

in Partial Fulfillment of the Requirements

for the Degree

Master of Arts

McMaster University

May 1969

MASTER OF ARTS (1969)
(Geography)

McMASTER UNIVERSITY
Hamilton, Ontario

TITLE: Socio-Economic Parameters in Farm Performance

SUPERVISOR: Dr. L. G. Reeds

NUMBER OF PAGES: viii, 215

SCOPE AND CONTENTS:

This study examines 43 farms in Seneca Township, and considers a number of social and economic factors which may influence farm management and levels of farm performance.

A model of the farm manager is formulated to serve as a basic research directive. Data are obtained by means of farm interviews. Multiple regression analysis is used to estimate a standard production function, and to group farmers into performance categories, on the basis of production function residuals. Farmers of each performance group are compared in terms of relevant biographical characteristics, attitudes, farm decisions, and pertinent farm practices.

It is concluded that major variations in farm performance can be explained in terms of differences among farmers in personal and family aspirations, differences in past and present economic opportunities, and differences in the extent to which farm adjustment and equilibrium levels of production have been achieved.

Little evidence was found of important differences in managerial competence among full-time farmers.

Location with respect to soil type, and associated differences in cost-return ratios appear to have some bearing upon the investment behaviour of farmers. This question however, warrants further investigation.

ACKNOWLEDGEMENTS

The author wishes to express his gratitude to the many people whose advice, assistance, and criticisms were so freely given in the preparation of this study.

I am particularly indebted to my supervisor, Dr. L. G. Reeds, for his encouragement, his suggestions, and his constructive criticisms at all times.

Thanks are also due to Dr. H. A. Wood, and to Dr. Wm. Found for their advice, to Dr. H. C. Abell, of the University of Waterloo, for her assistance in the construction of the questionnaire, and to Mr. Ingram for writing the computer programs.

The courtesies extended to me by Mr. Best and Mr. Bentley of the Agricultural Office in Cayuga, and by Mrs. J. Troubridge of the Seneca Township Office, are gratefully acknowledged.

Finally, special thanks are due to the many farm people in Seneca Township, for their willing cooperation in providing the information which made this study possible.

TABLE OF CONTENTS

		Page
	SCOPE AND CONTENTS	ii
	ACKNOWLEDGEMENTS	iii
	TABLE OF CONTENTS	iv
	LIST OF FIGURES	vii
	LIST OF TABLES	viii
CHAPTER		
I	INTRODUCTION	1
	1.1 Study Background and Research Objective	1
	1.2 Selection and Characteristics of Study Area	5
	1.3 The Criterion Problem: How to Measure Economic Performance	13
	1.4 Model of the Farmer as Decision Maker	15
	1.5 Review of Literature	19
	1.6 Summary	33
II	METHODOLOGY	36
	2.1 Data Requirements, Questionnaire Design	36
	2.2 Sample Design	37
	2.3 Data Collection	42
	2.4 Data Coding and Storage	45
	2.5 Data Analysis	47
	2.6 Summary	48
III	VARIATIONS IN FARM TYPE AND SOIL TYPE	50
IV	GROUPING OF FARMS BY PRODUCTION FUNCTION RESIDUALS	58

		Page
V	BIOGRAPHICAL CHARACTERISTICS	66
	5.1 Place of Birth	66
	5.2 Farm Background	70
	5.3 Age of Farmers	71
	5.4 Years of Managerial Experience, Years of Non-Farm Experience	78
	5.5 Years of Formal Education, Agricultural Education	82
	5.6 Marital Status, Family Achievement Score, Farm Mortgage	84
	5.7 Summary	90
VI	FARMER'S ATTITUDES	94
	6.1 The Use of Credit	95
	6.2 Attitudes toward Education	96
	6.3 Opportunities and Future in Farming	97
	6.4 Attitudes toward New Ideas in Farming	99
	6.5 Attitudes toward Farmer's Unions	101
	6.6 Opinions on the Solution of the "Farm Problem"	102
	6.7 Summary	105
VII	FARM PERFORMANCE, FARM GOALS AND THE NATURE OF ECONOMIC INCENTIVES IN FARMING	107
	7.1 Empirical Evidence For and Against the Argument of Satisficing Behaviour	107
	7.2 Economic Incentives in Farming and the Position of Low-Profit and Low-Income Farms	115
	7.3 Summary	123
VIII	DECISION MODELS AND FARMER'S USE OF INFORMATION	125
	8.1 Expectations About Future Prices of Farm Products	126
	8.2 Expectation Models about Prices of Farm Inputs	129
	8.3 Models about Government Programs and Policies for Farmers	131
	8.4 Evaluation of Eighteen Sources of Information	132
	8.5 Summary	135

		Page
IX	FARM PRACTICES	137
X	THE UNEXPLAINED RESIDUAL	145
	10.1 The Nature of Data Error	146
	10.2 Potential Factors Leading to Economic Imbalance at the Farm Level	147
	10.3 The Uniform Sample, A Hypothesis About Full-Time Farmers	159
	10.4 Summary	161
XI	SUMMARY AND CONCLUSIONS	163
	BIBLIOGRAPHY	174
	APPENDIX	177
	Questionnaire	178
	Variable Code and Definition	196
	Valuation of Land, Buildings, Livestock and Equipment	200
	Histogram of Regression Variables	202
	Regression Equation	209
	Regression Residuals	210
	Summary Statistics by Performance Groups	211
	Data Matrix	215

LIST OF FIGURES

FIGURE		Page
1	Value of Agricultural Products Sold Per Acre of Improved Land	4
2	Niagara Economic Region, Location of Study Area	9
3	Seneca Township - Principal Soil Types	11
4	The Farmer As Decision Maker	17
5	Seneca Township - Location of Sample Points	44

LIST OF TABLES

TABLE		Page
I	List of 68 Items of Information	38
II	Summary Statistics	51
III	Mean Returns by Farm Type and Soil Type	54
IV	Returns by Farm Type and Soil Type (Weighted Mean)	55
V	Simple Correlation Coefficients for Selected Economic Variables	61
VI	Grouping of Farms by Residuals	63
VII	Mean Hourly Wage and Average Management Assessment Score for Groups of Farms Derived from Residuals	65
VIII	Response Patterns by Age Groups	75
IX	Performance For Three Farm Goal Subgroups	110
X	Order of Importance of 18 Sources of Information	134
XI	Farm Management Practices by Performance Groups	138

CHAPTER I

INTRODUCTION

1.1 Study Background and Research Objective

Involvement by the author in two previous studies of agricultural conditions in parts of the mixed-farming area of the Niagara Peninsula[1], provided opportunity to gain first-hand knowledge of some of the salient agricultural characteristics of the region. Questions arising out of these surveys were in no small measure responsible for the incentive to pursue further research in an attempt to gain a better understanding of causes underlying widely observed variations in levels of production and performance of different farms.

The mixed-farming area of the Niagara Economic Region includes the Counties of Haldimand and Welland, as well as parts of the Counties of Lincoln, Wentworth, and Brant.

Here, as in other parts of Canada, agriculture, and particularly the economics of the farm, have been affected by rapid changes over the past two decades, in production methods and techniques brought on by new developments in science. Of still greater impact upon the agriculture of this country have been changes that have occurred within other sectors of the Canadian economy. The ensuing situation,

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[1] B. W. Darnel, Agricultural Underdevelopment in Caistor Township, (B.A. Thesis, McMaster University, 1967)

L. G. Reeds, Niagara Region, Agricultural Research Report, Part I, Mixed Farming, (McMaster University, 1968)

though perplexing in all its ramifications, has come to be known simply as the "farm problem". While such terms tend to be couched in ambiguity, its meaning is poignantly clear to the farmer who is faced with the problem of modernizing and expanding his operation under conditions which provide only a negative link to the inflationary wage-cost spiral.

Census statistics show, that in spite of increasing costs of production, and perhaps also as a result of these difficulties, agricultural adjustment has been taking place[1]. Over the past decade, the total area of farmland has been steadily decreasing from 856,319 acres in 1956 to 797,269 acres in 1966. This trend was paralleled by a decrease in the total number of farms. Over the same period of time however, both the physical volume of production as well as the total value of agricultural products sold has steadily risen. While these regional trends may give some cause for optimism about the progress of agricultural adjustment and development, they obscure very real differences existing within the region.

To compare the agricultural performance of different areas within the Niagara Region, Reeds[2] employed Census data and calculated for each township the "Value of Agricultural Products Sold per Acre of Improved Land". Results are shown in Fig. 1. Values range from a low of $35 for the Township of Sherbrooke to a high of $225 for East

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[1]Dominion Bureau of Statistics, Agricultural Census of Canada, 1956, 1966

[2]L. G. Reeds, Agricultural Research Report, p. 62

Flamborough. On a county basis, Brant ranks highest with $158, followed by Wentworth with $119, Lincoln with $59, Haldimand with $52, and Welland with $49.

In a region which ranks among the most prosperous in all of Canada, and which has been favoured agriculturally by ideal climatic conditions, generally productive soils, an excellent transportation network, and a rapidly expanding urban market, variations in agricultural output of this magnitude are difficult to explain.

While these intra-regional differences pertain to a sector of the regional economy which is declining in relative importance[1], it must be remembered that in terms of space occupied, agricultural land use outranks by far all other uses. In view of this consideration, trends and developments in agriculture can hardly be regarded as inconsequential to other aspects of regional development. If the rational use of space is one objective concurrent to all other goals of area planning, surely, an investigation of factors underlying variations in agricultural performance ought to rank high among research priorities. Similarly, if the future of agriculture within the region is singled out as a specific topic of concern, it is inconceivable how sound and meaningful plans can be formulated and how development programs can be successfully implemented without an understanding of the interplay of factors accounting for the variabi-

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[1] In 1963 agriculture accounted for 3.5% of total production in the Niagara Economic Region. This is expected to decline to 2.6% by 1970. Source: Niagara 1966, Department of Economics and Development (Toronto, 1967) p. 14

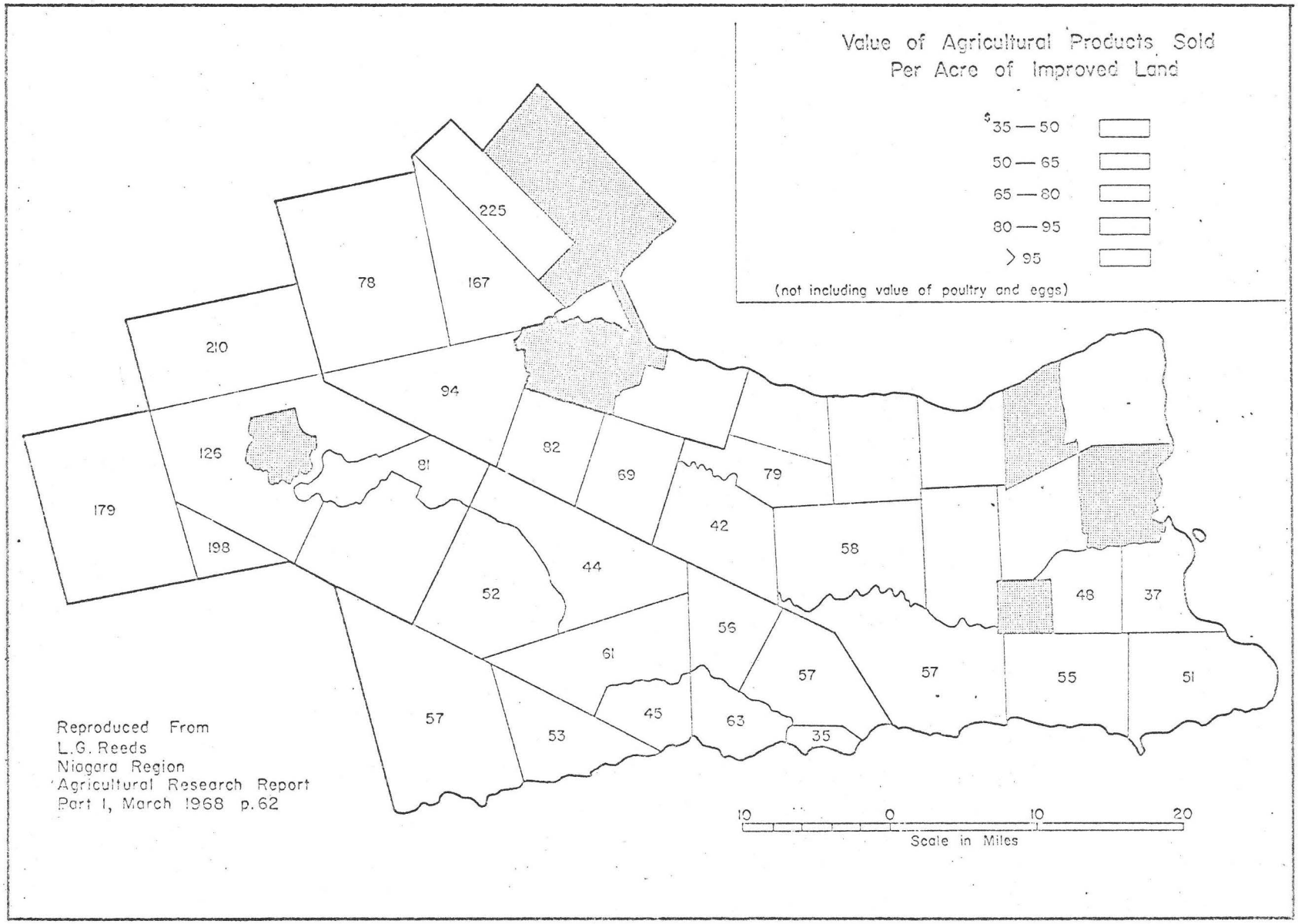
Value of Agricultural Products Sold
Per Acre of Improved Land
$35 — 50
50 — 65
65 — 80
80 — 95
> 95
(not including value of poultry and eggs)
225
78
167
210
94
126
81
82
69
79
179
198
42
58
44
52
48
37
56
61
57
57
55
51
57
53
45
63
35
Reproduced From
L.G. Reeds
Niagara Region
Agricultural Research Report
Part I, March 1968 p.62
10
0
10
20
Scale in Miles

FIGURE 1

lity of agriculture within the region.

An explanation of intra-regional and regional variations in agricultural characteristics and levels of performance may be considered the distantly-evolving goal of such research. This study can only provide a first step in that direction by focusing attention upon factors affecting the performance of the smallest area for which data can be collected, namely the individual farm. This procedure is based upon the premise that the total agricultural performance of a region is the aggregate result of the performance of each sub-region and ultimately of each farm unit. This does not mean that factors significant at the level of the individual farm will automatically explain variations in agricultural characteristics within the region. However, one may assume that factors which prove to be significant for a representative sample of farms within a sub-region such as a township, may also be significant at the level of the region.

The primary objective of this study is to attempt an explanation of variations in performance of a selected group of farms. Attention will center upon management and upon a number of related social and economic variables.

1.2 Selection and Characteristics of the Study Area

Since the subject of this inquiry is the individual farm firm, the decision to use the township as an areal unit from which to select farms for detailed study, is largely incidental. Funds and the amount of time available to conduct this research were important considerations in deciding upon the number of farmers that could be

interviewed. If farms had been selected on a county or regional basis, the research procedure, which will be outlined in the following section, could be the same, except for the need to enlarge the sample.

In view of the wide variations of agricultural conditions within the Niagara Region, an attempt was made to select a township which could be considered "average" relative to the agricultural characteristics of all other townships within the region. The criteria employed and reasons for selecting these are as follows:

1. The township should be one which has retained its basic agricultural characteristics.

   Urban growth and expansion of such centers as Hamilton, Niagara Falls, St. Catharines, and Welland has affected surrounding rural-urban fringe areas, and has contributed to the farmer's uncertainty, and to unstable farming conditions. The study area should not be within the rural-urban fringe, nor should it be an area in which urban influences are inconsequential with respect to agriculture.

2. A predominance of the land used by farmers for the production of crops and for grazing livestock should fall within land capability category II[1].

   Two of the prominent physiographic characteristics within the Niagara Region are:

   a. variability in soil and drainage conditions, ranging from poorly drained clays to well-drained sandy loams

   b. some variability in topography.

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[1] ARDA, The Canada Land Inventory, Soil Capability Classification for Agriculture, Report No. 2 (Ottawa, 1965)

These variations have been partly instrumental in causing farm abandonment on the least productive soils, and increasing farm specialization and greater intensity of land use in areas of superior soils.

3. The sample area may have some differences in soil type.

   Since soil type often has a bearing upon the production potential of a farm, variations of this nature may provide additional insights into the role of this factor. Furthermore, such differences would be analogous to variations existing within the entire region.

4. Census data should provide an objective measure of "average" conditions within the study area that is chosen.

In accordance with these criteria, Seneca Township was selected as the study area from which to choose the farm sample. This decision was based upon information gained during a reconnaissance survey in 1967 of all townships in the mixed-farming region of the Niagara Peninsula, upon Soil Survey information, and upon a comparison of Census statistics compiled for each of the twenty-nine townships.

Seneca occupies a roughly central position within the Niagara Economic Region (Fig.2).

In terms of distance from the city of Hamilton the area is not entirely outside of the "urban shadow" of that city. Proximity to alternative employment opportunities has encouraged some farmers in the area to seek employment off the farm. However, this has not resulted in a drastic reduction in the number of full-time farms, and in associated conditions of poorly-managed farms and large acreages

of idle land as observed in other townships of comparable location. Land speculation and the severance of agricultural land for non-farm purposes has been kept under control by strictly enforced municipal regulations. Residential development has been restricted to areas within or adjacent to existing villages and towns. Except for some limited industrial activity centered in Caledonia, the Township is primarily agricultural, and exhibits the type of environment defined under the first of the previously outlined criteria.

Physical conditions within the Township generally correspond with the second and third criteria. Seneca lies within the Haldimand Clay Plain, a physiographic region which is characterized by level to gently undulating topography, a predominance of clay soils which have been derived from transported parent materials, and which tend to be deficient in lime, nitrogen, phosphates, and organic matter. Some of the land in the area is only marginal farmland, with poor drainage being the limiting factor. In former years such land was used for farming; today however, virtually all cropland coincides with areas of good to fair surface drainage, while poorly drained land is reverting to bush or is occasionally used for permanent pasture.

Three related soil types occur within the township. These are Haldimand Clay (29,304 acres or 68.6%), Oneida Clay Loam (10,636.5 acres or 24.9%), and Brantford Clay Loam (2776.6 acres or 6.5%). The distribution of these soils is shown in Fig. 3.

Haldimand Clays are heavy-textured soils of a glacio-lacustrine

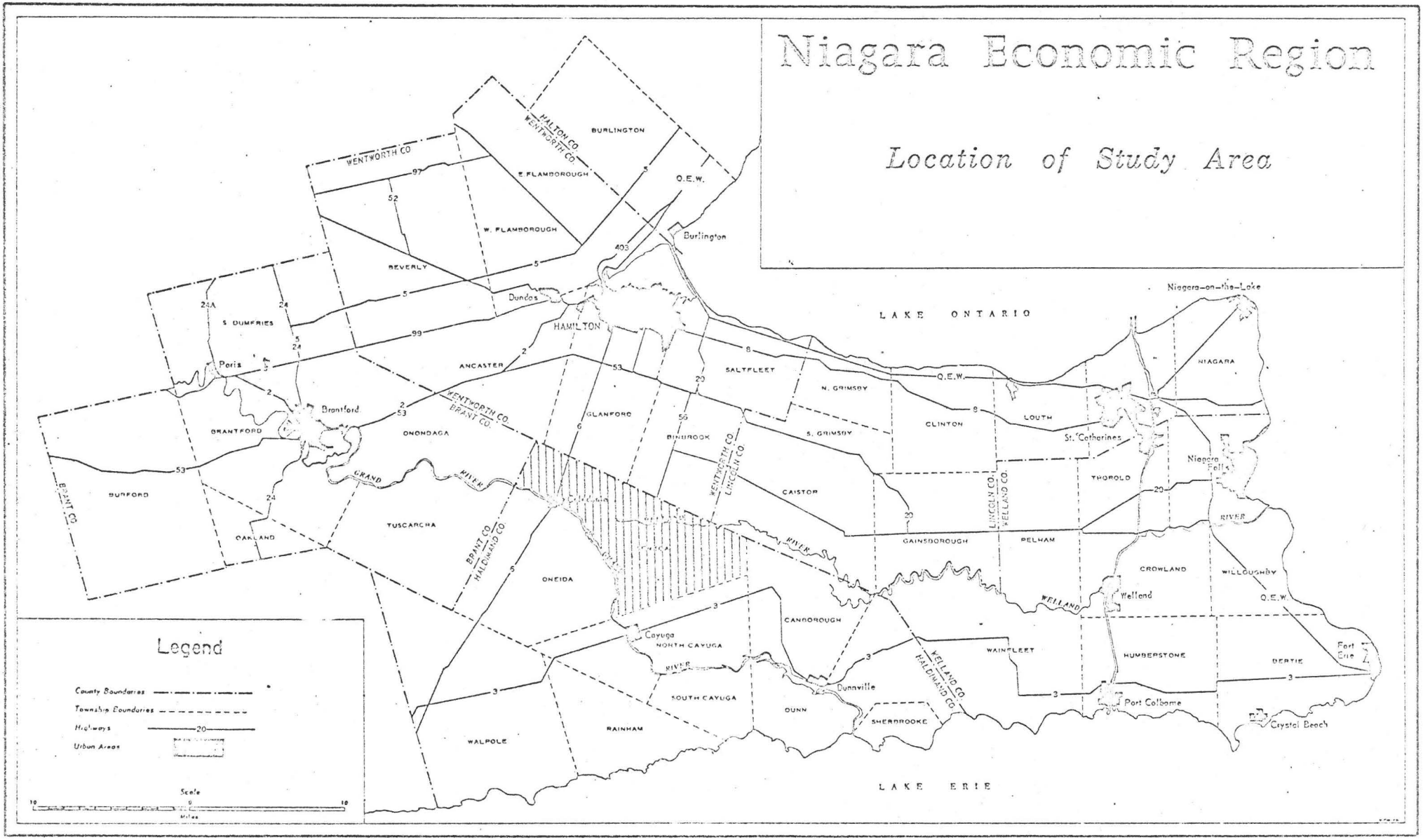
Niagara Economic Region
Location of Study Area
Legend
County Boundaries
Township Boundaries
Highways
Urban Areas
Scale
Miles
LAKE ONTARIO
LAKE ERIE
HALTON CO.
WENTWORTH CO.
BURLINGTON
E. FLAMBOROUGH
W. FLAMBOROUGH
BEVERLY
S. DUMFRIES
ANCASTER
HAMILTON
Dundas
Burlington
Q.E.W.
Paris
Brantford
BRANTFORD
BRANT CO.
ONONDAGA
GLANFORD
BINBROOK
SALTFLEET
N. GRIMSBY
S. GRIMSBY
CLINTON
LOUTH
St. Catherines
Niagara-on-the-Lake
NIAGARA
Niagara Falls
THOROLD
BURFORD
OAKLAND
TUSCARORA
ONEIDA
CAISTOR
GAINSBOROUGH
PELHAM
WELLAND
CROWLAND
WILLOUGHBY
Welland
CANBOROUGH
Cayuga
NORTH CAYUGA
SOUTH CAYUGA
DUNN
WAINFLEET
HUMBERSTONE
BERTIE
Dunnville
SHERBROOKE
Port Colborne
Crystal Beach
Fort Erie
WALPOLE
RAINHAM
GRAND RIVER
WELLAND CO.
HALDIMAND CO.
LINCOLN CO.

FIGURE 2

origin. They are generally acidic in reaction with a pH range of 6.0 to 6.5 in the A horizon. They tend to be deficient as well in phosphates, nitrogen and organic matter. Problems associated with soils of this type relate to their poor aeration and unsatisfactory internal drainage. However, in areas of good surface drainage, or where surface drainage has been corrected, land with this soil type can sustain intensive agricultural production. As a result of the high clay fraction and a high ion exchange capacity, crops generally show excellent response to applications of commercial fertilizer, provided the soil is kept in satisfactory tilth, and that proper field practices are maintained.

Oneida Clay Loam occurs in a narrow band along the Grand River. Its boundary with Haldimand Clay is fairly distinct and coincides with the stream divide, which separates the rolling and more dissected area of the Township drained by the Grand River, from the larger, eastern portion drained by tributaries of the Welland River. Soil deficiencies are similar to those of Haldimand Clays. Surface and internal drainage is good. The rolling nature of most of the land in this soil type poses some limitations.

Brantford Clay Loam occurs in the extreme western section of the Township. Soil deficiencies are less than on the other two soil types. Internal and surface drainage are generally good. Topography is gently undulating, but slope is not a limiting factor. Land in this area is considered the best and most productive farmland in the Township.

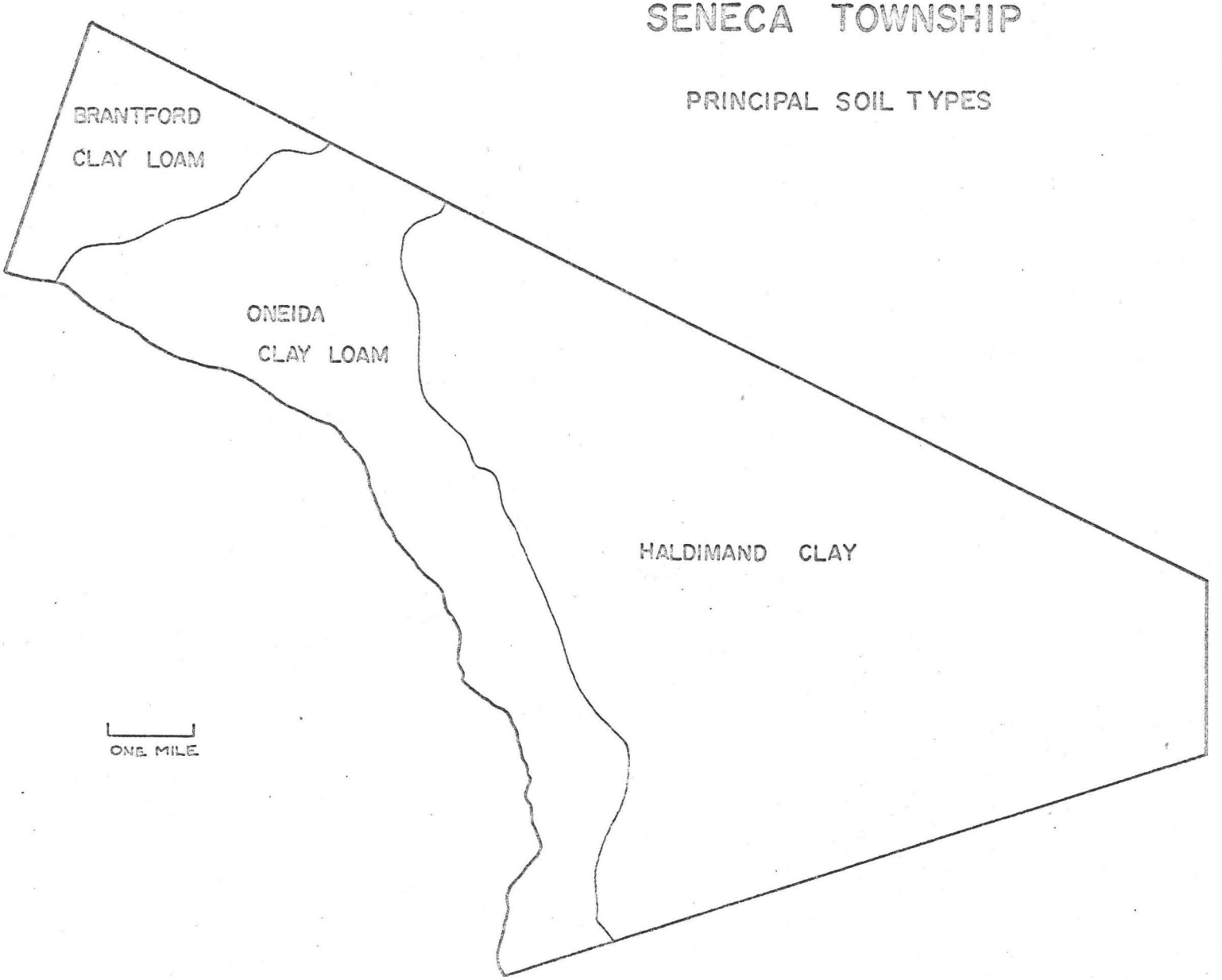
SENECA TOWNSHIP
PRINCIPAL SOIL TYPES
BRANTFORD
CLAY LOAM
ONEIDA
CLAY LOAM
HALDIMAND CLAY
ONE MILE

FIGURE 3

If the land is classified into capability categories, Class I land will include most of the area in Brantford Clay Loam, parts of the area in Oneida Clay Loam, and the fertile bottom land along the Grand River. Class II land includes virtually all cropland on Haldimand Clay, as well as areas of the other two soil types if limitations are evident.

Finally, census data provided an objective measure of "average" conditions for the area from which farms were to be selected. An examination of Census information for the 1961 to 1966 period tends to support the selection of Seneca Township.

Changes in "area of farmland" range from a decline of 17.6% for West Flamborough to an increase of 13.2% in Humberstone, as compared to Seneca which experienced a decline of 3.8%. Changes in "area of improved land" range from a decline of 13.0% for the Township of Bertie to an increase of 17.5% for Humberstone; in Seneca the decline for the same period was 3.1%. The number of farm operators declined throughout the entire region, varying from a decline of 1.3% for Rainham to 38.2% for Bertie. A decline of only 1.8% for the Township of Seneca is well below the regional average decline of 11.6%. However, this deviation supports the contention that agricultural change in the study area is taking place very gradually, and that in the past the Township has been characterized by fairly stable conditions[1].

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[1]Based upon Census data compiled by L.G. Reeds, Agricultural Research Report, Part I (Hamilton, 1968) pp. 43, 44

1.3 The Criterion Problem: How to measure Economic Performance

Within the context of this study "economic performance" is a qualitative term which is used to describe deviations from, or agreement with some norm with which the actual, aggregate economic result of decisions made and actions taken by the farmer during a particular production year can be compared.

The norm or standard against which the performance of the individual farm is measured may be based upon external data, provided such data is available and can be applied, or alternatively, a norm can be established on the basis of the performance demonstrated by farmers included in the sample. For the purpose of this study, the latter procedure was adopted.

Several techniques can be used to obtain an estimate of performance. One such measure is capital turnover, which is the number of years required for gross income to equal total farm investment. In the same category are estimates based upon gross returns per $1,000 of farm capital, and gross returns per acre of cropland.

A more precise measure of performance is obtained by calculating returns to family labour. This is the amount remaining to the farmer after deducting from gross income his total cash operating expenses and his capital cost.

A third technique would be to estimate for each farmer the degree of deviation from the optimal situation in which the ratios of added returns to added costs among all inputs are equalized; in other words, a determination of the point of "rational production" for

each farm.

Finally, on the basis of data from the entire sample, one could employ regression analysis to determine a standard production function and to predict the gross income each farmer ought to achieve. A comparison of the predicted gross income with the actual gross income of each farm would provide an index of performance.

It is clear, that none of these techniques is without fault. Capital turnover, and gross returns on investment fail to consider net returns, as well as size differences and concomitant economics of scale. Returns to family labor as a measure of performance also ignores size differences, but more critically, it levies a heavy penalty against the farmer whose total farm capital contains a high percentage of non-productive capital. The third technique, while undoubtedly the most precise is not feasible without very precise data. Finally, regression analysis requires normality of data. If this prerequisite can be met, this method has several important advantages. These are: ease of application, recognition of the physical fact of diminishing marginal returns, and assessment of output in terms of the contribution of several important inputs.

If one is able to surmount the problems inherent in any of these analytical procedures, or if one is prepared to ignore them, still another question needs to be considered.

One is likely to argue that any true criterion of performance must be based upon net returns. This is a valid contention, but it can be shown that all but the first two criteria do in fact take into

account a farmer's net returns. Optimum net revenue can only be achieved if production occurs close to, or at the point where marginal revenue equals marginal cost. It follows that at that point gross revenue is determined by the type of quantity of all inputs and by the manner in which they are combined. Therefore, the farmer achieving the highest gross revenue with the least inputs is also optimizing net revenue. In other words a large output with a low input does imply a large net revenue.

1.4 Model of the Farmer as Decision-Maker

Once a suitable criterion of performance has been selected, and differences among farmers in performance have been identified, the role of management can be considered. This procedure rests upon the premise that ultimately it is the farm manager, of varying background, motivation, and ability, who, in the light of his total experience decides upon production objectives which he deems desirable and within his means to attain. It is these decisions which are transformed into action and which eventually leads to the outcome and level of performance that a particular farm demonstrates. Thus, the specific research question is not directed at the more or less passive elements of production, but rather at the decision-maker who controls and manipulates them.

Empirical observations and a priori reasoning form the basis of the model of the farmer as a decision-maker, illustrated in Fig. 4. This model served as an over-all research directive.

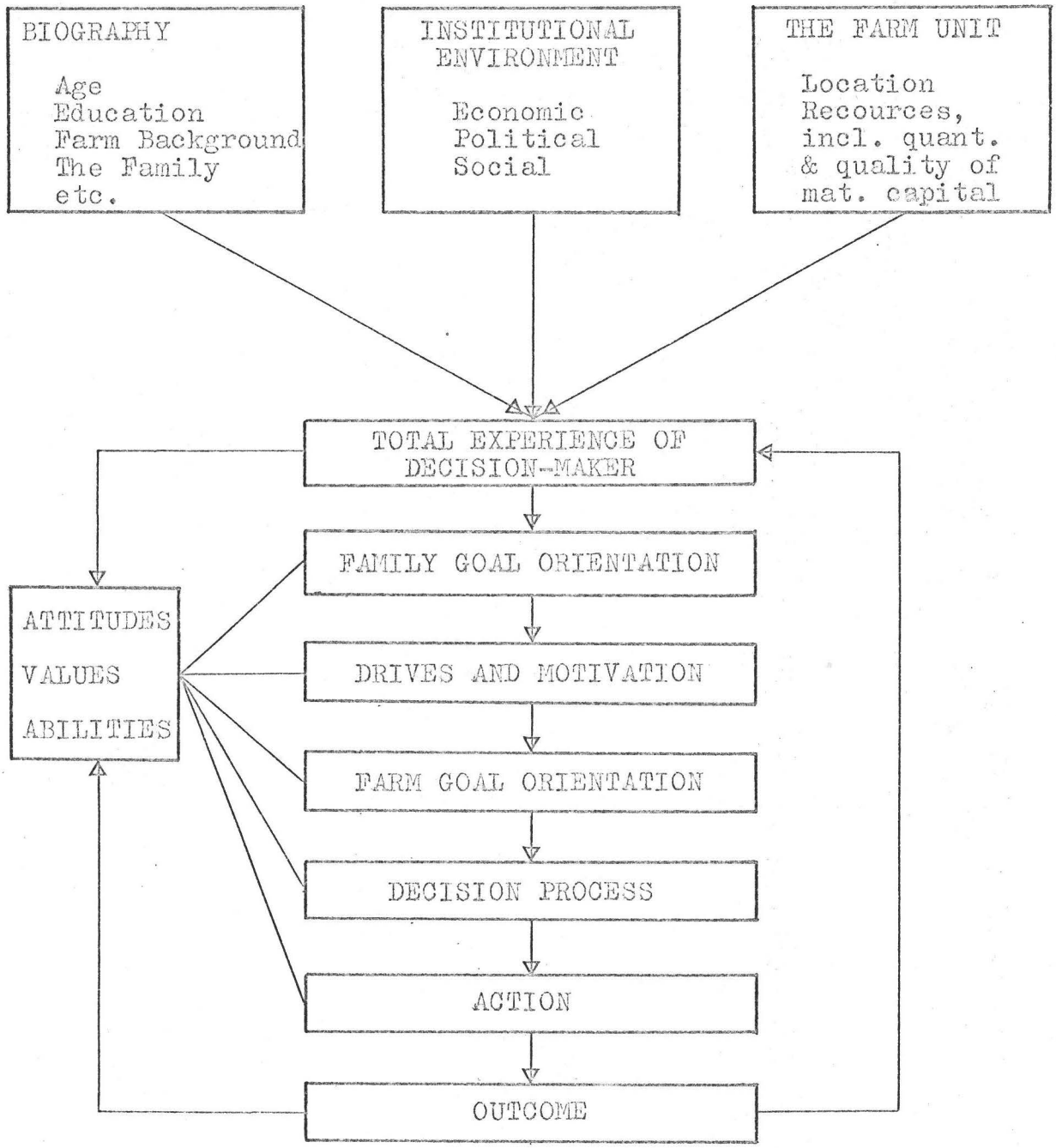
Production decisions are seen as being governed by two basic

considerations. These are the production possibilities on the one hand, and the needs and objectives of the producer on the other. One may argue on theoretical grounds that the only real production limitations which confront the farmer are the physical constraints associated with the quantity and quality of his land and the economic constraints of prices. In reality however, even if prices are "right", every input, whether it be a fixed or a variable cost input may embody constraints which are very real to farmers. Also, one cannot assume that every farmer's concept of what is possible corresponds to what he ought to be doing or what he could be doing to optimize net revenue. One would expect that the role of information, a farmer's past experience, his knowledge and his education are of paramount importance in the formulation of his model of production possibilities for his particular operation. It seems equally dangerous to conclude that certain farmers fail to do what is economically rational because they lack the necessary knowledge of ability. This may be true in some instances, but it may be untrue in others. A farmer may choose to do what is most expedient to his personal satisfaction even though he knows that his choice may be more costly or less profitable in purely economic terms. Thus, production decisions are not only circumscribed by the dictates of the physical and institutional environment, but also by the ability of the farmer to perceive what is possible, and by the things to which he attaches the greatest value.

The first question an individual must ask is "What do I want?" and only then can he ask "How can I get what I want with what I have?".

FIG. 4

THE FARMER AS DECISION-MAKER



It is the first question which seems to be of critical importance, yet most studies in farm management have either ignored it or have taken its answer for granted. While it is true that most of the needs of an individual, and the things upon which society bestows the greatest respect can be expressed in economic terms, one cannot assume that these wants and aspirations are the same for every individual or every farm family. A farmer's age, his marital status, the number and age of his children, as well as income available from other sources, will determine what income needs to be produced by the farm. In addition, the social and educational background of the farmer and his wife is likely to have an important bearing upon the family's level of living and aspirations, and may in turn raise the amount of disposable income required by the family. Thus, family goals are regarded as the major source of incentive behind all farm goals and production objectives. If family goals are ambitious and materially oriented, a corresponding response is likely to be evoked in the formulation of farm plans in order to meet these demands. On the other hand, where motivation generated by material wants and needs is weak, or where the family sets non-material priorities, it is expected that farm plans are also less ambitious.

Farm goals are followed by production decisions which are translated into action, and which finally will lead to an outcome which should be in agreement with production and income expectations upon which the original decisions were based. Unfavourable weather conditions, disease, price fluctuations in inputs, as well as in

farm product prices may result in considerable deviation of the actual outcome from the expected. However, where such deviations are recurrent, lack of managerial ability may be indicated.

Finally, a farmer's attitudes, his values, and abilities are seen as the product of life experience. These influence the conduct of family and business affairs, the formulation of goals, the making of decisions, and the manner in which actions are performed. In turn, the success which he achieves becomes again part of his total experience.

In summary, decision processes of the farmer are seen as a response to certain personal and family needs and aspirations on the one hand and to economic incentives and opportunities on the other. Outcome and its quality are seen as the result of a sequence of interrelated and continuous events which lead from the question of what is desired to the formulation of family and farm goals, to farm decisions, and to productive action.

1.5 Review of Literature

Human behaviour as a subject of inquiry has in recent years evoked such widespread interest among various groups of people that even a cursory review of all sources which may be pertinent to this study would be a demanding task.

This review can only touch upon a few important concepts which relate to the previously discussed model of the decision-maker. Several related studies which have influenced the design of this research will also be discussed.

Profit Motivation, Economic Man, the Role of Knowledge

The conceptual model of the farmer, as developed in this study makes three important assumptions:

1. That economic motivation of varying degree is the basis of all productive action

2. That man is not omniscient, but behaves rationally to the extent to which he attempts to achieve outcomes which he considers best, in the light of the resources and knowledge available to him

3. That knowledge and information are critical elements in the decision process.

While this model is based largely upon a priori reasoning and upon empirical observations by the author, it also draws support from a number of studies.

A classic study which illustrates man's response to economic incentives is Von Thuenen's The Isolated State[1].

While Von Thuenen was primarily concerned with the functioning of distant-cost factors and resulting patterns of land use, the assumption that farmers will respond to an increase or decrease in economic rent is implicit throughout his study.

If the definition of economic rent[2] is broadened to become synonymous with total profits from farming, including farm perquisites and the potential for profits resulting from an appreciation in land values, and if costs include not only capital costs and operating

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[1]P. Hall, Von Thuenen's Isolated State, English Ed. of "Der Isolierte Staat" by J. H. V. Thuenen (London, 1966)

[2]Von Thuenen defined economic rent as "that portion of the farm revenue which pertains to the land itself".

expenses but also a consideration of opportunity costs, a parallel with the situation in Von Thuenen's model is apparent. In the Isolated State, increases in transport costs lead to a decline in economic rent, eventually requiring the adoption of a different land-use system. This process is seen to continue until all production possibilities have been exhausted, and agricultural production is no longer economically feasible. A decline in absolute or total profits in real-life situations will also reduce the number of decision alternatives. If profits continue to decline, economic incentives are weakened, and while the income needs of the farmer are likely to remain unchanged it will be increasingly difficult for him to satisfy these demands, until eventually a point will be reached where even the most able farmer will sell his operation or look for other sources of income.

As a result of technological innovations, a change in prices or changes in factor costs this process may also work in the other direction.

Economic motivation as a basis for productive action is established fact, and as such need not detain us any longer.

The central issue of many disputes has been the concept of Economic Man. It assumes that the decision-maker is a rational economic being who is prepared to respond to even the minutest change in factor costs or product prices in order to optimize profits.

Recent developments in economics and in the other social sciences have raised considerable doubts as to whether this over-

simplified concept of man provides a suitable foundation upon which to build a theory, whether it be a theory on how individuals or firms do behave, or of how they ought to rationally behave.

In this study of farming in middle Sweden, Wolpert[1] argues that the normative concept of economic man is not suitable for use in behavioral analysis. Man has limited abilities to perceive and store information, to decide on optimal solutions, and to predict the outcome of future events even if profit were his only goal. His goals are more likely to be multi-dimensional, and optimization cannot be considered a relevant criterion. Wolpert observed that the sample population of farmers which he studied does not achieve profit maximization, nor are its goals directed solely to that objective. Decision behaviour reflects not only alternatives in objectives, but also man's awareness of alternatives, his degree of aversion to risk and uncertainty, and his system of values.

Wolpert's findings concur with the argument advanced by Simon and March:

> "most human decision-making, whether individual or organizational, is concerned with the discovery and selection of satisfactory alternatives; only in exceptional cases is it concerned with the discovery and selection of optimal alternatives"[2].

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[1] J. Wolpert; "The Decision Process in Spatial Context", Annals of the Association of American Geographers, 54, pp. 537-58, 1964

[2] J. G. March, H. A. Simon; Organizations, (New York, 1958) p. 141

Simon[1] proposed the principle of "bounded rationality" as a substitute for the allegedly omniscient rationality of economic man. He reasons that man is incapable of providing solutions required for objective, rational behaviour in the real world. Therefore, the intended rationality of a decision-maker requires him to construct a simplified model of the real situation in order to deal with it. He may behave rationally with respect to his model, but such behaviour may not be optimal with respect to the absolute optimal solution to a problem. To understand and predict his behaviour, one must understand the manner in which this simplified model is constructed, and its construction, Simon argues, will inevitably be related to his psychological properties as a "perceiving, thinking, and learning animal".

If the principle of bounded rationality is accepted as an alternative explanation of human behaviour, knowledge and the ability to assimilate and utilize existing as well as new ideas are of critical importance.

Economic man has only one objective, to optimize profits. Presumably all his efforts are directed to the achievement of that one goal, and no assumptions are generally made about the origin of his sources of motivation.

In real-life situations, productive efforts and the outcome of these are essentially only a means to satisfy certain ends, which

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[1] H.A. Simon, Models of Man, (New York, 1964) pp. 198, 99

can be expressed in terms of personal and, or family needs, goals, and aspirations. The satisfaction of these needs, and the attainment of these personal objectives, as previously pointed out, constitute the primary motivating force. How these needs are met will depend upon the opportunities that are available. Thus, basic goals are first formulated by an individual, in the light of his knowledge of what is true, good, and desirable. In the second instance, knowledge is critical in perceiving and recognizing production possibilities, in other words, in the formulation of a "simplified model of reality" which must precede production decisions.

Since the entrepreneur is not omniscient, and since he is exposed to changes in his social and economic environment, and to new decision situations, he must search for new knowledge in order to assure his survival as an economic being.

This search and probing may be expected to vary widely from one individual to another. In an empirical study dealing with the exchange of farming information, Abell[1] showed how farmers in a selected area of Alberta utilize different sources of information. The four categories of information in their order of importance to farmers were: 1) talking to other people, 2) using mass media, 3) personal observation of other farmers, and 4) attending organized meetings. The study showed that farmers differ considerably in the types of information sources they use, and that these differences

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[1] H. C. Abell, The Exchange of Farming Information, (Ottawa, August, 1963)

are related to certain aspects of farm characteristics, as well as to certain social and biographical characteristics of the operator and his family. For example, it was found that the percentage of farmers attending organized meetings was higher among those located on better soils, and among farmers with larger acreages. Similarly, the farmer's age, his education, the number of previous jobs he has held, and his level of living were found to be significantly related to the types of information he uses.

These observations suggest that the search for knowledge is strongly related to the entrepreneur's personal ambitions, and that typically, the more strongly motivated and the more successful farmer will involve himself in a greater variety of learning situations than the less enterprising farmer.

Finally, while the search for new knowledge is largely a random process, the actual adoption of new ideas will depend to a great extent on their facility and usefulness in achieving economic objectives. This point has been well illustrated by numerous diffusion studies.

Griliches[1] in a study of the spread of hybrid corn in the United States was able to show that variations in rates of acceptance, and differences in "equilibrium levels"[2] in various localities are almost exclusively related to areal differences in profits resulting

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[1] Z. Griliches, "Hybrid Corn and the Economics of Innovation", Science, 132 (1960), pp. 275-280

[2] Equilibrium Level - the fraction of the acreage which is ultimately devoted to hybrid corn.

from the adoption of the new hybrids. Griliches does not attach much importance to differences in social factors, although it is likely that these do increase in importance with increases in the uncertainty of profits that may result from the adoption.

The advantages of innovations and of new ideas are not always as apparent as those associated with the adoption of hybrid corn. Generally, technical agricultural progress is complex, and so are the demands made upon those who seek to benefit from it.

Evidence presented here, while far from exhaustive, tends to weigh heavily in favour of the concept of stochastic man of bounded rationality. At the same time however, it is equally apparent that the satisfaction of virtually all his personal needs, goals, and aspirations does depend upon economic action.

Related Studies

Studies that have collected data at the farm level are numerous. This approach is sometimes favoured by public and private planning and development agencies such as ARDA, PFRA and others concerned with rural problems. In such studies the farm may constitute the smallest data unit; however, emphasis is generally placed upon the definition and description of broader regional problems, rather than upon details pertinent to the individual farm. On the other hand, studies of the farm by production economists, rural sociologists, geographers, and others, have naturally tended to be strongly oriented toward the specific interests of the researcher's own discipline.

Production economists, with few exceptions, have focused attention upon changes in prices and quantities of factors and products of the firm, and have assumed rational behaviour and virtual constancy of institutions, production methods, etc., assumptions which eliminate any need to consider the role of the decision-maker[1].

Geographers studying the farm have been equally prone to take a one-sided approach. Traditionally emphasis has been upon land-use and environmental relationships. However, in more recent times, an interest in decision processes and behaviour has been evident.

Rural sociologists, in constrast, have tended to overstress the relationships among people and to maintain a distinction between social and economic values, which implies that economic values have no social consequence and that social values are of no economic consequences[2].

It is beyond the scope of this study to review the diverse literature which has dealt with various aspects of the farm and its management. However, brief consideration will be given to three recent studies, which have influenced the design of this research.

In a recent study of a selected group of farmers which had been settled in Ontario by the Department of Veteran's Affairs, Rust[3]

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[1]G. I. Trant, Farm Management and Production Economics, Departmental Paper, Department of Agricultural Economics, University of Guelph (Guelph, 1965) pp.. 2, 3

[2]G. L. Johnson, et al. ed., A Study of Managerial Processes of Midwestern Farmers, (Ames, 1961) p. 7

[3]R. S. Rust, "Farm Survey Data Relationships with Managerial Ability", The Economic Annalist, 33 (April 1963) 34, (Feb. 1964)

attempts to relate farm survey data to managerial ability.

A total of 61 farms were investigated. Data were based upon interviews and upon Government Farm Appraisal records. Managers were placed into six categories on the basis of the interviewer's subjective assessment, and objectively on the basis of average annual increases in net worth for a ten to twelve year period. Each of the six management groups was then compared against farm survey data. Data were collected on a wide range of items including biographical characteristics of farmers, family expenditures, membership in organizations, use of information by farmers, farm practices and others.

Research findings are presented in tables which are easily compared. Relationships between "levels of management" and some 237 items of information are almost consistently of the positive type. For example, good managers are generally younger, better educated, read more magazines, keep better farm records, and are better able to estimate production outcomes, than farmers in any of the lower groups. Similarly, a higher percentage of managers in the upper group have had their soil tested, use certified seed, employ chemical weed control, and repair and overhaul their machinery and equipment during the off-season, etc.

Rust concludes that 63 out of 237 question items might be used as "management indicators". These are not listed in the study, however, several of the items pertaining to farm practices showed strong correlations with management, and suggested themselves for adoption in this study. These include the following: the use of treated and certified

seed, the use of soil tests, methods of weed control, storage of surplus hay and grain, time of the year when machinery is repaired and overhauled, and types of farm records kept by the operator.

Rust has illustrated the existence of relationships between "levels of management" and performance. On the other hand, in its attempt to equate outcome with ability alone, the study suffers from the same shortcoming as other related research efforts which have failed to consider the farmer's personal and family goals.

One of the most ambitious studies in the field of farm management has been the recent North Central Regional Farm Management Project entitled "Interstate Managerial Survey" (I.M.S.)[1]. The survey, which was conducted among 1075 farms in seven different states of the U.S., was specifically concerned with managerial decision behaviour. Questions which farmers were asked center around a general "model of functions" which a manager performs or has opportunity to perform. These functions include: observation, analysis, decision, action, and responsibility bearing. In the conclusion, problem definition was suggested as an additional function that should be added. Each of these functions was studied separately. However, it was recognized that they are inter-related parts of a whole process.

The study placed little emphasis upon the personal characteristics and goals of the decision-maker, but it does provide considerable information about the manner in which farmers use value concepts and factual concepts in the formulation of expectation and decision models

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[1] G. L. Johnson, et al. ed., A Study of Managerial Processes of Midwestern Farmers, (Ames, 1961)

upon which their productive efforts are based.

Three questions were adopted from the Interstate Managerial Survey questionnaire. These include a question about farmer's expectations with regard to changes in government programs and policies affecting farmers, a question about price expectations, and one question about factor cost expectations[1].

Measurement and analysis of qualitative data has been one of the most difficult aspects of that type of management research which attempts to relate various indices of performance with qualitative information pertaining to the manager.

Factor analysis has been suggested as a possible statistical approach to this type of problem. Factor analysis has been used with some success by MacEachern, Woods, and Eisgruber in a study of human attributes and performance levels of tenant farmers[2].

The basic idea underlying factor analysis is the concept of simple structure. That is, many of the variables a researcher may wish to examine measure the same thing. Factor analysis seeks to find the few common factors which account for most of the variance. Relationships among data items are assumed to be linear, and the resultant factors are treated as dimensional. The inference is that they account for the linear intercorrelation among data items, and

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[1]Question Nos. 53, 55, 56, Questionnaire, Appendix I.

[2]G. A. MacEachern, et al. Analysis of Human Attributes and their Relationship to Performance Levels of Farm Tenants. Indiana Agricultural Exp. Stn. Res. Bul. No. 751 (November, 1962)

are considered as dimensions in the sense that every respondent is assumed to possess more or less of each factor[1]. However, the notion that a small number of common factors can measure specific qualitative human attributes has been seriously questioned. Comments made by Guttman are instructive:

> "As for the empirical truth of the hypothesis of a small number of common factors for mental abilities, evidence constantly being accumulated by factor analysts throughout the world - notably among them Thurstone's students - now seems conclusive against it. The growth of the literature on factor analysis in psychology has been accompanied by an ever lengthening list of different common factors"[2].

In a recent study by Wirth[3], pattern analysis is suggested as another possible method of handling non-quantitative variables.

Wirth used production function residuals and the ratio of net farm income to total farm capital as criteria of performance. A total of 60 items of information pertaining to the manager were grouped into three categories: 1) biographical information, 2) information on drives and motivation, and 3) information on decision processes.

"Hierarchical classification by reciprocal pairs", a modified form of linkage analysis, is used to group farmers into pairs on the basis of similarities for selected variables from one of the three

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[1] L. L. Thurstone, Multiple Factor Analysis, The University of Chicago Press (Chicago, 1947)

[2] L. Guttman, "What lies ahead for Factor Analysis", Educational and Psychological Measurement, 19 (1958)

[3] M. E. Wirth, Pattern Analytics, A Method of Classifying Managerial Types, Mich. Agr. Exp. Stn. Quarterly Bul., 47 (1964)

groups mentioned above. The idea is to match each individual with another individual most like him. In the second matrix, reciprocal pairs are matched, and so forth, until each member in the sample has been classified on the basis of items of agreement with every other member. The resulting groups are then compared against performance categories.

The study showed that with certain sets of variables (antecedents), pattern analysis classifications were consistent with managerial performance criteria, while with others they were not. Complications arise as a result of the large number of patterns that are possible. Also, since farmers are matched only on points of agreement, it can happen that certain variables for which no agreement is found are deleted, even though a different analytical technique might prove such variables to be important.

Wirth concludes that pattern analysis can be used to classify farm managers into relatively homogenous groups. He points out however, that the method needs considerable "sharpening" before it can be applied more widely, and with meaningful results to problems of this nature.

In each of the studies discussed here, a specific area of concern is evident. Rust compares farm survey data and levels of management in an attempt to identify certain management indicators. The Interstate Managerial Survey is concerned with decision processes, while the study by MacEachern and the study by Wirth emphasize certain analytical techniques. While none of these studies attach much

importance to an actual interpretation of the non-economic aspects of farm management (eg. the role of the farm family, level of living, aspirations, personal characteristics of the manager etc.), they did provide valuable guidelines in the selection of items of information to be included in this research.

1.6 Summary

Agriculture in the mixed-farming area of the Niagara Peninsula is characterized by wide variations in levels of farm income. Large differences between townships in values of agricultural products sold per acre of improved land can be identified. While some of these differences relate to variations in the quality of the land and to types of crops grown, similar income variations exist at the farm level. The inference is that some of these differences are the result of differences in management. The purpose of this study is to attempt an explanation of variations in the economic performance of a group of farms selected from a representative township of the Region.

Seneca Township was selected as the area from which to choose the farm sample. Its agricultural characteristics are considered "average" in terms of the extent of urban influence to which it is subjected, and in terms of soil characteristics, land capability, and past changes as indicated by Census data.

Economic performance is defined as a qualitative term which describes deviations from or agreement with a norm with which the outcome of a farmer's decisions and actions can be compared. The norm is based upon the levels of performance demonstrated by farmers included

in the sample, while performance will be measured on the basis of output in terms of all important inputs.

To facilitate the formulation of research hypotheses a model of the farm manager is proposed. Decision and action processes of the farmer are seen, on the one hand as a response to personal and family needs and aspirations, and on the other as a response to economic incentives and opportunities in an effort to meet such needs. Outcome and its quality are the result of a sequence of interrelated and continuous events which lead from the question of what is desired to the formulation of family and farm goals, to production decisions, and to productive action.

Profit motivation on the part of the farmer is accepted as fact, since very few of his needs could be met without at least some economic action. The concept of economic man is questioned, and the principle of bounded rationality, proposed by Simon, is suggested as a more accurate definition of man's behaviour as an economic being. Knowledge is considered the key element, both, in the formulation of personal values and goals, and in the recognition of production possibilities. The search for knowledge will vary among individuals, and appears to be strongly related to the drives and motivation of a farmer, and to the degree of success he has already achieved. The utilization of new ideas, on the other hand, appears to be largely a function of the economic rewards associated with it.

A review of several studies pertinent to this research yielded little concrete information about the importance of the manager's

personal characteristics, or about contributions to performance of important sources of motivation such as the farm family, its level of living, and its aspirations. Nevertheless, these studies did provide valuable guidelines in suggesting items of information and techniques which are relevant to this investigation.

CHAPTER II

METHODOLOGY

2.1 Data Requirements, Questionnaire Design

The type of data required for this study is largely implicit in the model of the farmer previously discussed. Since the number of interactions which might be investigated is virtually without limits, the actual selection of variables to be considered is a subjective choice, depending in part on the nature and scope of this study, on analytical techniques that can be applied, and on a priori reasoning with regard to the possible significance of certain factors.

Items of information which are used fall into two general categories: 1) information about the farm as a physical and economic unit and 2) information about management, the farmer and his family. A complete list of all variables is presented in Table I.

All basic data were collected by means of interviews with farmers. For this purpose, a pre-tested questionnaire was employed, which was designed in accordance with generally accepted principles and research methods in social relations[1]. The wording of questions and the sequence in which they were asked was kept constant in each interview in order to assure the comparability of the data obtained. Most questions are "open-ended" requiring either a statement or fact,

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[1] C. Selltiz, et al., Research Methods in Social Relations (New York, 1967) pp. 235-278

or an expression of opinion, attitude, or a value judgement. This procedure was adopted because of difficulties in estimating in advance the possible range of response.

Questions in the interview schedule (appendix) are not in the same order as the variables listed on Table I. On pages one and two of the questionnaire, farmers are asked to provide information about farm size, acreage of cropland, and land capability. This is followed by several questions on farm practices, and by questions about the farmer's background. Only much later in the interview are questions asked about the critical economic aspects of the operation. The logic of this apparently haphazard sequence of questions is self-evident. It was felt that the extent to which farmers will cooperate in volunteering pertinent economic information about their farms, would depend upon the establishment of a modicum of rapport during the early part of the interview. This assumption was borne out by actual experience.

2.2 Sample Design

In 1961, Seneca Township had a total of 199 commercial farms as defined by the Census of Canada. According to the Census, any farm with an annual gross income larger than $1,200 is considered a commercial farm. Various surveys have shown that the majority of farms in the Niagara Region, that are operated on a full-time basis obtain annual gross incomes considerably above $1,200. Since this study is primarily concerned with the full-time farm and its operator, the Census definition of a commercial farm was not considered acceptable.

TABLE I

LIST OF 68 ITEMS OF INFORMATION

1	Sample Number
2	Farm Type
3	Soil Type
4	Total Acreage
5	Acres Cropland
6	Acres Cropland Adjusted
7	Land Value per Acre
8	Total Investment in Land
9	Total Investment in Buildings
10	Total Investment in Machinery and Equipment
11	Total Investment in Livestock
12	Total Farm Capital
13	Total Man Hours per Year
14	Cash Operating Expenses
15	Capital Cost
16	Total Operating Cost (Cap. Cost and Cash Op. Exp.)
17	Total Farm Expenditures (Cash Op. Exp. Interest, Deprec.)
18	Gross Farm Income
19	Net Farm Income (Gross Income less Total Farm Expendit.)
20	Returns to Family Labour (Gross Inc. - (Cap. Cost + C. Exp.)
21	Capital Turnover

TABLE I (cont'd.)

22	Gross Income per Acre Adjusted Cropland
23	Hourly Returns (Ret. to Fam. Lab. div. by Tot. Man Hours)
24	Age of the Farmer
25	Place of Birth
26	Formal Education, Total Number of Years
27	Agricultural Education, Number of Years
28	Farm background
29	Number of Years of Non-farm Experience
30	Number of Years of Farm Management Experience
31	Acquisition of Farm (Inherited or Bought)
32	Mortgage on the Farm
33	Joint Operation (eg. partnership)
34	Equipment and/or Labor Sharing Agreement
35	Son committed to farm
36	Marital Status of Farmer
37	Wife of Farmer, Background (Farm, Non-farm)
38	Wife, Formal Education
39	Number of Children
40	Family Achievement Score
41	Attitude toward Credit
42	Attitude toward Education
43	Future in Farming

TABLE I (cont'd.)

44	Attitude toward New Ideas in Farming
45	Attitude toward Farmer's Unions
46	Farm Goals
47	Farm Organization and Extension Involvement Score
48	Readership Score
49	Expectation Model for Product Prices
50	Expectation Model for Factor Costs
51	Expectation Model for Govt. Programs and Policies
52	Use of tested Grain for seeding
53	Use of Treated Seed
54	Use of Fertilizer on Hay and Pasture
55	Basis for Decisions on Types and Quantities of Fertilizer
56	Methods of Weed Control
57	Use of Soil Tests
58	Correction of Soil Acidity
59	Correction of Surface or Internal Drainage
60	Time of Year Equipment is repaired and overhauled
61	Storage of Surplus Hay and Grain
62	Type of Farm Record
63	Method of Decision Making
64	Farmer's Assessment of Usefulness of Information
65	Solution of Farm Problem

TABLE I (cont'd)

66	Subjective Assessment of Farmer as a Manager
67	Status of Farmer (Full-time, part-time)
68	Number of Managers on Farm

To obtain a more accurate estimate of the number of potential[1] commercial farms, selection was made on the basis of information contained in the 1967 township assessment roll. This record provides the following information: name of occupant, his age, occupation, religion, and ethnic origin, whether land is owned or rented, total acreage, location by lot and concession, and assessment values for land and buildings.

Two assumptions were made, first, that any individual, regardless of the amount of land he owns, would not be listed as a "farmer" if he holds a year-round, full-time job off the farm. Second, that at least 95 acres of land are required to operate a farm on a full-time basis and to achieve an adequate net income. On the basis of these two criterion it was found that 146 individuals own more than 95 acres of land and are listed as "farmers". From this population, a sample of 50 farms was drawn on a random basis. A table of random numbers was used to make the selection. The distribution of sample points is illustrated in Fig. 6.

2.3 Data Collection

Data were collected by means of the previously-discussed one-call confidential survey questionnaire. Interviews were conducted over the 19-week period between January 15 and May 24, 1968.

In view of the imposition of a lengthy questionnaire, a personal letter was sent in advance to each farmer, informing him

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[1] A farm which may be assumed to be a commercial or full-time operation.

about the general purpose of this study, and requesting his co-operation. This was followed up by a personal visit in order to arrange for an appointment. In some instances an interview was granted at that time.

A visit of 50 farms yielded 43 usable questionnaires. In three cases, farms had changed ownership during 1967; one farm was found to be operated on a part-time basis by a farm machinery dealer[1], two questionnaires had to be rejected because one farmer, in his generous but misguided effort to help, invited one of his neighbors who was also on the sample list, in order that both could be interviewed at the same time; one farmer refused to co-operate.

Most interviews were conducted in the evening, and lasted from two to four hours. By and large, farmers were responsive and very cooperative and frequently volunteered more information than was requested. Interviews typically commenced with a few general questions about the respondent's farm, his background, his family, or whatever circumstances suggested. This was followed by a reiteration of the purpose of this study, and an explanation that all information provided would be treated confidentially.

Aerial photographs were used as an introduction to the actual questionnaire. Farmers were asked to outline their property boundary. Questions about farm size, acreage of cropland, soil type, drainage

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[1]All other part-time farmers in the sample were interviewed. However, in this particular case discussion centered on costs of farm machinery, farmer's buying habits and other topics relevant to this study.

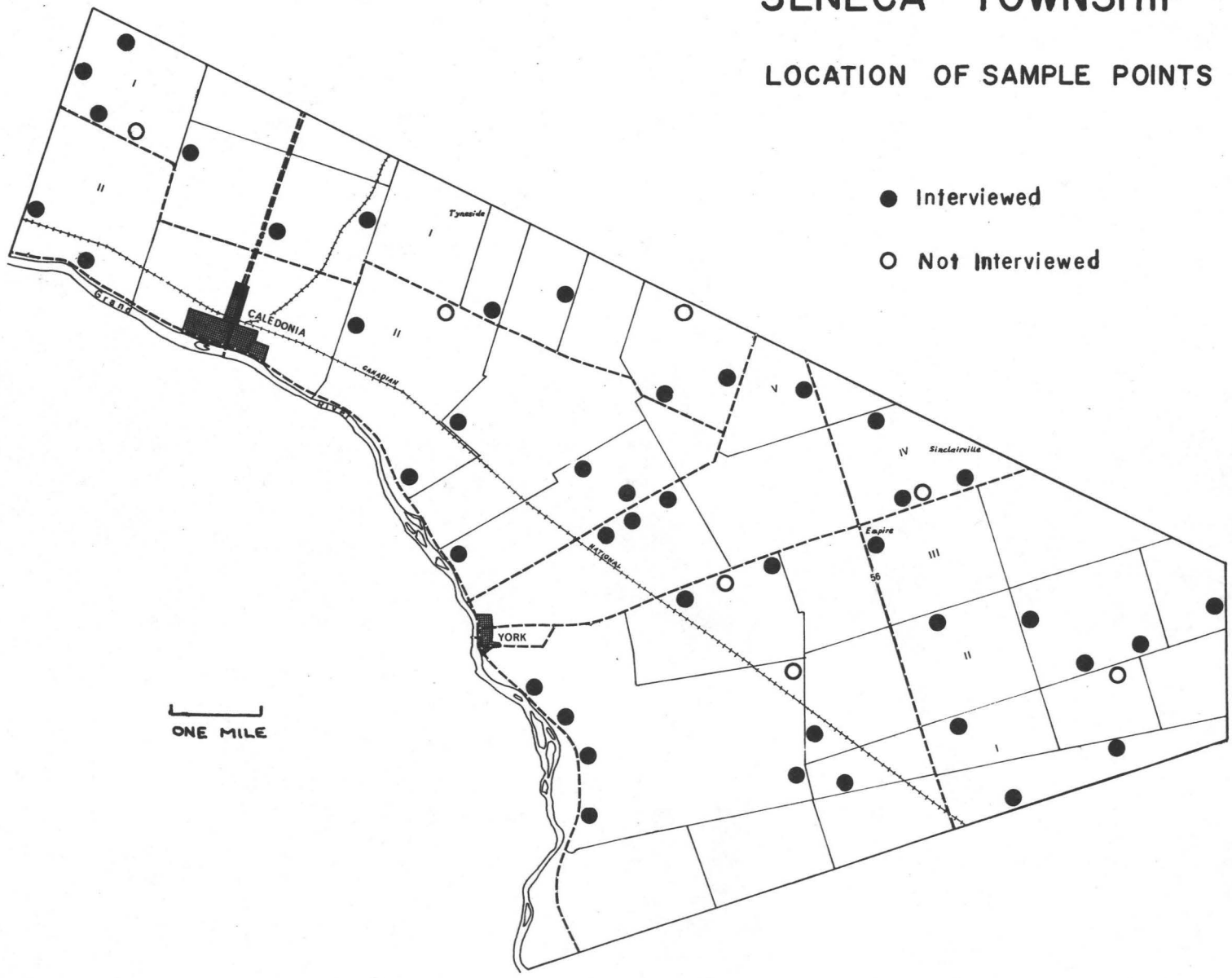
SENECA TOWNSHIP
LOCATION OF SAMPLE POINTS
Interviewed
Not Interviewed
Grand
CALEDONIA
CANADIAN
NATIONAL
Tynanside
Sinclairville
Empire
56
YORK
ONE MILE

FIGURE 5

conditions, and land capability were then introduced.

Questions on biographical and related items created no problem, and open-ended questions in the first section of the schedule required little probing. Questions on farm income and operating expenditures were preceded by a brief livestock and equipment inventory and by a tabulation of labour inputs. An item by item account of farm expenditures was not required for this study. However, the procedure of inquiring about individual expense items was found useful. Most farmers, once they realized the extent of the list of items in the questionnaire, produced their farm record book or their 1967 Income Tax Statement. This was interpreted as a willingness on the part of the farmer to volunteer the actual information that was required, namely cash operating expenses, capital cost allowance, interest paid on farm loans and mortgages, and gross farm income.

Successive questions on management practices, attitudes, expectation models, and the use of farm information required more probing, but otherwise were found relatively easy to administer.

A copy of the questionnaire and a table showing all data employed in this study is included in the appendix.

2.4 Data Coding and Storage

Economic data obtained from the farmer required only limited preliminary analysis. Land values were estimated on the basis of 1967 assessment records. It was found that a reasonable estimate of the actual market value of farmland could be obtained by multiplying

the assessment value by eight[1]. To obtain an estimate of total investment in farm building, the township assessment equalization factor of 25% was applied to the assessed value; from this sum the estimated value of the farm residence was subtracted[2].

Investment in livestock was estimated on the basis of average price quotations obtained from the Toronto Livestock Marketing Bulletin. Differences in type, age, and breed of animals were taken into consideration.

Estimates of farmer's total investment in farm equipment and machinery were based upon the inventory made at the time of the interview, the farmer's estimate of the total resale value of his equipment, and that portion of his depreciation allowance pertaining to equipment and machinery.

Acreages of cropland were adjusted to Class I land on the basis of the capability rating suggested by the farmer, and in conjunction with information obtained from aerial photographs and from field observations.

All non-quantitative information provided by farmers required coding. This was achieved by determining the range of response for each question, and by establishing suitable response categories. For

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[1] e.g. Assessment for the land portion of a 100 acre farm is $2,000, multiplied by 8 the total land value is $16,000 or $160 per acre.

[2] e.g. Assessment value for all buildings of a particular farm is listed as $4,000, equaliz. rate is 25%, then real value is estimated to be $16,000. If the value of the residence is estimated at $7,000, then total investment in farm buildings for that particular operation is $9,000.

example, in response to question No. 16 " .... how much education do you need to be a farmer today?", one group stated that education is unimportant or only of marginal importance to success in farming; a second group felt that education was of considerable importance but that other things, such as capital and a willingness to work hard would be of at least equal importance; a third group was identified which stated that education is of critical importance, ie. "a person should get all he can get".

The number of response categories for different questions ranged from as few as two, for questions requiring a simple "yes" or "no" answer, to as many as six for questions requiring an expression of opinion. A complete conversion and coding key for all quantitative and qualitative data is included in the appendix.

Following the conversion and coding procedure, all data were transferred onto 80 column computer cards. The resulting master deck served as the main data source from which groups of information items could then be drawn for further analysis.

2.5 Data Analysis

In selecting farms for this study, no attempt was made to effect homogeneity with respect to farm type and location. It is recognized that variations of this kind may result in differences in cost-return ratios which cannot be attributed to differences in management. This problem will be examined in detail in Chapter III.

To obtain an index of performance, which measures output on the basis of all important inputs, multiple regression analysis is

used, and a standard production function is estimated. Residual values, which represent the difference between actual and estimated gross income, are used to group farms into different performance groups. This technique and the grouping procedure employed, is discussed in Chapter IV.

Factor analysis and linkage analysis are not considered suitable techniques for an interpretation of qualitative data. Instead, the relevance of each item of information pertaining to management will be assessed by determining for each performance group the mean value for items such as farmer's age, education, and various composite scores, and by determining the response frequency percentage for all pertinent non-quantitative items of information. Correlations between certain variables will also be considered; however, only to the extent to which this is feasible and for items of information for which such a relationship is assumed to exist.

2.6 Summary

Two basic types of information were required: information about the farm as a physical and economic unit, and information pertaining to management. A questionnaire was designed to facilitate collection of the necessary data. From a total population of 146 property owners, who were assumed to be full-time farmers, a sample of 50 farms was selected. Data were collected by means of prearranged interviews. A total of 43 usable questionnaires were obtained. Certain items of economic information required conversion prior to further analysis. Non-quantitative data were coded by determining

the response range for each question, and by devising suitable response categories. Converted and coded data were transferred onto computer cards for the purpose of further analysis.

Preliminary data analysis will require a consideration of differences in cost-return ratios which may be due to differences in farm type and location. Multiple regression analysis and resulting production function residuals were used to group farmers into performance categories. Qualitative data were analyzed by determining mean values and response frequency percentages for all pertinent items of information, and for each performance group. Relationships between a limited number of variables were also to be examined.

CHAPTER III

VARIATIONS IN FARM TYPE AND SOIL TYPE

Summary statistics of all important economic variables give some indication about the range of differences in the economic structure of farms included in the sample (Table II). Since performance is to be assessed on the basis of output in relation to all important inputs, farm to farm differences in size, capital, structure, labour inputs, and so forth, are taken into consideration.

Two additional factors which may affect cost-return ratios of farms need to be recognized; these are farm type and soil type.

Various studies[1] have shown, for example, that specialized fluid milk farms in Ontario generally achieve higher returns on investments in capital and labour than most other farm types. Similarly, comments made by farmers in the study area suggest that Brantford Clay Loam is a more productive soil than either Oneida Clay Loam or Haldimand Clay.

Data obtained for this study is insufficient to ascertain the extent of performance variation among farms which may be due to differences in farm type and location. However, if one is prepared to assume constancy of management for all farms in the sample, any

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[1] Ontario Farm Management and Accounting Report, Pub. 315 (Toronto, 1961)

Preliminary Summary, Ontario Farm Management and Accounting Project, Publication No. A/E 1967/3 (Guelph, 1967)

TABLE II

SUMMARY STATISTICS

(43 Farms, 20 Variables[1])

		MEAN	ST.DEV	MINIMUM	MAXIMUM
4	TOTAL ACRES	201.9	103.3	98.0	643.0
5	ACRES CROPLAND	170.0	71.6	60.0	350.0
6	ACRES CROPLD.ADJ.	146.6	59.3	53.0	305.0
7	LAND VALUE P.ACRE	$ 157.5	23.7	109.0	210.0
8	CAPITAL LAND	$ 31010.8	14757.6	15600.0	91975.0
9	CAPITAL BUILDINGS	$ 12060.2	4992.4	3532.0	24920.0
10	CAPITAL EQUIPMENT	$ 14822.0	6402.3	2500.0	39500.0
11	CAPITAL LIVESTOCK	$ 13408.4	5381.6	3840.0	26900.0
12	TOTAL FARM CAPITAL	$ 71302.3	24944.9	31220.0	153130.0
13	MAN HOURS PER YEAR	4481.7	1603.1	2062.8	10483.2
14	CASH OPERATING EXP.	$ 11853.2	8282.0	1780.0	44659.0
15	TOT.FARM CAP. x 0.06	$ 4278.1	1496.7	1873.2	9187.8
16	TOT.OPER.COST (14+15)	$ 16131.4	9217.9	3653.2	52792.6
17	TOT.FARM EXPENDIT.	$ 13243.3	9186.8	2580.0	50815.0
18	GROSS FARM INCOME	$ 17299.0	10141.9	3056.0	56212.0
19	NET FARM INC.(18-17)	$ 4056.5	1905.7	476.0	7700.0
20	RET.TO FAM.LAB.(18-16)	$ 1168.5	1749.7	-2981.4	5280.0
21	CAPITAL TURNOVER	4.9	1.9	1.6	10.2
22	GROSS INC.AC.ADJ.CROPL.	$ 131.5	101.4	34.0	641.0
23	HOURLY WAGE (20÷13)	$ 0.25	0.38	-0.60	1.10

[1]Items No. 1,2,and 3 omitted from this table are the Sample Number, Farm Type, and Soil Type.

important difference in farm type and soil quality should be reflected in the mean input-output ratio of different groups of farms.

For the purpose of this analysis all farms in the sample were arranged on the basis of farm type and location with respect to soil type. Five farm types are recognized, these are: 1) specialized fluid milk farms, 2) specialized non-fluid milk farms[1], 3) specialized hog operations, 4) specialized beef operations, and 5) mixed farms[2]. The three soil types in the township are Brantford Clay Loam, Oneida Clay Loam and Haldimand Clay.

In a preliminary multiple regression analysis of six economic variables[3] with gross income as the dependent variable, only "cash operating expenses" and "total man hours" were accepted into the regression, and together accounted for 97% of all variability in gross income. In view of the high predictive ability of these two variables, one would expect that for groups of farms belonging to the more "profitable" farm type or located on more productive land, each unit of combined cash and labour input will yield higher returns than for groups of farms of a less profitable farm type or located on less productive land.

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[1]Farms specializing in the production of manufactured milk.

[2]All farms with more than one important enterprise.

[3]Independent economic variables included acreage of cropland, capitalization buildings, capitalization equipment, capitalization livestock, total man hours per year, and cash operating expenses.

Thus for each farm, the gross income per $1,000 of combined inputs in cash expenditures and labour costs[1] was calculated. The results were used to determine the mean for each group of farms, while the weighted mean was calculated to compare all farms belonging to one farm type with all farms of any other farm type, and similarly, to compare all farms located on one soil type with all farms located on any other soil type. The results are presented on Tables III and IV.

The distribution of farms on each of the three soil types is roughly proportional to the acreage of land in each type[2]. Once farms are arranged by enterprise type, one will note, however, that non-fluid milk dairy farms, hog and beef farms are not represented on each of the three soil types (Table III). Furthermore, where groups contain fewer than four farms comparison is difficult.

The following, limited conclusions may be reached from information presented on Table III

1. Fluid milk dairy farms and mixed farms achieve higher returns on Oneida Clay Loam than on Haldimand Clay.

2. Mixed farms on Oneida Clay Loam obtain slightly higher returns than fluid milk dairy farms on the same soil.

3. Fluid milk dairy farms and mixed farms on Haldimand Clay achieve virtually similar returns, but returns for non-fluid milk dairy farms are lower.

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[1] Labour is rated at $1.00 per hour.

[2]

Brantford Clay Loam	2776.6 acres	or	6.5%
Oneida Clay Loam	10636.5 acres		24.9%
Haldimand Clay	29304.0 acres		68.6%

TABLE III

MEAN RETURNS BY FARM TYPE AND SOIL TYPE[1]

	DAIRY FLD.	DAIRY MFG.	HOG	BEEF	MIXED	WEIGHTED MN.
BRANTFORD CLAY LOAM						
Number of Farms	1	1	-	-	4	Total 6
Mean Gross Income	$14,500	12,000	-	-	20,142	17,844
Mean Gross Returns per $1,000 OE+LC	$ 1,279	1,073	-	-	1,054	1,089
ONEIDA CLAY LOAM						
Number of Farms	5	-	1	-	4	Total 10
Mean Gross Income	$22,271	-	33,998	-	18,470	21,923
Mean Gross Returns per $1,000 OE+LC	$ 1,101	-	1,061	-	1,145	1,115
HALDIMAND CLAY						
Number of Farms	5	4	1	2	15	Total 27
Mean Gross Income	$17,035	12,044	8,110	9,110	16,845	15,272
Mean Gross Returns per $1,000 OE+LC	$ 1,022	945	946	985	1,016	1,002
WEIGHTED MEAN						MEAN
Total No. of Farms	11	5	2	2	23	43 Farms
Gross Income	$18,275	12,035	21,054	9,110	17,701	17,299
Mean Gross Returns per $1,000 OE+LC	$ 1,081	971	1,004	985	1,043	1,039

[1]Mean Gross Returns per $1,000 Cash Operating Expenses and Labor Cost* (*rated at $1.00/h.)

TABLE IV

A. RETURNS BY FARM TYPE

(Weighted Mean)

All Soil Types	Gross Returns per $1,000 Operating Exp. and L.Cost
DAIRY FLD. (11 Farms)	$ 1,081
DAIRY MFG. (5 Farms)	$ 971
HOG OPERATIONS (2 Farms)	$ 1,004
BEEF OPERATIONS (2 Farms)	$ 985
MIXED FARMS (23 Farms)	$ 1,043

B. RETURNS BY SOIL TYPE

(Weighted Mean)

All Farm Types	Gross Returns per $1,000 Operating Exp. and L.Cost
BRANTFORD CLAY LOAM (6 Farms)	$ 1,089
ONEIDA CLAY LOAM (10 Farms)	$ 1,115
HALDIMAND CLAY (27 Farms)	$ 1,002

On Table IV, all farms in the sample are arranged by farm type and soil type. In part A, all farms of a given farm type are grouped together without consideration of location, while in part B, all farms located on a specific soil type are grouped together without consideration of farm type. For each group the weighted mean was calculated.

A comparison of farm types shows fluid milk dairy farms to rank highest in returns per $1,000 of "investment", followed by mixed farms, hog operations, non-fluid milk farms and beef operations. For reasons already given, proper ranking of hog and beef farms is not possible.

Returns for non-fluid milk dairy farms appear low, but might have been somewhat higher if the sample had included a number of farms of this type located on Oneida Clay Loam. On the other hand, returns for mixed farms appear high. However, this group includes all farms which could not be placed into any of the other four categories; more than half of these farms are specialized two-enterprise operations with cost-returns ratios comparable to those of fluid milk dairy farms.

A comparison of groups of farms arranged on the basis of soil type indicates returns to be highest for farms located on Oneida Clay Loam, followed by those on Brantford Clay Loam, and Haldimand Clay. This ranking order conflicts with the previous statement that Brantford Clay Loam is the most productive soil type in the township. The difference in returns between the two groups is very small and may be due partly to the fact that six of the ten farms located on Oneida

Clay Loam also own "river land"[1] with soils comparable and possibly higher in productivity than Brantford Clay Loam.

Because of insufficient data, the findings of this analysis must be considered inconclusive. This precludes any categorical ranking of farms in the sample by farm type and soil type, which could be incorporated quantitatively into the types of analyses employed in this study. One may however, infer from this data that some differences in cost-return ratios do exist between farms of different types. The findings also suggest that Haldimand Clay is in fact a less productive type of soil than Brantford or Oneida Clay Loam.

For most farms in the sample differences in income which may be due to differences in farm type are not sufficiently large to warrant an adjustment in the data that will be used to determine the performance of individual farms.

To compensate for differences in soil type and land capability, adjustments will be made on the basis of information available for each farm, rather than on the basis of location with respect to soil type alone[2].

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[1] Very productive alluvial land along the Grand River.

[2] For each farm land capability was assessed on the basis of information provided by the farmer and in conjunction with aerial photographs and field notes. Acreage of cropland for each farm was "adjusted" using the following conversion ratios: 1 acre Class I land = 1 acre adjusted land, 1 acre Class II land = .87 acre adjusted land, 1 acre Class III land = .75 adjusted land. Adjustment ratios were adopted from An Economic Classification of Farms in Eastern Ontario, Farm Economics, Co-operatives and Statistics Branch, Ontario Dept. of Agriculture and Food, 1966.

CHAPTER IV

GROUPING OF FARMS BY PRODUCTION FUNCTION RESIDUALS

Several techniques have been suggested which may be used to assess the economic performance of a farm relative to several important inputs.

Two possible indices of performance, capital turnover, and gross income per $1,000 of farm capital, are rejected because of their inadequate recognition of size differences among farms, and their failure to consider the contribution of cash and labour inputs. On the other hand, "returns to family labour", a "net-income" criterion which is frequently used by farm-management researchers, is considered unsuitable in as much as it levies a heavy penalty against the farmer whose total farm investment contains a high proportion of non-productive capital.

To obtain an index of performance which measures output on the basis of all important inputs, but which excludes a consideration of non-productive capital, multiple regression analysis[1] is used to estimate a standard production function on the basis of data for the entire sample population. Residual values, which represent the difference between actual and predicted values of gross income, may then be employed to group farms into different performance categories. Apart

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[1] A. Ralston, H. S. Wilf, Mathematical Methods for Digital Computers, (New York: 1960) pp. 191-203.

from recognizing the physical fact of diminishing marginal returns, this analytical technique has the advantage of assessing the contribution to output of all variables, individually as well as collectively.

The equation for the production function is based upon the formula $Y_a = f(A_a, C_b, C_e, C_l, L_y, E)$

where:

Y_a = Output, actual gross income in dollars (V.18)

A_a = Acres of cropland adjusted (V.6)

C_b = Capital invested in farm buildings (V.9)

C_e = Capital invested in equipment and machinery (V.10)

C_l = Capital invested in livestock (V.11)

L_y = Labour, total man hours per year (V.13)

E = Cash operating expenses (V.14)

It is assumed that this equation includes all important measurable variables that influence output. Since management is not included in the equation, it is assumed that a large proportion of the unexplained residual reflects the managerial component and related social factors.

The residual value (MS) is obtained by subtracting the actual gross income (Y_a) from the predicted gross income (Y_p), thus

$$MS = Y_a - Y_p$$

When MS is large and positive superior performance is indicated. When MS equals zero or nearly so, average performance is indicated. And when MS is large and negative, inferior performance is indicated.

Data pertaining to each of the seven variables used in this analysis exhibit approximately normal distributions[1]. Simple correlation coefficients and levels of significance are listed in Table V. It will be noted that all variables are significantly related to gross income. In all but one instance, relationships among independent variables are also significant.

Results of the regression analysis[2] indicate a multiple correlation coefficient of 0.9896 between factors of production and output. Thus, economic factors internal to each of the farms included in the sample account for 97.8% of all variation in farm income.

With a virtually linear input-output relationship, the role of management and of related social factors does appear marginal indeed. However, in view of the fact that production data specify only quantities of inputs, but reveal little or nothing concrete about the nature of management, the final test of the importance of management and related factors must rest upon a comparison between production function residuals and other data obtained in the survey.

If positive or negative residuals are found to coincide with differences among farmers in management and social characteristics, then social factors do in fact appear to play an important role in influencing the decision maker's motivation, his decision processes, and the manner in which actions are performed. On the other hand, if

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[1] Histograms No. 1 to No. 7, Appendix II

[2] Appendix III

TABLE V

SIMPLE CORRELATION COEFFICIENTS FOR SELECTED ECONOMIC VARIABLES

VARIABLES COMPARED	VALUE OF R	LEVEL OF SIGNIFICANCE[1]
Acres (6)/Buildings (9)	0.3915	98%
Acres (6)/Equipment (10)	0.4644	99%
Acres (6)/Livestock (11)	0.4395	99%
Acres (6)/Hours (13)	0.3194	95%
Acres (6)/Op.Expenses (14)	0.3255	95%
Acres (6)/Gross Income (18)	0.3583	98%
Buildings (9)/Equipment (10)	0.4707	99%
Buildings (9)/Livestock (11)	0.3466	95%
Buildings (9)/Hours (13)	0.4259	99%
Buildings (9)/Op.Expenses (14)	0.2732	-
Buildings (9)/Gross Income (18)	0.3251	95%
Equipment (10)/Livestock (11)	0.5174	99%
Equipment (10)/Hours(13)	0.5202	99%
Equipment (10)/Op.Expenses (14)	0.6067	99%
Equipment (10)/Gross Income (18)	0.6441	99%
Livestock (11)/Hours (13)	0.6473	99%
Livestock (11)/Op.Expenses (14)	0.6351	99%
Livestock (11)/Gross Income (18)	0.6724	99%
Hours (13)/Op. Expenses (14)	0.6243	99%
Hours (13)/Gross Income (18)	0.6576	99%
Op.Expenses (14)/Gross Income (18)	0.9863	99%

[1]Correlation Coefficients are significant at the 95, 98, and 99% level when the value of R exceeds 0.304, 0.358, and 0.393 respectively.

such a relationship is not apparent, or is only weakly developed, the unexplained residual may be due to data error or to factors which have not been considered.

To test the preliminary hypothesis that variations in residual values are indicative of differences in management, residual values for each of the forty-three farms are plotted on a histogram (Table VI). The standard error of estimate of $1,572, indicated by regression results, is used as a group interval for category II and category III farms. All farms with a residual value above or below these categories, are placed into Group I and Group IV respectively. The resulting groups are then compared with two other management criteria: the mean hourly wage[1] for each group, and the mean value of a subjective management assessment score[2], which was assigned each farmer immediately following the interview. Mean, minimum, and maximum values of these "test criteria" are presented in Table VII and are compared with the four groups derived from residual values.

It will be noted that minimum and maximum hourly returns over-

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[1]Hourly wage = returns to family labour divided by total man hours per year. Note: since all important economic variables were incorporated into the regression, an identical ranking is likely to occur if such data is used to establish another criterion of performance. The probability of identical ranking is somewhat reduced by using "returns to family labour", because this index is based upon total farm capital, a fraction of which did not enter the regression.

[2]A score of 0 - 10 was assigned each farmer, following each interview, and without reference to questionnaire data. The evaluation was based upon an estimate of managerial ability in the light of what was said during the course of the interview.

TABLE VI

GROUPING OF FARMS BY RESIDUALS

Number of Farms per Residual Interval								0								
								+	−							
8								213 2 B 43								
7								129 1 B 39	38 5 B 40							
6								310 5 H 38	113 5 H 30							
5						1191 5 O 27	833 5 O 42	3 1 H 34	513 5 H 28	645 5 H 32						
4						1375 5 O 21	536 5 H 37	266 5 H 22	192 5 H 17	690 4 H 31						
3					2006 1 O 36	1096 5 O 11	542 1 O 26	130 1 H 12	278 5 H 16	867 5 B 25	1469 2 H 23	1643 5 B 33				
2					1685 1 O 35	1405 1 O 9	751 1 H 14	466 2 H 6	349 5 O 13	920 5 H 18	1362 3 H 19	2086 2 H 24				
1		3610 1 H 8		2341 1 B 41	1800 5 H 5	1415 1 H 4	540 2 H 7	396 5 H 3	268 5 H 2	836 5 H 10	1367 3 O 1	1751 4 H 15			3606 5 H 20	4049 5 H 29
	3669 to 4192	3145 to 3668	2621 to 3144	2097 to 2620	1573 to 2096	1049 to 1572	525 to 1048	+0 to 524	−0 to 524	525 to 1048	1049 to 1572	1573 to 2096	2097 to 2620	2621 to 3144	3145 to 3668	3669 to 4192
	GROUP I (5 Farms)					GROUP II (18 Farms)			GROUP III (15 Farms)			GROUP IV (5 Farms)				

213 Residual ($)
2 B Farm Type, Soil Type
43 Sample Number

1 Dairy Fld.
2 Dairy Mfg.
3 Hog
4 Beef
5 Mixed

B Brantford Clay Loam
O Oneida Clay Loam
H Haldimand Clay

(Standard Error of Estimate $1,572)

lap for some farms in Group II and Group III, as well as for certain farms in Group III and Group IV. However, mean values are consistent with residual groups. Similar overlap is found for minimum and maximum values of the management assessment score. For example, the minimum score for a Group I farm corresponds with the maximum score for a Group IV farm. In addition, the mean score for farms in Group IV is slightly higher than for farms in Group III.

It is evident that each of the three indices compared in Table VII would yield slightly different groups of farms. Since each index is derived in a different manner this is to be expected. However, the degree of correspondence which does exist among the three criteria cannot be attributed to chance, thus, residual values can be treated as approximate indicators of performance.

Within the frame of reference established here, one may now examine the extent to which performance variations are related to differences among farmers in biographical characteristics, farm decisions, and farm practices.

TABLE VII

MEAN HOURLY WAGE AND AVERAGE MANAGEMENT ASSESSMENT SCORE
FOR GROUPS OF FARMS DERIVED FROM RESIDUALS

RESIDUAL GROUPS	MIN. RESIDUAL	MAX. RESIDUAL	MEAN HOURLY WAGE	MIN.	MAX.	AVERAGE MANAGEMENT SCORE	MIN.	MAX.
I	+$1,685	+$3,610	$0.74	$0.50	$1.10	7.8	7	9
II	+$ 3	+$1,415	$0.41	$0.20	$1.00	7.2	5	9
III	-$ 38	-$1,469	$0.05	-$0.30	$0.60	4.9	2	7
IV	-$1,643	-$4,049	-$0.24	-$0.60	$0.20	5.2	4	7

CHAPTER V

BIOGRAPHICAL CHARACTERISTICS

5.1 Place of Birth (V 25)[1] (Q 13)[2]

Only 18 farmers in the sample were born and raised in Seneca Township. Another nine farmers grew up in other parts of the Niagara Region, and two farmers came from other provinces. It is of some interest to note, that 14 farmers, or fully one third of the entire group are immigrants from Europe[3].

The inference is not that the ethnic origin of an individual or his nationality have any bearing upon his success as a farmer. However, it is assumed that the farmer who was born and raised in the local area, and who has a life-time of familiarity with its agriculture, has important advantages over the person who grew up under different circumstances and in a different agricultural environment. Are these differences reflected in performance?

No meaningful difference was found between farmers that grew up in Seneca and those that came from adjacent areas. Hence, the only distinction which will be made is between Canadian-born farmers, and

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[1]Variable Number, corresponds with the number on the Data Source List in the Appendix.

[2]This number corresponds to the question number in the interview schedule, included in the Appendix.

[3]By country of origin: Holland 8, Germany 3, Poland 3.

those of recent European origin. The distribution by performance group and place of birth is as follows:

Canadian-born farmers:

Performance Group	I	II	III	IV	Total
Number	3	14	8	4	29
Percentage	10.4	48.3	27.6	13.7	100
Percentage by positive and negative residuals	58.7		41.3		100

European-born farmers:

Performance Group	I	II	III	IV	Total
Number	2	4	7	1	14
Percentage	14.3	28.5	50.0	7.2	100
Percentage by positive and negative residuals	42.8		57.2		100

It is apparent from this comparison that the percentage of Canadian-born farmers with positive residuals is higher than the percentage of European-born farmers in Group I and II. While a difference of 16% may not be significant, field observations generally tend to support this pattern. If residuals were to be interpreted as indicators of managerial ability, one would have to conclude that the Canadian farmer is a better manager than his immigrant neighbour. For a number of reasons, this conclusion is highly suspect.

Lack of familiarity with local agricultural conditions on the part of the immigrant farmer has already been suggested as a disadvan-

tage with which he is initially confronted. To give an example of this, two Dutch farmers that were interviewed pointed out that they would have bought their farms elsewhere, had they known more about local soil conditions. In addition to problems of this nature, the newcomer is also confronted with the more formidable task of acquainting himself with a host of economic and institutional factors which relate to farming and which can be of considerable importance.

A still more critical problem is the question of the amount of capital available to an individual in becoming established as a farmer. With few exceptions, Canadian farmers in the sample either acquired the home farm or received substantial assistance from their parents in becoming established on a farm of their own. In contrast, the alternatives available to the immigrant are to buy a farm with the funds which he brings with him, to rent a farm, or to work at another job until he has accumulated sufficient savings for a down-payment. His purchase may be premature, and often the only farm which he is able to afford, is one which has been neglected for years. Despite the benefits of various long-term loans available to farmers, he is usually faced with a large debt, with the effect that during the critical, formative years, his capacity to invest in equipment, livestock, buildings and important cash inputs, may be severely limited.

Except for two farms that were bought in 1948 and 1949 by World War II veterans, all other farms owned by immigrants were acquired after 1954. Some of these farms were bought as recently as 1964, and the average number of years of possession of all immigrant farms is

as low as 7.8. With total farm investment ranging from $31,000 to $135,000, one must ask whether or not it is possible to establish a balanced operation within a period of eight years. The answer must be affirmative if the 6 immigrant farmers in Group I and II are considered. The apparent paradox in this situation is the fact that on an average, immigrant farms in Group I and II were bought more recently and are owned by younger farmers than immigrant farms in Group III and IV. It was found that several of the younger farmers made very extensive use of various farm loans, and as a result were able to raise output to a fairly high level in a relatively short period of time. While on the other hand, many of the older farmers frequently were in a less favourable position to obtain large amounts of credit, or were unwilling to assume the risk of additional debts.

Empirical data to support this hypothesis are limited and were obtained incidentally. However, a distinction can be made between the immigrant farmer who is reasonably efficient but who is struggling with a large debt, and the newcomer whose operation is inefficient because of a chronic shortage of capital.

One may argue perhaps, that the inefficient operator should borrow more extensively, and that his failure to take such remedial action may be indicative of limited managerial ability. While in some cases this contention is undoubtedly valid, one must also recognize that what a farmer ought to do may not coincide with what he can do. This is particularly true in the case of the immigrant farmer who begins farming with very limited capital of his own, and who may

already carry such a heavy financial burden that he is unable or unwilling to assume additional debts.

No evidence was found which would distinguish between the foreign-born and the Canadian farmer in terms of managerial ability. On the other hand, the age of the immigrant, the amount of his initial investment, the number of years he has had to develop and expand his operation, and the amount of his net returns over that period of time, are important considerations in explaining differences in performance among that group of people, as well as differences between Canadian-born and foreign born farmers.

5.2 Farm Background (V 28) (Q 13)

A distinction is made between people that grew up on the farm and those that did not.

It was found that 38 farmers or 88.4% of the sample were born and raised on the farm. Hence, little can be said in a substantative way about the extent to which the experience of a farm background and success in farming are related.

At the same time however, the virtual non-existence of recent success stories of people who entered farming without prior experience, and the abundance of cases of people who have attempted to farm but who have failed because they lacked the necessary experience, attests to the fact that such a background, or a willingness to acquire comparable knowledge and skills are essential to the successful operation of a farm business.

Five of the people in the sample did not come from a farm home.

One is a skilled machinist who never felt the need or desire to abandon his full-time non-farm job. His performance as a farmer is very poor. The other four farmers are very successful. Three have a complete high school education, and two of them hold a diploma from an agricultural school. In all four cases, farm experience was acquired prior to the time the farm was bought.

5.3 Age of Farmers (V 24) (Q 13)

Among all items of biographical information, "age" is the variable which embraces most fully the farmer's "total life experience".

It is generally assumed that younger farmers are more aggressive, better educated, more willing to adjust to change and to accept new ideas in farming, than older farmers, while the latter are assumed to be more tradition-oriented, and more reluctant to adjust to changing conditions. One may also assume that age has some bearing upon a farmer's personal and family needs. If these generalizations are valid, and if the effects of age are more or less the same for all members in the group, then one may assume a relationship between a farmer's age and his level of performance. In the table below the average age of farmers is compared for each performance group.

Performance Group	I	II	III	IV	Total Sample
Mean Age	40	47	44	43	43.5
Standard Deviation	7.5	12.0	9.0	9.3	
Minimum/Maximum	30/47	28/67	35/62	34/53	28/67
% of Farmers below 43.5 years of age	40	28	60	40	42

It is quite evident from this comparison that "age" is not the critical variable it is assumed to be. While farmers in Group I have a lower average age than farmers in any other group, one would also have to explain why only 28% of the farmers in Group II are younger than 43 as compared to 60% of the farmers in Group III.

A number of reasons are suggested why age differences among farmers are not strongly reflected in differences in performance. Few, if any logical reasons can be cited why all members of a particular age and occupational group should behave in a similar fashion. The argument of alleged conservatism on the part of older farmers was not found very convincing. Older farmers somewhat in their attitudes, as will be shown later, but apparently this has no effect upon their performance.

If an advance in age should be associated with a relative decline in the amount of disposable income required by the farm family, or if age has an adverse effect upon the farmer's ability to perform physical work, it is quite possible that such changes lead to a very gradual adjustment in the level of production. If such an adjustment is made judiciously and over time, it need not upset the equilibrium of an operation.

Finally, "age" also embodies an important experience component. In question No. 59, farmers were asked to comment on the usefulness of 18 different sources of information. "Past Experience" was considered "always useful" by 93% of farmers in the sample. In contrast "Farm Records", which achieved the second highest rating, was consi-

dered "always useful" by only 72%. This illustrates the importance farmers attach to past experience. This should give him a decided advantage over the young and inexperienced manager who is just commencing his career. On these grounds, one could argue that it is in fact the older farmer who is most capable of superior performance. Reality might well bear out this argument, were it not for the ironic situation that for most farmers, knowledge and experience are greatest at a time in their life, when they least need it. Thus, in theory, if not also in fact, the age factor in relation to economic performance is capable of complete neutrality.

Age in Relation to Other Variables

To determine the nature of relationships between "age" and other variables, farmers were divided into four age groups as follows:

Group Number	Age	No. of Farmers
1	28 - 37	12
2	38 - 47	14
3	48 - 57	11
4	58 - 67	6

The response to a number of questions was then compared for each age group. Results are presented in Table III.

As one might expect, the number of years of formal education obtained by farmers is highest for members of Age Group 1. It is surprising however, that a considerable number of farmers in the other three age groups also obtained one or several years of secondary education. Out of 31 farmers which make up Age Group 2, 3 and 4, 20 completed Grade IX or better, nine completed Grade VIII, and only 2 farmers

obtained less than eight years of formal education.

The distribution of farmers that are still paying a mortgage requires little explanation. The percentage of farmers that have a mortgage on their property generally decreases with age. One exception is Age Group 4. This group includes two Dutch farmers with sons that are committed to farm, and one semi-retired farmer who acquired his property through the Veteran's Land Act.

Age differences among farmers are reflected in differences in attitudes with regard to the use of credit, the importance of education in farming, prospects about the future of young people in farming, the acceptance of new ideas, and attitudes toward farm unions.

In question No. 46 (V41), farmers were asked to explain how they feel about the use of short and long term loans in connection with their farm business. Only three farmers in the entire sample stated that they never use loans of any kind. The remaining forty farmers felt that the use of credit was essential to the operation of a farm. Further probing revealed considerable differences in the actual use of credit. Only short-term loans were considered. "Frequent use" of credit was defined as one or several loans per year, up to a maximum or total amount of $3,000. On the basis of this criterion, 83% of farmers in Age Group I make "frequent" use of credit, as compared to 33% of farmers in Age Group 4. Comments made by farmers in connection with this particular question, makes it quite evident that the manner in which they use credit is not always a reflection of their true attitude, or vice versa. Necessity may force a young

TABLE VIII

RESPONSE PATTERNS BY AGE GROUPS

	Variable	Age Groups 1 28-37	2 38-47	3 48-57	4 58-67
	Number of farmers in each age group	12	14	11	6
V26	Mean, Years of Formal Education	11.2	9.6	9.9	9.5
V32	Percentage of Farmers Paying a Mortgage	83.3	42.8	27.2	50.0
V41	Percentage of Farmers using credit "frequently"	83.3	50.0	54.5	33.3
V46	Percentage of Farmers "expanding production	75.0	42.8	45.4	66.6
V42	Percentage, Response: Education "very important"	50.0	42.8	63.0	66.6
V43	Percentage, Response: "Good future in farming"	33.3	8.3	21.4	16.7
V44	Percentage of Farmers that are innovators	50.0	21.4	27.2	0.0
V45	Percentage, Response: in favour of Farmer's Unions	33.3	28.5	27.2	66.6
V66	Mean, Score subjective assessment of Management	6.6	6.2	6.5	5.3

farmer to make far more frequent use of short-term loans than he would like, while on the other hand, the very infrequent use of such loans by an older farmer, may not reflect his attitude about credit, but rather may indicate that he has adequate financial reserves of his own.

Differences in farm goals (Q41, V46) appear to be linked to the frequency of credit use. The high percentage of farmers in Age Group 4 that are planning to "expand production" is explained by the fact that several farmers in this group have sons who are planning to farm.

It is interesting to note that a higher percentage of older farmers felt that education is very important to success in farming, than did younger farmers (Q16, V42). The explanation suggested for this pattern is that older farmers have witnessed and experienced the rapid technological change which has characterized the period since the end of the last war. In the light of their own limited educational background they may be more keenly aware of the complexity of modern farming and the need for education, than younger farmers who grew up during a period of change, and who themselves frequently had the opportunity to obtain more than a grade-school education.

In terms of proportions, twice as many of the farmers in Age Group 1 felt that there is a good future in farming, than did farmers in Age Group 4 (Q18, V43). In view of the fact that the young farmer has just begun his career, and must be convinced that what he is doing is right, whereas the old farmer is more likely to reflect upon a

lifetime of hard work and many struggles, this response pattern is not surprising. On the other hand, it is difficult to explain why only 8% of the farmers in Age Group 2 felt that farming holds out the promise of a good future for young people. It is suggested that members of this particular Age Group (38-47 years) are most keenly aware of the opportunity costs involved in farming vis-a-vis the non-farm job. In other words, farmers in Age Group 1 are firmly committed to the farm in terms of personal interest, farm debts, and family obligations, whereas farmers in Age Group 3 and 4 may already have reached an age and a level of achievement at which alternative forms of employment appear less attractive.

The largest number of innovators (Q57, V44) among farmers fall into Age Group 1, while on the other extreme are farmers in Age Group 4, none of whom were found to be innovators. One might infer from this pattern that an increase in age is paralleled by a decline in the adoption of new knowledge and techniques in farming. However, if this were true, one would also expect that all farmers in the 58 to 67 age range are found in Performance Group IV. This is not the case. Four of the six oldest farmers in the sample are in Performance Group II, while the other two are in Group III. Information obtained in the course of interviews, suggests that older farmers generally are well-informed about new ideas in farming, and that they will adopt new techniques, provided that a change can be justified in terms of the benefits and advantages resulting from it. Again it is suggested that the difference between the younger and the older farmer is

not so much one of attitude, as it is one of economic status and needs. As a rule, the older farmer is subjected to fewer economic pressures than the young farmer who is still in the process of becoming established. The former also has had more time to learn that "mistakes are less costly when made by the other fellow".

Attitudes toward farmer's unions (Q25, V45) were generally one of indifference. However, some differences in response among different Age Groups were recognized. Young farmers seemed to be either very much opposed to union-type farm organizations, or they expressed strong interest to "become involved if a good union ever becomes established". In contrast, older farmers objected to the idea of "unionism" but not to the concept of a strong organization which could advance their collective cause.

The subjective Management Assessment Score (V66) was included in Table VIII to illustrate that apparent differences in management between farmers of different Age Groups are very marginal[1]. This observation supports the conclusion reached earlier, that "age" is not a critical variable in explaining differences in performance.

5.4 Years of Managerial Experience (V30) (Q17)
Years of Non-Farm Experience (V29) (Q13)

Several of the arguments that have been presented in an attempt to explain why age differences among farmers are not strongly related

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[1]The lower mean score for farmers in Group 4 is the result of very low scores assigned to two farmers who are near retirement, and whose farmstead shows many signs of neglect and disrepair.

to performance, also apply to the variable "years of managerial experience".

The following data show that the relationship between years of managerial experience and economic performance is highly inconsistent.

Performance Group	I	II	III	IV
Mean, Years of Managerial Experience	11.0	16.6	9.9	12.0
Minimum/Maximum	6/16	1/35	1/23	7/15
Percentage of Farmers above sample mean of 12.3 years of Managerial experience	40.0	55.5	26.7	40.0
Standard Deviation	4.8	10.5	9.9	12.0

While there is less deviation from the mean, among farmers in Group I, evidence is inadequate to support the hypothesis that years of managerial experience is critically related to a farmer's performance. The higher mean for farmers in Group II is likely related to the higher average age[1] of that particular group.

In contrast to years of managerial experience, the number of years farmers have spent in non-farm work, either as part-time farmers, or prior to the acquisition of their farm, is significantly related to performance.

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[1]The mean age for the four groups is 40, 47, 44 and 43.

Performance Group	I	II	III	IV	Sample
Mean, Number of years of non-farm work	1.4	1.9	7.2	8.4	4.7
Standard Deviation	3.1	2.7	6.6	11.1	
Minimum/Maximum	0/7	0/7	7/21	11/25	0/25
Percentage of farmers with any non-farm exp.	20	33	80	60	51

From this data one may infer that non-farm work experience is not a valid substitute for farm experience, and that every year spent in work off the farm is one year lost in terms of farm experience. However, this argument is only valid to the extent to which the number of years of total farm experience of an individual are relevant to his degree of success as a farmer. Since the nature of this relationship is not at all clear, it is futile to suggest that farmers in Group III and IV perform more poorly because they have sacrificed a certain amount of farming experience. An examination of the reasons for lengthy periods of non-farm employment by different people will provide a more plausible explanation for the lower levels of performance.

Reference was made earlier to the different ways in which farmers in the sample acquired their property. On this basis, three groups can be recognized.

The first group includes twenty-five farmers from the local area[1] who either acquired the home farm, or who received assistance

[1]Farmers from Seneca Township and adjacent areas.

from their parents in becoming established on a farm of their own. The distribution by Performance Groups is as follows: three farmers are in Group I, twelve are in Group II, seven are in Group III, and three are in Group IV. These people have had an average of 1.5 years of non-farm experience.

The second group is made up of five farmers, two Canadians and three farmers of European origin. In all five cases, farms were bought during the period between 1959 and 1964. At the time of purchase every one of the five farmers was under 31 years of age. In every case, the initial investment was very large, and extensive use was made of farm credit. Four of these farms are in Performance Group II, while the farm bought most recently is in Group III. The average number of years of non-farm employment by members of this group is 3.0.

The third group includes the remaining thirteen farmers, two of whom were born in Canada, while the others are immigrants from Europe. All of these people were above the age of 35 at the time they bought their farm, and most of them relied upon their own limited savings in becoming established. The initial capital usually was accumulated during several years of employment in a factory or at some other job. Frequently, such employment was not terminated at the time the farm was bought, but continued for some time until farm debts could be reduced and production could be increased to a level where all financial obligations could be met from farm income alone. Three of these farms are still operated on a part-time basis, and in one

instance the farmer's wife is working and contributes to the family income. Many of the farms bought by these people were in very poor condition, and it is no coincidence that twelve of these thirteen farms are located on Haldimand Clay. The performance pattern for this group is as follows: two farmers are in Group I, two are in Group II, seven are in Group III, and two are in Group IV. The average number of years of non-farm employment by members of this group is 9.4.

Thus, it is quite evident that "years of non-farm experience" is closely related to the manner in which farmers became established. This in turn will have some bearing upon performance, and helps to explain the relatively low level of performance for several farms in the sample.

5.5 Years of Formal Education (V26) Q13)
Agricultural Education (V27) (Q13)

A distinction is made between formal education and specialized agricultural education. The former was considered to include all training acquired in grade school, high school, military college, and any non-agricultural technical training involving formal instruction and attendance at a school. Agricultural education was defined to include all specialized agricultural training obtained at an agricultural school or college[1].

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[1]Several of the Dutch farmers had undergone farm apprenticeship training in Holland, which includes a certain amount of formal agricultural instruction. Such training was equated with two years of agricultural education.

Assumptions about the purpose and importance of education need not detain us. However, the question posed here is: to what extent are performance variations related to differences among farmers in levels of education?

Performance Group	I	II	III	IV	Sample
Mean, Yrs. Formal Edc.	9.2	10.3	10.3	10.4	10.2
Standard Deviation	3.2	2.6	3.2	.5	
Minimum/Maximum	5/14	6/15	7/18	10/11	5/18
Mean, Yrs. Agr. Educ.	.8	.2	.5	.0	.4
Standard Deviation	1.1	.6	1.4	.0	
Minimum/Maximum	0/2	0/2	0/5	0/0	0/5

No "anticipated" relationship exists between levels of formal education and performance. In fact, it must seem paradoxical that the farmer with the least amount of formal schooling in the entire sample, is in Performance Group I and has the largest positive residual. This does not negate the value or importance of formal education, but it does suggest that educability and motivation are critical elements of success in farming.

Ironically enough, it is the farmer himself who inadvertently has perpetuated the myth that all a man needs to farm is "a strong back and a weak mind". Nothing less appropriate could be said about those farmers that were interviewed, who succeeded despite their inadequate educational background. While industriousness has undoubtedly contributed to their success, their level of achievement and their ability to compete with other farmers surely is indicative of more than the

the virtues of a "strong back".

In comparing the educational levels of different farmers with their performance, the assumption is implicit that education has a cumulative effect, and that eight years of education has the same effect upon one person as it has upon another. Little evidence was found to support this assumption. Still more erroneous is the notion that lack of education on the part of the farmer is indicative of a lack of intelligence, and that he chose farming because he was unfit for any other vocation.

Only six farmers in the entire sample obtained training at an agricultural school. With the exception of two Dutch farmers, all are below the age of 35, and began farming during the last ten years. Two of these six farmers are in Performance Group I, two are in Group II, and two in Group III. Five operate specialized fluid milk dairy farms, and one is specializing in the production of hogs. While superior performance was not indicated in every case by the data that was obtained, these people generally appeared to be more positive about their work, and seemingly were more convinced about profit opportunities in farming than most of the other farmers interviewed.

5.6 Marital Status (V36) (Q13)
Family Achievement Score (V40)
Farm Mortgage (V32) (Q36)

It was suggested earlier that the needs and aspirations of the farm family represent one of the major sources of motivation. It is assumed that the farmer lacking strong sources of motivation

will be more prone to inefficient resource allocation and to satisficing behaviour, than his more strongly motivated neighbour.

Six of the farmers interviewed do not have any strong family obligations. Four are unmarried, and two are separated. Three are in Performance Group III and three in Group IV. Arguments of age, lack of education, or lack of capital in becoming established do not apply to any of the unmarried farmers. All are between 34 and 39 years of age, have had from two to four years of high school, and all four farmers are operating second and third generation farms that are located on good land and that have good buildings and equipment. It may be relevant that in all four cases one or both parents are still living on the farm, and are being supported by the son. However, in every case the farm is managed by the son, who has acquired part or total ownership of the operation.

In contrast, the two farmers that are separated, are both over 50 years of age, and only one has a son who may consider farming. Both farms were acquired on a "limited capital" basis, one in 1949, and the other in 1954. They are located on poorer land in the Township. Both operations have been characterized by chronic financial problems, and one of the two farmers gave this as the main reason for the separation from his wife.

It is suggested that the low performance of the four unmarried farmers is due in part to an absence of a strong source of motivation, while lack of capital and age appear to be more cogent reasons for the low performance of the other two farmers.

The extent to which the farm family provides an incentive to achievement among married farmers is expected to vary considerably. The farmer with a young family and with a mortgage to pay is more likely to aim for an optimization of net income than the farmer with no pressing financial commitments. It was also suggested that the social and educational background of the farmer and his wife may have an important bearing upon the family's level of living and aspirations. This in turn may be reflected in farm performance.

It has already been shown that the age factor did not discriminate significantly between farmers of different performance levels. However, it was also pointed out that this is in part related to the fact that four of the farmers in the 58 to 67 age category have sons who are committed to farm, in contrast to the other two farmers in the same age group who are considering retirement. In the light of this information, the commitment to farm on the part of a farmer's son must be considered a major incentive to the older farmer to maintain production or to expand his operation.

No relationship was found between size of family and levels of performance. The average number of children per farm family is 2.6, while for the four Performance Groups it is 1.8, 4.1, 2.5, and 2.2. The higher average for Group II again seems to be related to a higher average age for people in this category.

To obtain some indication of the extent to which the farm family constitutes a source of motivation to farm achievement, a subjective score, similar to the management assessment score, was

used. The family achievement score is based upon a cumulative rating of the following items of observation: 1) the family's level of living, 2) past achievements, with particular emphasis upon involvement by the family in community and social affairs, as well as educational and occupational achievement by children who have left the home, 3) an expression of the family's plans for the future. Individual scores were reduced to a single score ranging from 1 to 10.

The mean of the family achievement score for each Performance Group, and the minimum and maximum score occurring in each group are as follows:

Performance Group	I	II	III	IV	Sample
Mean, Family Achievement Score	7.2	6.8	5.8	4.8	6.2
Standard Deviation	0.5	1.0	1.3	1.9	
Minimum/Maximum	7/8	4/8	4/8	3/8	3/8

The data presented here tends to support the hypothesis that a direct relationship exists between levels of aspiration of the farm family and the economic performance of the farm. However, this relationship is not consistent. It will be noted that the standard deviation increases as one proceeds from Performance Group I to Group IV, and that each Group contains at least one family with a score of eight.

Two reasons are suggested to explain this apparent inconsistency. One of the farms in Group IV and several of the farms in Group

III are still in a process of expansion and adjustment, which makes inefficiencies highly probable. The second reason relates to expenditure priorities between the farm and the family. If family expenditures in any particular year are unusually high, and if these are made at the expense of farm inputs, the level of performance is likely to be affected. Two farmers in Performance Group III indicated that they spent less money on the farm during 1967 than they normally would do because of certain family priorities. The reverse is also possible, where farm priorities dominate over family priorities. This appears to be the case for the farm in Group II which has a family achievement score of 4, but a management score of 7, and a level of performance which is above average.

Assumptions about the relationship between levels of aspirations of the farm family and levels of education of the farmer and his wife, tend to be substantiated, as the following data would indicate:

Family Achievement Score	8	7	6	5	4
Mean, Formal Education of Farmers' Wife	11.6	10.2	9.8	9.5	8.0
Mean, Formal Education of Farmers	12.1	9.6	9.7	9.0	7.6

Finally, it was suggested that financial commitments, other than those generated directly by the farm family, may represent an important source of motivation. In question No. 36, farmers were asked whether or not there is a mortgage against their property. It was

found that 80% of the farmers in Group I, 44% in Group II, and 53% in Group III make payments on a farm mortgage, whereas none of the farmers in Group IV had any obligations of this nature. This pattern does suggest that the financial commitment entailed in a mortgage, is an additional reason for a farmer to aim for an optimum level of production and performance.

Again, however, it is evident that this relationship is not always of a positive nature. There is some evidence that a farm mortgage can also have serious negative effects upon production. Several of the immigrant farmers indicated that they are trying to pay off their mortgage "as fast as possible" because of the large amount of interest they have to pay every year. The following hypothesis is suggested to explain this concern for debt reduction and to illustrate how it can lead to a protraction of a low level of performance. A farm which is established on a limited capital basis (typical of numerous immigrant farms) tends to produce very low returns on capital invested during the first few years. If interest rates on the farm mortgage are 6% but farm returns to total investment are below 6%, then it is normal for the farmer to assume that savings which accrue from a faster reduction of farm debts are greater than returns from additional farm inputs, with the result that debt reduction is over-emphasized at the expense of farm inputs and potential farm earnings. As long as debt reduction is given greater priority than it warrants, returns relative to inputs will remain low, with the effect that the farmer has reasons to prefer

the certain "profits" resulting from a faster reduction of his debt over the uncertain profits which may result if some of the excessive payments on his mortgage were to be used to increase cash inputs.

While data in support of this hypothesis is inadequate, it can be shown that average returns to family labour, when expressed as a percentage return on annual capital cost and cash operating expenses, is well above the six percent level for farms in Performance Group I and II, while it is below that level for all but one of the twenty farms in Performance Group III and IV[1].

5.7 Summary

One third of the sample is made up of post-war immigrants from Europe. A comparison of the two groups of farms showed that the immigrant group contains a higher proportion of low-performance farms than the native group. Lack of familiarity with local farming conditions and insufficient capital in becoming established, were suggested as the major reasons for the incidence of low-performance farms within that group. It was also pointed out that younger immigrant farmers were established more recently and were able to achieve high levels of production and performance in a relatively short period of time, because of an ability and willingness to make more extensive use of credit.

Since most farmers in the sample had a farm background, the

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[1]Average returns on combined capital cost and cash operating investment for the four Performance Groups are as follows: Group I 22.4%, Group II 11.4%, Group III -1.4%, Group IV -8.6%.

importance of this variable could not be adequately assessed. However, it was noted that people who were not born and raised on a farm, did have relevant farming experience, and in some cases obtained special agricultural training, prior to the purchase of a farm.

No conclusive evidence was found in support of the hypothesis that an increase in the age of farmers is accompanied by a decline in performance. It was suggested that older farmers may have a less obvious need to optimize profits, but that adjustments in production can occur gradually and without having a marked effect upon efficiency. Since farming experience also increases with age, it is possible that the greater ambition of the younger farmer has its parallel in the greater experience of the older farmer, which would tend to make age a potentially neutral factor.

Some relationships were evident between the age of farmers and other variables. As expected, older farmers on an average had less formal education than younger farmers. A lower percentage of older farmers have a mortgage against their property, make "frequent" use of credit, and plan to expand production, than younger farmers. Exceptions appear to relate to the fact that several farmers have sons who are committed to farm. Age differences are reflected in differences in attitude with regard to the need for education, opportunities in farming, and farm unions. A higher percentage of older farmers felt that education is very important to success in farming than did younger farmers. In contrast, older farmers were less optimistic about opportunities in farming. Older farmers generally were opposed

to the idea of farmer's unions but favoured the concept of a strong farm organization to further their collective cause.

No obvious relationship was found between levels of performance and years of managerial experience. On the other hand, it was noted that a decline along the performance scale was paralleled by a marked increase in the number of years people have spent in work other than farming. Low performance because of a sacrifice of farming experience was not accepted as a generally valid hypothesis. Instead, it was suggested that the number of years people have spent in non-farm work is related to the manner in which they have acquired their property.

Education could not be proven to be a critical variable in relation to performance. While the general value of formal education is recognized, it is argued that a certain level of education need not have comparable effects upon all people. The idea that lack of education on the part of the farmer is indicative of a lack of intelligence is considered fallacious. Some limited evidence was found that special agricultural training is of relevance to success in farming.

A distinction was made between farmers that are married and those that are single. An absence of the motivation normally provided by the farm family was suggested as the only apparent reason for low levels of performance on the part of the four unmarried farmers. Age and chronic financial difficulties appear to be important factors in explaining the relative position of two farms owned by people who are separated.

The relationship between levels of performance and the farm family as a source of incentive and motivation was illustrated by comparing the average family achievement score for each Performance Group. Inconsistencies may be due to low performance ratings of certain farms that are in a process of production adjustment. In instances where a farm exhibits a high level of performance concurrent with a low family rating, persistent farm priorities may be indicated.

The obligation entailed in a farm mortgage is considered an additional incentive to the farmer to aim for optimum returns. Some evidence for this relationship does exist. Certain negative implications were pointed out as well. It was suggested that farmers who obtain only very low returns on their investment may be prone to over-emphasize debt reduction at the expense of additional farm inputs and potential farm earnings.

CHAPTER VI

FARMER'S ATTITUDES

Webster[1] defines the term attitude as "a position or bearing indicating action, feeling or mood". Thus, reference to the attitude of a farmer may imply a general disposition, or it may refer to an expression of his opinion or "attitude" toward a particular subject.

While it is the farmer's "collective" attitude toward his work and toward life in general which is likely to affect his decisions, his actions, and ultimately his performance, definition, measurement, and analysis of this factor would be a demanding task.

This part of the inquiry was limited to specific questions on which farmers were asked to express an opinion. Questions were oriented to ascertain attitudes of farmers with regard to the use of credit, their feelings about the importance of education in farming, their opinions regarding opportunities for young men to enter farming, their attitudes toward new ideas in farming, their attitudes toward farm unions, and their opinions on how the "farm problem" might be solved.

It has already been shown that some differences exist in the pattern of response between farmers of different age groups (Chapter 5.3). The purpose of this chapter is to examine the extent to which such a pattern is evident for farmers in different performance groups.

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[1] Webster's New Collegiate Dictionary, (Toronto, 1958)

6.1 The Use of Credit (V41) (Q46)

The purpose of Question No. 46 was to obtain some information on how farmers feel about the use of credit in connection with their farm business. As pointed out earlier, this question did not provide any specific answers which might be interpreted as indicative of the true feelings of farmers regarding this issue. Over 90% of the farmers stated that credit is a good thing if it is used wisely. Further probing however, revealed considerable differences among farmers in the actual use of credit, and a distinction was made between farmers who never use credit, those who use it occasionally, and farmers who make frequent use of credit. Frequent use was defined as one or several short-term loans per year, up to a maximum or total amount of $3,000[1]. The results are as follows:

Performance Group	I	II	III	IV	TOTAL
Do not use credit	0%	6%	0%	40%	7% (3)
Use occasionally	40%	22%	60%	0%	35% (15)
Use frequently	60%	72%	40%	60%	58% (25)

It would appear that no obvious relationship exists between levels of performance and the use of credit by farmers. There is no evidence that low levels of performance are the result of an aversion on the part of the farmer toward the use of borrowed capital. Also, as suggested in Chapter 5.3, the manner in which credit is used by the

[1]Only two farmers were found to use more than $3,000 per year and pay it back within a twelve month period. These were also considered "frequent users".

manager is not necessarily a reflection of his attitude, but an indication of his economic status, his farm goals, and his needs.

6.2 Attitudes Toward Education (V42) (Q16)

In questions No. 16, farmers were asked "How much education do you need to be a farmer today? What do you think?". A minority of farmers felt that education is not important to success in farming. They explained that a willingness to work hard, a love for farming, and the necessary capital are the essential prerequisites to success in farming. A second group of farmers was identified, which felt that education is of considerable importance, but not as important as one of these other personal characteristics; they too stressed the need for capital. A third group of farmers felt that education is very important. Their usual response was "the more you can get the better". Many of these people also felt that a farmer should prepare himself at an agricultural school or college before entering upon a career in farming.

The response pattern for the four Performance Groups is given in the following table:

Performance Group	I	II	III	IV	TOTAL
Educ. "not important"	0%	11%	13%	0%	9% (4)
Educ. "of some importance"	80%	33%	27%	60%	40% (17)
Educ. "very important"	20%	56%	60%	40%	51% (22)

The pattern shows that it is not necessarily the farmer with the highest level of performance who attaches the greatest importance

to the role of education. The percentage of farmers who feel that education is very important is considerably higher for farmers in Performance Group II, III and IV than for farmers in Group I. It will be recalled that the average number of years of formal education for farmers in Group I is below the sample mean. Hence, it may be possible that these farmers can afford to attach less importance to education because their own success is living proof, as it were, that superior performance can be achieved without having had the benefits of secondary education.

If the foregone assumption is valid, then one would also expect to find a relationship between a farmer's educational background and his attitude toward education. Some evidence for this relationship was found. The average number of years of formal education of farmers who said that education is not important or only of some importance is 8.6. The mean for farmers who responded that education is very important is 11.1. One exception to this general pattern was discussed in the previous chapter. It was pointed out that a slightly higher percentage of farmers in Age Group 3 and 4 felt that education is very important than farmers in the lower age categories.

The conclusion from this observation is, that a farmer's attitude toward education generally reflects his own educational background, but that success in farming cannot be equated with so many units of years of schooling.

6.3 Opportunities and Future in Farming (V43) (Q18)

Farmers were asked the question "Do you feel that there is a

future in farming for young people today?". It is assumed that the more successful farmer would provide a positive answer, whereas the less successful farmer would be more inclined to say "no". The following data shows that such a distinction is not generally valid.

Performance Group	I	II	III	IV	TOTAL
"No future in farming"	40%	11%	20%	0%	16% (7)
"That all depends"	20%	33%	47%	80%	42% (18)
"Definitely a future in farming"	40%	56%	33%	20%	42% (18)

Probing revealed that those farmers who provided a negative response, based their opinion upon their personal dissatisfaction with the present economics of farming, rather than upon long-range prospects. Furthermore, people who used the interview as a means to air their grievances about farming in general, placed themselves in a position where they could not say that farming holds a good future for young people, without contradicting themselves.

People giving the second type of response usually were more objective in their answers. They felt that there is no simple answer to this question since the future is not known. However, judging by present circumstances, they felt, that a young person with the necessary personal qualifications and particularly, with the necessary capital, could still find a great deal of satisfaction and a future in farming.

The third group of farmers felt that there will always be a future in farming, "for the simple reason that people always have to eat". Some of these people also suggested that "conditions in farming

can't get much worse, therefore, sooner or later they must get better".

The feelings of older farmers in particular, is not without implication with regard to the number of young people that will enter farming. Many people have suggested that the demise of the family farm is imminent and inevitable. Arguments generally hinge upon present economic conditions in agriculture, and an apparent lack of interest among young people to consider farming as a career. Observations made in connection with this study give very little substance to the hope or fear that the family farm will soon be a thing of the past. A total of fifteen farmers in the sample have sons in the 18 to 24 age category. In eleven cases the son is interested in farming, and in nine cases sons have committed themselves to farm. These young people are enthusiastic about farming. Several of them hold a diploma from an agricultural school, while others have expressed a desire to obtain such training. As one might expect, none of the parents of these young people stated that there is no future in farming, at the same time however, there is ample evidence that the choice of these young men is of their own volition.

6.4 Attitudes Toward New Ideas in Farming (V44) (Q57)

To assess farmer's attitudes toward new ideas in farming, and to make a distinction between the innovator and the farmer who adopts a practice only after it has become widely accepted, farmers were asked to list any new ideas, practices, or techniques which they have adopted on their farm over the last two or three years.

The first group includes those people who did not provide any

evidence of recent adoptions, or who cited items which are common practice. Farmers who made recent adoptions were asked how they obtained the information. If they stated that several other farmers in the area have been using the practice with success, they were placed in the second group, that is, farmers who adopt after the advantages of a certain practice or new idea have been demonstrated. Farmers who made adoptions on the basis of information obtained from farm magazines, their agricultural representative, from supply dealers or other sources, but who did not know of any other farmer who has adopted the idea or practice, were considered "innovators".

The results of this grouping are as follows:

Performance Group	I	II	III	IV	TOTAL
Adopts after practice is common	20%	11%	33%	20%	21% (9)
Adopts after advantages have been demonstrated	40%	50%	60%	60%	53% (23)
Will innovate	40%	39%	7%	20%	26% (11)

It is evident that by far the larger number of farmers take the cautious approach, and adopt a practice only after its advantages have been proven or after a practice has become widely accepted. Only 26% of all farmers in the sample are prepared to take risks and to innovate. Most of these people are in Performance Group I and II.

This pattern would suggest some relationship between levels of performance and farmer's attitude towards the adoption and use of new ideas. The evidence presented here however, is inconclusive. One

might argue for example, that farmers with higher levels of performance are generally in a better economic position to experiment and to innovate, than farmers with lower returns. In many cases, the effects upon farm profits which may result from an innovation are not always evident, or may even be negative. For example, farmers in the study area have been using Atrazine as a pre-emergence herbicide on corn fields. One farmer, who was considered an innovator, observed that Atrazine left harmful residues, and was not completely effective on his particular type of soil. As a result he switched to Naptane. He doesn't know what the effects of this new chemical will be, and it may take several years before its advantages or disadvantages have been demonstrated. The risk element associated with such innovations may be very high, while the prospects of larger profits may not at all be certain. Under these circumstances, a farmer's refusal to gamble should not be interpreted as conservatism, but as an attitude of common sense.

6.5 Attitudes Toward Farmer's Unions (V45) (Q25)

As pointed out earlier, few farmers expressed a genuine enthusiasm for farmer's unions. Some farmers felt that these organizations are absolutely useless, while others argued that there are too many of them "to do any good", that it is too difficult to get farmers organized, and that interests among farmers are too diverse to establish a single organization which might further the "common cause" of all farmers. Older farmers in particular, objected to the word "union" itself because of its connotations. Only six farmers in the sample are members of a farmer's union. One young farmer explained how he became

president of such a group without being aware of the fact for nearly five months.

The response pattern by performance groups is as follows:

Performance Group	I	II	III	IV	TOTAL
Farmer's Unions "of no use"	60%	28%	13%	40%	28% (12)
"Might be useful"	40%	33%	40%	40%	37% (16)
"Are useful"	0%	39%	47%	20%	35% (15)

Some evidence of a relationship is apparent, however, this is not likely to be of much significance because of a high probability of response error, and the frequently indefinite answers provided by farmers[1].

6.6 Opinions on the Solution of the "Farm Problem" (V65) (Q54)

Questions No. 54 was introduced with a statement to the effect that there is general agreement among farmers that the biggest problem facing them today are spiraling costs of production without commensurate increases in returns. This was followed by the question "I wonder if you have any ideas on what might be done to correct this situation?". A total of fifteen farmers were uncommitted. They felt that the problem does not have a simple solution. When asked whether the government should interfere in this situation, eight of these people were of the opinion that "the farmer can look after himself", that "he doesn't want

[1] A typical answer was "I guess unions are alright, but I don't see how they can do much good".

any hand-outs", that "he wants to be left alone"; the other seven farmers said that they don't know.

Four farmers felt that government subsidies will be the only answer to keep anybody on the farm "if the situation gets any worse".

Three farmers explained that the most serious problem of the farmer is not the price-cost squeeze, but the fact that farms are too small and not sufficiently automated. They felt that the government should provide large long-term loans on easy terms to those farmers that are serious, while all the small farmers should leave the land.

Seven farmers suggested that the simplest solution to the farm problem is to raise food prices. Several of these people seemed bitter about the fact that many non-farm people think that the farmer is accorded special favours by the government, when in reality it is the other way around. They argued that it is not the farmer that is being subsidized but the consumer. They pointed to the relative affluence of urban people and explained that the money these people save in food costs, they spend on luxury items and good living, and all "at the expense of the farmer".

Five farmers suggested various measures which might be categorized under "vertical integration". They mentioned such things as eliminating the middle-man, forming co-operatives, having large and more specialized farms. They did not provide very clear models on how this would benefit the farmer, but they felt that these are the things that will come in the future.

Five farmers were of the opinion that lobbying and organized activity would be necessary before anyone would listen to the farmer.

Three farmers suggested various forms of government control with regard to farm prices, and the prices for inputs, particularly farm machinery prices. Measures for stricter import regulations were also suggested.

The following list shows the response pattern by performance groups. Although several farmers provided more than one suggestion on what might be done, only the suggestion which appeared to be most important was listed.

Performance Group	I	II	III	IV	TOTAL
No Comment	40%	22%	40%	60%	35% (15)
Subsidies	0%	17%	7%	20%	12% (5)
Soft Loans	20%	6%	7%	0%	7% (3)
Increase Food Prices	20%	28%	7%	0%	16% (7)
Vert. Integration	20%	11%	7%	20%	12% (5)
Organize	0%	17%	13%	0%	12% (5)
Govt. Control	0%	0%	19%	0%	6% (3)

Because of the wide range of answers provided by different farmers, and the relatively small size of the sample, considerably more detailed information, and more precise probing would be required to determine the nature of the relationship between levels of performance and farmer's conceptualization of the price-cost dilemma. However, some limited, general observations are possible. It was found that younger farmers and people with large operations generally were opposed to subsidies, and particularly to any government programs that might

protect the small and inefficient operator. The suggestions emphasized most frequently by this group included easier credit terms, and adjustments in farm prices, either by raising food prices or by controlling profits at the intermediate level. Many of the older farmers, and also some of the smaller operators on the other hand, seemed to feel that the problem is incapable of solution at the farm level, and that the responsibility to improve the lot of the farmer must rest with the government.

6.7 Summary

It was suggested that a farmer's "collective attitude" toward his work and toward life in general, may affect his decisions, actions, and his level of performance. Respondents were asked to express opinions and feelings on several questions.

Most farmers feel that the use of credit is essential to the operation of a modern farm business. Differences in the actual use of credit need not be a reflection of differences in attitudes, but may be due to variations among farmers in economic status, farm goals, and farm needs.

A majority of farmers emphasize the need for education as a basis of success in farming, however, other personal characteristics and financial means are frequently considered of equal or of greater importance. Farmer's attitudes toward education are not generally related to economic performance, but tend to reflect their own educational background.

Most farmers seem to feel that the farm still provides opportu-

nities for young people today. Capital and personal qualities and qualifications are considered to be of critical importance. Among 15 farmer's sons, nine have decided to stay on the farm.

Few farmers are innovators. New developments in agriculture generally do not carry the promise of large margins of profit. Adoption behaviour on the part of the farmer may not be a reflection of his attitude toward new ideas in farming, but may be indicative of little more than caution.

Farmer's unions appear to evoke little excitement among farm people. While many farmers feel that a strong organization might be useful in furthering their cause, they are not very optimistic that such a single union is feasible.

Various solutions were suggested by farmers to the "farm problem". It was noted that farmers appear to fall into two general groups, those who wish to work out their own solution and who generally oppose government interference, and a second group, who feels that the onus to improve farming conditions rests upon the government.

Very limited evidence was found in support of the assumption that attitudes and opinions of farmers may be related to levels of economic performance. On the other hand, it would seem that similarities among farmers, in age, educational background, economic status, and perhaps enterprise type, are the more common grounds for shared interests, feelings, and attitudes of farm people.

CHAPTER VII

FARM PERFORMANCE, FARM GOALS, AND THE NATURE OF ECONOMIC INCENTIVES IN FARMING

The inference is easily made that failure on the part of the farmer to achieve a high level of performance indicates limited managerial ability or satisficing behaviour. Some evidence has already been presented which suggests that constraints other than lack of ability are at the root of low performance.

The purpose of this chapter is twofold: first, to examine the extent to which satisficing behaviour is a relevant criterion in explaining differences in levels of performance, and second, to examine the nature of economic incentives in farming with a view to explain the persistence of low-income farms.

7.1 Empirical Evidence For and Against the Argument of Satisficing Behaviour

Satisficing behaviour on the part of the farmer may be defined as the acceptance of a level of returns on his investment in land, labour and capital, which is below optimum. Since the optimum level of production for each of the farms in the sample is not known, it is assured for the time being, that none of the forty-three farmers achieve optimum returns on their investment. The question one may now ask is how many of the farmers are satisfied with their present achievement, who are these people, and what is their present economic status and their level of performance? In other words, the concept of

the satisficer is broadened and simplified to distinguish between the farmer who accepts his economic status quo and the farmer who does not.

In question No. 41, farmers were asked if they have any long-range plans for their operation, which they hope to put into effect in the foreseeable future. Virtually all of the items of change mentioned by farmers have strong economic implications. A few examples are: "to build another silo", "to increase my dairy herd", "to shift to dry lot feeding", "to build a new hog barn with a liquid manure system", "to grow more of my own feed", "to use fertilizer on land in hay and pasture", and so forth; the list could be expanded considerably. It was also found that those farmers contemplating any change at all, usually mentioned a whole series of improvements they hope to undertake.

A second, probing question was followed to ascertain the reasons for these changes. In 83% of all cases, economic reasons were given for the proposed change, while the remaining 17% of the respondents did not mention economic reasons, even though the proposed changes usually had economic implications. One farmer plans to put aluminum siding on his barn "because the roof is leaking", "because it keeps the wind and the snow out", and "because it looks better". It was not suggested to him that it might also reduce long-term maintenance cost, or prevent some hay from spoiling, and he did not mention such reasons, although these things may also have been on his mind. Another farmer plans to build a closed-in work shop; he explained that he loves to weld and "tinker" with machinery, and that he only has time for these

things during the winter months. He did not mention the possibility that this might also reduce his machinery repair bill. If there was any vagueness about a farmer's proposed plans, or if they were not strongly production-oriented, that is, if the aim was not directly to increase farm profits, then that farmer was excluded from the "non-satisficing" group of managers (i.e. the group aiming to achieve greater farm profits). On this basis, a distinction is made between farmers who plan to increase farm profits, farmers who plan to maintain their present level of production and farm income, and farmers who are planning to decrease production.

A total of 24 farmers, or 55.8% of the sample, are planning to increase profits, 17 farmers or 39.5% plan to maintain production, and two farmers or 4.7% are planning to decrease production. In Table IX each of these three sub-groups is compared in terms of performance, average returns on total annual investment, and average net income.

Of the five farmers which comprise Performance Group I, only one is planning to expand his operation with the aim of increasing total output as well as the rate of return on his investment[1]. He is a recent graduate from an agricultural college, and operates a special-

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[1]The capital cost portion of "total annual investment" is based upon total farm capital, rather than upon the farmer's equity. In normal accounting procedures a distinction is normally made. In this study, the farmer's equity could only be estimated for completely debt-free farms.

TABLE IX

PERFORMANCE FOR THREE FARM GOAL SUBGROUPS

Farm Goal Subgroup	Performance Group			
	I	II	III	IV
A. Increase Farm Profits				
Percent and No.of Farmers	20%(1)	72%(13)	40%(6)	80%(4)
Mean, %age Ret.Tot.Ann.Investment[1]	11	13	1	-9
Mean, Net Farm Income (dollars)	5,000	5,546	3,052	1,876
B. Maintain Production				
Percent and No. of Farmers	80%(4)	28%(5)	53%(8)	-
Mean,%age Ret.Tot.Ann. Investment	25	8	-2	-
Mean, Net Farm Income (dollars)	6,053	5,150	2,737	-
C. Decrease Production				
Percent and No. of Farmers	-	-	7%(1)	20%(1)
Mean, %age Ret.Tot.Ann.Investment	-	-	-16	-9
Mean, Net Farm Income (dollars)	-	-	476	690

[1]Percentage of Return on Total Annual Investment (Capital Cost and Cash Op.Expenses) (eg. Cap.Cost $5,000, Cash Op.Exp. $10,000 = Tot.Ann.Inv. of $15,000; if Gross Farm Income is $20,000, then Net Returns are $5,000 or 33.3% on Tot.Annual Investment)

ized fluid milk dairy farm. His net income in 1967 was approximately $5,000 on a gross income of $15,000. His return on total annual investment is only 11%, as compared to an average return of 25% obtained by the four other farmers in Performance Group I. This is attributed to the fact that he has only been established for three years. Satisficing behaviour is not a relevant consideration.

The four other farms include three fluid milk dairy farms, and one dairy-beef operation. The average net income is $6,053 on an average gross income of $16,402. Returns on total annual investment range from 19% to a high of 37%. All four farmers indicated that "for the time being" they will maintain their present level of production. They plan to undertake only minor improvements such as painting a barn, or replacing a tractor. One might argue that these farmers are "satisficing", in as much as they appear to be satisfied with their present level of production. However, it is also quite evident that in terms of their present investment they achieve close to optimal returns. Surely, this is not accidental but must reflect the aim of the farmer to maintain his operation at a high level of efficiency. That this is in fact the case is illustrated by one of the four farmers who has an agreement with another farmer for the joint purchase and use of major pieces of farm machinery. If such an agreement can be worked out between two farmers, the reduction in production expenses can be very considerable. But such agreements also involve inconveniences which many farmers are not prepared to accept. It is argued that the farmer who is satisficing would hardly be willing to relinquish the

the freedom of possessing his own machinery for the sake of additional profits which may accrue from such an arrangement with another farmer.

The fact that these four farmers are not expanding the total size of their operation cannot be considered an indication of satisficing behaviour. Since labour is a major limiting factor, one would first have to demonstrate that an expansion of these one-man operations would result in greater profits without the use of additional labor inputs.

Performance Group II is made up of eighteen full-time farmers, thirteen of them plan to increase farm profits, while five plan to maintain production. The average annual net income for the entire group is $5,436 on an average gross income of $20,259. Annual returns range from -5% to 18%. Only one farmer has negative returns to total investment. This is attributable largely to "unproductive" capital in the form of 293 acres of unimproved land out of a total of 643 acres.

The group includes seven fluid-milk dairy farms, three non-fluid milk dairy farms, and eight two-enterprise type operations that were classified as mixed farms. Four of the farms in this group are owned by immigrants, and a total of eight farmers are still paying a mortgage.

The five farmers that plan to maintain their present level of production are between 47 and 52 years of age, they were born in the township, they operate fairly large and well-established farms, and none of the five farmers has a mortgage against his property. No

obvious reasons can be suggested why these five farmers accept their present level of returns, whereas the other thirteen farmers aim for larger farm profits and greater efficiency of production. Satisficing behaviour may be a relevant consideration.

Fifteen farmers make up Performance Group III. Six plan to increase farm profits, eight will maintain their present level of production, and one farmer is planning to retire. Average annual net income is $2,712 on an average gross income of $14,475. Annual returns to total investment range from -16% to 10%, with a mean of -1.4%. This group includes one non-fluid milk dairy farm, one hog farm, one beef farm, and twelve two or multiple enterprise mixed farms. Seven of the fifteen farmers are immigrants. A total of six farmers hold off-farm jobs for up to four months during winter time.

Most of the farmers in this group seemed very much aware of the fact that their returns are low, and plans for farm improvements and greater farm profits were spelled out most explicitly by several farmers in this group. At the same time however, there is some question about the future of some of the farms in Group III. Observations discussed in Chapter V of the purchase of run-down farms with limited capital and of the need for continued off-farm employment by immigrant farmers apply in several cases. Two of the immigrants are expanding and improving their operations, both have gross income exceeding $25,000 per year, and it is likely that they will achieve greater profits in the future. The remaining five immigrant farmers have annual gross income below $10,000, one hopes to expand his opera-

tion, three hold off-farm jobs and operate very marginal farms, and one farmer is planning to retire and to sell his property.

Among the remaining eight farmers, three farmers hold part-time jobs off the farm, have gross farm returns below $10,000, and do not plan to increase farm profits. Five farmers have annual gross returns over $10,000, all five operate on a full-time basis, three are in a process of expansion, while two unmarried farmers indicated that they will maintain their present level of operation.

The distinction between farmers in Group III that plan to increase profits and those that will maintain production is clearly one of economic status. Five of the six farmers that aim to increase profits have already gross incomes exceeding $10,000 per year, while the group of eight farmers maintaining production is made up of two unmarried farmers, also with gross incomes larger than $10,000, and six farmers with other sources of income, but with gross farm incomes below $10,000. It is not likely that those farmers holding part-time, off-farm jobs would turn to outside employment if farm income could be increased without a considerable increase in total farm expenditures. Their failure to aim for greater farm profits does not mean that they are satisfied with their present farm income, but rather would seem to indicate that family income needs are more easily met by some limited amount of off-farm employment then by intensifying production.

Performance Group IV is comprised of five farmers, one beef operation, one non-fluid milk dairy farm, and three mixed farms. The farmer with the beef enterprise has always held a full-time job off the farm; he is now planning to retire. The other four farms

are in a process of expansion. Average net income is $2,048 on an average gross income of $20,499. Annual returns to total investment range from -19% to 3% with a mean of -8.6%.

In summary, it would appear that the present economics of the farm leaves very little room for satisficing behaviour. Farmers who achieve high returns on their investment, do so only because of past attempts to optimize profits and because of sustained current efforts to maintain balanced operations. If they fail to expand their operations beyond a certain level of production, it is not a question of complacency, but a question of profits in farming. On the other hand, farmers with lower returns on their investment generally seem to be aware of that fact, and, as evidenced by the foregone discussion, they will take remedial action to achieve greater profits, if it is within their capacity to do so, and if a need for a higher level of income exists.

7.2 Economic Incentives in Farming and the Position of Low-Profit and Low-Income Farms

On the basis of income and expenditure information provided by farmers and on the basis of subsequent estimates, it was found that a total of thirteen farmers or 30.2% of the sample had negative returns to family labour. That is, if in 1967, each of these thirteen farmers had been required to pay to a landlord a rent, estimated at 6% of the total value of each of these farms, and if in addition each farmer would have spent his usual sum of cash expenditures, losses for these farms would have ranged from $123 to $2,981.

In terms of returns to family labour, or the equivalent of

percentage returns to total annual investment, all of these farms can be considered "low-profit" farms[1]. All have negative returns to family labour, and except for one farm, all are in Performance Group III and IV, that is, they have negative residuals. The average gross income for the group is $11,079, with an average net income of $2,155. If an annual gross income of $10,000 is used as an arbitrary limit to differentiate between a low and a high income farm, then seven of these operations must be considered "low-income" farms. The group is made up of five immigrants and eight people with a local background. Except for two non-fluid milk dairy farms, two beef farms, and one hog operation, all farms are mixed enterprises. Twelve of these farms are located on Haldimand Clay, and one farm is located on Oneida Clay Loam along the Grand River.

The question which is posed here is what economic incentives does farming offer to people who appear to be losing money on every dollar they invest, and what are the reasons why the low-income farm can persist under apparently very adverse circumstances?

The first point to be made is, that all of these thirteen farms do have positive net incomes, even after interest payment on loans and mortgages have been taken into consideration. It will also be recalled, that performance was estimated on the basis of productive capital alone, whereas returns to family labour are estimated on the basis of cash operating expenses plus capital cost. The latter may

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[1] If these farmers would be required to pay 6% on their fixed capital their operations would have to be considered as non-profit farms. Since they all achieve positive net returns in this study, they are considered as low-profit farms.

include a sizeable portion of unproductive capital. For example, the farm with negative returns to family labour in Performance Group II, has a total of 643 acres of land, however, out of these, only 305 acres are considered adjusted cropland. At an estimated value of $143 per acre, the total investment in land for this particular farm is $91,975, while the portion of the investment which may be considered "productive" is only $43,615, leaving a balance of $48,560 of unproductive investment, which represents an annual "unproductive" capital cost of $2,901. Thus, the probability for negative returns to family labour is very high for any farm whose total investment contains a large proportion of unproductive capital.

It is clear that the argument of unproductive capital with regard to farmland, applies only in the sense that any land not used for agricultural purposes does not contribute to farm income, but if such land does appreciate in value it will contribute to the farmer's net worth. On the basis of information provided by farmers, increases in land values in the study area ranged from 4% to 7% per year for the period between 1948 and 1957, and have been well above 10% per year over the past decade.

While it is recognized that unproductive farmland generally bears a lower assessment than cropland, and would also bring a lower price if sold as part of a farm, recent increases in land prices are not indicative of greater farm profits, but are due to increasing pressures upon land for non-agricultural purposes. The distinction, therefore, between productive and nonproductive farmland, from an

investor's point of view, is of limited significance. Since the farmer also benefits from an appreciation in land values, his investment in non-productive farmland cannot be considered unproductive in terms of ultimate returns. These increases are not reflected in the farmer's gross income. However, if the annual increment in net worth from the land portion of investment were to be added to farm income, several of the thirteen farmers considered here would have positive returns to family labour. On the other hand, since twelve of these operations also have negative residuals, inefficiencies of a more serious nature are more likely to be blamed for the negative returns to family labour.

The second point to be made here, is the fact that the investment made by farmers who inherited the parental farm is usually limited to unpaid labour prior to the transfer of ownership, support of parents, payments to brothers and sisters who may have a share in the farm, and any investment in livestock, buildings, equipment, etc. made by the young farmer himself. For some farmers, this may amount to a substantial investment. At the same time however, the financial burden is usually less severe than that experienced by the farmer who expands his operation in a piecemeal fashion. It is suggested therefore, that the farmer who never had to pay a mortgage on his property, has far less reason to consider capital costs as real costs which must be reclaimed by productive efforts. He is aware of the fact that his farm represents an investment, but usually, real costs to him are the money which he must spend to produce. If he is the traditional type,

he may simply shrug at the suggestion that he could earn more by getting a job and by investing the proceeds from the sale of his farm.

In contrast, the farmer who is paying a mortgage, cannot help but be aware of the interest he is paying. His productive efforts therefore must yield a margin of income over and above his operating expenditures, which will allow him to live, re-invest in his operation, and reduce his debts at the same time. If this margin is not forthcoming, the alternatives are all too obvious. On the other hand, if net returns are divided in favour of excessive debt reduction or family expenditures, then the production potential of fixed capital will not be realized, nor will variable cost inputs yield optimum returns. The same holds true if farm profits are unjudiciously invested in the operation itself.

Thus, three major reasons are suggested in this context for negative returns to family labor. These are:

1. Capital invested in land which contributes to capital cost but not to farm income.

2. Failure on the part of some farmers to estimate their own performance on the basis of total cost rather than on the basis of operating expenses only.

3. Chronic financial difficulties and slow capital formation by farms established with insufficient initial capital.

One may now turn to the specific question of economic incentives in farming for low-performance and particularly for low-income farms.

It is an old truism that people farm because they like it,

and because of many non-material rewards associated with that particular "way of life". At the same time however, it is difficult to believe that any man would farm, if his efforts would not also hold out the promise of a modicum of economic rewards. For the efficient and serious farmer the most important economic incentive lies in the profits which he can make from the sale of his product. These profits may not be large, but it is evident that they do exist. On the other hand, if one examines the balance sheet of the low-income farmer, whose efforts may bring him little more than a net-return of $1,000 a year, the argument of farm income as a source of economic incentive becomes considerably less convincing.

In addition to ordinary farm income, farm perquisites need also to be considered. These do not normally appear on the farmer's balance sheet, even though they may represent a very significant opportunity for savings. In that sense, they are a source of farm income and must be considered an economic incentive.

Finally, mention has already been made of appreciations in land values. For most farms in the Niagara Region, these increases have been very considerable. And, while these potential profits may constitute only a limited economic incentive to the farmer who is primarily concerned with production, they appear to be of very great importance to the low-income farmer who may be buying time to await an opportune moment at which to sell his property.

The importance of these hidden economic incentives is well illustrated by the following discussion, pertaining to one of the farms

in the sample. The farm under consideration is 250 acres in size. It is owned by an immigrant, who bought it in 1955 as a 100 acre farm for $9,500. In 1958 an additional 150 acres of land were added which were acquired for $9,000. For the sake of simplicity, it is assumed that both properties were bought in 1955, and that the total price of the farm at that time was $18,500. The farmer explained that his own capital in 1955 was only $2,500; this would necessitate a mortgage of approximately $16,000. Both, husband and wife were working at a non-farm job prior to the purchase of the property. The wife continued her off-farm employment until 1958.

The farmer operates a beef-hog enterprise. Gross income for 1967 was $10,300, with net returns of approximately $2,800. The production function residual is -$278 (Group III), and returns to family labour are estimated at -$237. The farmer's wife and three teen-age children contribute unpaid family labour as time permits.

All mortgages had been paid off by spring of 1967, and at the time of the interview in the early part of 1968, the farm was completely debt-free, except for a few unpaid monthly bills.

If it is assumed that the farmer paid an average of 6% interest on his previous mortgages, and further, that his annual payments on the principal sum and in interest were $2,000, then the total interest paid over the twelve year period amounts to $6,450. This brings the total price paid for the property to $24,950.

The farm residence is an old frame house which is assessed at little more than scrap value. Yet, it has provided the family with

adequate shelter, and with more living space than most modern homes in the city. No monthly rent is required of the farmer. If savings in rent are estimated at $100 per month, the total income in terms of savings amounts to $14,400 over the twelve-year period.

He drives a family car, part of which can be claimed as a farm expense. Gasoline is bought in bulk at rates considerably below normal retail prices. A substantial portion of the food consumed by that family is produced on the farm. For such food, the farmer charges himself a price equal to what he gets for his other farm products. Vegetable produced in the farm garden often are considered incidental and are not declared as "farm products sold". If it is assumed that a family of five, living in the city, has spent an average of $100 per month on groceries over the past twelve years, and if it is assumed that 80% of the food consumed by this particular farm family came from the farm and was bought at prices 75% below city prices, then the monthly savings in food cost for this farm family amount to $60 or $8,640 over the twelve year period.

The farmer complained that his net income has never been above $3,000 since he began farming. With a basic tax exemption of $1,000 for himself and his wife, and $300 for each of his three children, this man has not paid a single cent of income tax since the time he bought the property, twelve years ago.

All these years, no doubt, this family has lived very frugally. Many sacrifices were necessary, and it is not surprising that the farmer's wife was lamenting most bitterly that farming is "a poor man's

way of life" and that there is "no money in it", and that for twelve years she "could not spend a penny on the home". And so it would seem, yet, at the time of the interview this farm was estimated to be worth $74,000. This means that the farmer's net worth increased from $2,500 in 1955 to $74,000 in 1967.

Approximately half of this increase is due to an inflation in land values, while the other half represents the farmer's investment in buildings, livestock, and equipment and farm machinery. The farmer explained that he does not wish to expand his operation any further, because he hopes to sell his property in another four or five years.

While this particular illustration may not be typical of all low-income farms, it provides evidence of the fact that farming does offer a modicum of economic rewards, even for this allegedly poor and nearly destitute farm family.

7.3 Summary

Satisficing behaviour on the part of the farmer is suggested as a factor which may explain low levels of performance of many farms. The argument is examined in the light of the farm goals of forty-three farmers and their present economic performance. It was found that most of the people who already achieve high levels of returns on their investment do not contemplate any major production changes, whereas farmers with lower returns and with lower net incomes generally seem to be aware of inefficiencies, and take remedial actions, if it is within their power and ability to do so.

Thirty percent of the farmers in the sample have negative returns to family labour. About half of these operations are considered low-income farms. A question is raised about the nature of economic incentives in farming, and the persistence of numerous farms with low returns and low levels of performance.

It is pointed out that economic performance was based upon productive inputs alone, whereas returns to family labour are estimated on the basis of total farm capital. Three reasons are suggested for the incidence of negative returns to family labour. Unproductive capital invested in farmland may contribute to an increase in net worth, but does not affect farm income. A distinction is made between the farmer who inherited his property and the farmer who had to pay a mortgage. It is suggested that the former is less likely to consider the cost of that portion of total farm capital which was passed on to him by his parents, whereas the farmer who is paying a mortgage is forced to think about such capital costs because he is paying interest. Financial difficulties of some farmers and very slow increases in total farm capital and in farm income is suggested as the third reason for negative returns to family labour.

Three sources of economic incentives in farming are identified. These are: farm income from the sale of agricultural products, opportunities for savings as a result of farm perquisites, and potential profits arising out of an appreciation in land values. A low-income farm is examined to illustrate the importance of these incentives.

CHAPTER VIII

DECISION MODELS AND FARMER'S USE OF INFORMATION

The decision dilemma of the farmer is one which ought to be viewed with particular sympathy.

In farming, the weight of decision responsibility usually rests upon one person. Production plans, decisions, and actions do not yield economic results until months, and sometimes years have passed. Unfavourable weather conditions and disease may affect the quantity and quality of the final product, and may cause unexpected losses. Once resources have been committed they cannot be removed, and production plans are difficult to alter. Finally, unforeseen economic changes during the production period may lead to changes in factor and product prices with which the farmer somehow must cope. Thus, on the one hand, a farmer must consider problems of a physical and technical nature associated with the production process itself, while on the other, he must formulate expectations about future accurate factor and product markets.

The ability to formulate accurate models of the future is considered of critical importance in decision processes. This ability, and the types of models used by farmers, are likely to vary considerably, and hence, may relate to farm performance.

The purpose of this chapter is to examine the types of models used by different farmers in the formulation of expectations of future events. Three important decision situations which confront the farmer

will be examined. These are: farmer's expectations about future product prices, expectations about future prices of inputs, and expectations about future changes in government programs and policies for farmers.

In section four, the assessment provided by farmers of different sources of information used in making farm decisions will be examined briefly.

8.1 Expectations about Future Prices of Farm Products (V49) (Q55)

In question No. 55 of the interview schedule, farmers were asked if they expect any changes over the next twelve months in the prices they will receive for specific farm products. In every case, the product from which the farmer derives most of his income was named. The farmer's response was then followed by a probing question to determine the reasons for his expectations. At the time the data was coded, a number of response categories were selected, which could accommodate the entire range of answers provided by farmers. For example, if a dairy farmer explained that he doesn't expect any changes in milk prices because "things have not changed much in the past", his particular response was considered a "past trends" model. On the other hand, if he expects a price change as a result of a decrease or increase in government subsidies, his response was considered a "government action" model. If the respondent provided several explanations, he was asked which factor he considers most important in formulating his expectations.

The results are as follows:

Expectation Model	Percent	No. of Farmers
Supply and Demand	28	12
Cyclical	23	10
Government Action	23	10
Past Trends in Farm Prices	12	5
Seasonal	9	4
Uncommitted	5	2
	100	43

An attempt to relate these models to the performance of different farmers did not yield any meaningful results. None of the farmers in Performance Group I mentioned supply and demand factors, one farmer was uncommitted, while three farmers, all of whom are dairy producers, based their expectations upon "government action" or lack of it. It was found that enterprise type has an important bearing on how a farmer will think about future prices.

The "government action" model was cited almost exclusively by dairy farmers. With the quota system, rigid health inspections, and the recent introduction of the Milk-Marketing Board, this pattern is not surprising.

The "supply and demand" model was used most frequently by farmers specializing in livestock enterprises, particularly cattle. It was also mentioned by four farmers who sell corn as a cash grain. It was noted that supply was mentioned far more frequently than demand.

Mention was made of the low-priced imports of meat from New Zealand. A few hog producers complained that "you just can't win, if hog prices go up in Canada, they start shipping pork from across the border". A few farmers also related beef prices with the price and supply of Western grain. Demand, on the other hand, was mentioned only incidentally by a few farmers who said "it is all a matter of supply and demand". Although, one dairy farmer hinted that synthetic milk might have an effect upon the demand for whole milk.

Hog producers generally, still seem to cling to the notion that the market goes in "cycles", and without fail, provided a cyclical model. However, four farmers with hog enterprises explained that the hog cycle was a "seasonal thing" because of consumer preferences, that is, people seem to eat more cold cuts, ham, sausages, etc. during the hot months of the year. This model might also be considered a demand model.

The "past trends" model did not relate to any particular enterprise type or performance group. It appears to be the lazy farmer's model, although, in the sense that learning processes require a recognition of past events, all models are to some extent past trends models. However, in these particular cases, a certain amount of cynicism was detected, "things haven't improved any, for farmers in the last few years, how can you expect them to get better?". This type of answer was given by one farmer in Performance Group I, and by two farmers in each of Group II and III. Again, it is suggested that these particular feelings may have arisen out of the circumstances of the interview,

and may not reflect the true attitude these people will adopt when they make important production decisions.

8.2 Expectation Models about Prices of Farm Inputs (V50) (Q56)

The procedure employed in questioning farmers about input price expectations was virtually the same as for the previous question. However, instead of inquiring about different expenditure items, all farmers were asked about their price expectations for commercial fertilizer, an input which is used in fairly large quantities by all farmers in the sample.

The models used by farmers, and the percentage and number of farmers using them are as follows:

Expectation Model	Percent	No. of Farmers
Price Wars	35	15
General Trends for Input Prices	26	11
Increase in Labor Costs	23	10
Gen. Increase in Production Costs of Fertilizer Companies	9	4
Supply and Demand	7	3
	100	43

Again, it was found that the relationship between levels of performance and the models used by farmers is largely incidental.

An important difference was observed between farmers who buy fertilizer in bulk quantities[1] and those who buy it throughout the

[1]Bulk, as used here refers to the purchase of loose fertilizer, or to large quantities of bagged fertilizer.

season as the need arises. People in the former group generally use large quantities of fertilizer, and are aware of the fact that bulk and quantity discounts are available at certain times of the year, and when bought from certain suppliers. These farmers explained that prices of fertilizer will remain stable, and may even decline somewhat. In every instance, they related their expectations to price wars among chemical companies and suppliers. Ten of these farmers are in Performance Group I and II, as compared to five farmers, giving the same model, from Group III and IV.

An additional three farmers from Group I and II mentioned supply and demand conditions, and also suggested that there might be overproduction of fertilizer, leading to competition and price wars among chemical companies.

It is suggested that farmers in the upper two performance groups may be using larger quantities of fertilizer, they may be more thrifty, and they are likely in a better economic position to take advantage of bargains. On the other hand, the farmer who only buys "so many bags" whenever the need arises is probably paying a much higher price.

A total of seventeen farmers, primarily people from the lower two performance groups, expected price increases. They related their expectations to increases in labor costs, to increases in the production costs of the manufacturer, or to the general trend that "everything else is going up".

One should be reluctant in attaching any qualitative meaning to these models. In other words, what is reflected in the farmer's model is part of his experience in buying fertilizer and not necessarily his performance. It may be true that all farmers buying fertilizer in bulk quantities are aware of price wars, and of bulk discounts, and use the price-war model, but this does not necessarily meant that they are good managers.

8.3 Models about Government Programs and Policies for Farmers (V51) (Q53)

Farmers were asked the question "Do you think there will be any changes in federal or provincial government programs and policies for farmers in the next two years?". Again, the question was followed by a probing question, to ascertain the basis for the respondent's expectations. The following results were obtained:

Expectation Model	Percent	No. of Farmers
Past Performance of Govt.	19	8
Party Politics	16	7
Government as Problem Solver	23	10
Uncommitted	42	18
	100	43

No strong relationship with performance groups was evident. A very large percentage of farmers were uncommitted. They explained that "it is hard to say" or that they "just don't know", that this is "anybody's guess". Probing, in these cases did not provide any useful results.

A second type of response was negative. These farmers explained that they do not expect any changes "because the government isn't interested in farmers, or hasn't done anything for them in the last few years". A somewhat similar response was given by farmers who were undecided. Seven farmers explained that their answer would depend on what party will form the government after the next federal election[1].

Only ten people, or 23% of the sample, expected any positive changes, and envisioned government in the role of the problem-solver. This response was typical of older, Canadian-born farmers, who are active in farm organizations and community affairs.

In general, farmers seem to be aware of the influence of government decisions and policies upon agriculture and farming. However, very few farmers appear willing or able to see their problem within the context of overall economic conditions. In that sense, the observations made in this study concur with the findings of the Interstate Managerial Survey[2], that farmers tend to be rather politically naive, and that the political models they employ do not indicate a very high degree of political maturity on their part.

8.4 Evaluation of Eighteen Sources of Information (Q59)

In question No. 59, farmers were asked to comment on the usefulness in decision-making, of eighteen different sources of informa-

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[1]The party politics model was mentioned more frequently in the last few interviews in April and May, just prior to the Federal Election on June 20, 1968.

[2]G.L. Johnson, et. al., A Study of Managerial Processes of Midwestern Farmers (Ames, 1961) p. 98.

tion. A distinction is made between communicative and non-communicative sources of information. Examples of communicative sources are the radio, television, newspapers, farm magazines, farm meetings, etc.. Non-communicative sources include past experience, experimentation on the farm, farm records, and observing other farmers.

A farmer could make one of the following four choices in evaluating each source of information: 1. of no use, 2. occasionally useful, 3. frequently useful, and 4. always useful. A score of minus one was assigned to the evaluation "of no use", the assessments "occasionally", "frequently", and "always useful" were given scores of one, two, and three, respectively. In Table X all eighteen sources of information are ranked on the basis of aggregate scores, indicating the general importance to farmers of each source of information.

It will be noted that non-communicative sources rank highest on the list. This is to be expected. The farmer cannot escape drawing important conclusions from his previous production efforts and their outcome. Accurately kept farm records will give him more precise information about input-output relationships for his particular operation, and may be more valuable than published estimates, while observing other farmers often will help him in making his own decisions.

This empiricism, which seems to be such a fundamental part of the farmer's nature, explains why most of the models he uses, reflect so strongly his own personal world and experience.

Considerable differences exist among farmers in their evaluation and actual use of different sources of information. A larger

TABLE X

ORDER OF IMPORTANCE OF 18 SOURCES OF INFORMATION

AS EVALUATED BY FARMERS

	Information Source	No. of times mentioned				Total Score
		No Use	Occ. Usef.	Freq. Usef.	Always Usef.	
1.	Past Experience	0	2	1	40	124
2.	Farm Records	0	9	3	31	108
3.	Experimentation	0	13	6	24	97
4.	Farm Magazines	0	10	13	20	96
5.	Obs. other Farmers	0	13	10	20	93
6.	Talking to a successful Farmer	0	10	9	20	88
7.	Agricultural Representative	0	13	9	17	81
8.	Radio	2	13	11	15	78
9.	Fairs, Field Days Demonstrations	1	11	14	13	77
10.	Government Publications	0	16	9	14	76
11.	Neighbors	3	12	12	14	75
12.	Equipment and Supply Dealers	1	14	14	10	71
13.	Banks Farm Credit Corp.	3	7	7	16	66
14.	Auction Sales	2	17	8	11	64
15.	Farm Organizations	0	10	8	12	62
16.	O.C.A. and other Agricultural Schools	1	10	9	8	51
17.	Newspapers	10	11	9	9	46
18.	Television	8	14	7	5	35

sample, and considerably more detailed data would be required to explain these variations. However, it is suggested that such factors as age of the farmer, level of education, economic status, and ethnic origin are of some importance.

During the course of the interviews, the impression was gained, that farmers in general are well-informed on matters pertaining to their own production problems. Very few farmers read less than four farm magazines, while some read as many as eight or ten. In addition, they receive various bulletins and publications from governments, farm organizations, machinery dealers, chemical companies, and from other sources. If farmers lack certain kinds of information, they generally know where and how they can obtain it. More than eighty percent of the farmers interviewed were able to name their Agricultural Representative, while sixty-eight percent had made one or several visits or phone calls to his office during 1967.

Lack of information is the least likely explanation for farm to farm variations in levels of production and performance. Information on how production and efficiency might be increased is generally available, and frequently the farmer himself is in possession of such knowledge. If he fails to use it, it is not because he is "stubborn", "backward", or "conservative", but because farm profits do not warrant it.

8.5 Summary

Ability on the part of the farmer to formulate accurate models of the future is considered a critical aspect of the decision process.

Three types of models are examined. These relate to farmer's expectations about future farm prices, future input prices, and changes in government programs and policies for farmers.

It was found that the farmer's personal experience is of paramount importance in determining the manner in which he formulates expectations about future events. Enterprise type appears to be the most important factor in explaining specific types of product price expectation models. Whereas the manner in which farmers purchase inputs and the prices they will have to pay are important in the formulation of factor price expectation models.

Few farmers provided clear models about expected changes in government programs and policies.

An evaluation of eighteen sources of information reveals the importance farmers attach to personal experience and empirical observations.

It is suggested that farmers are generally well-informed, and lack of information is not considered a valid explanation of variations among farmers in levels of performance.

CHAPTER IX

FARM PRACTICES

Low levels of returns on farm investment are often attributed to failure on the part of the farmer to accept and put into effect recommended farm practices. The specific question posed here is: What are variations among local farmers in farm practices, and to what extent are such differences related to levels of performance?

An attempt was made to select practices which are pertinent to all farmers in the sample. These are listed in Table XI which also shows the percentage of farmers in each of the four performance categories using them.

An examination of this data will show that for certain items a relationship with performance does exist, while for others it is not apparent, or is contrary to the pattern which one might expect.

Positive relationships with performance are evident in connection with the use of tested grain for seeding, the use of information from soil tests as a basis for decisions on types and quantities of fertilizer, the use of lime to correct acidity, and the maintenance of farm records. For as many as five items, the percentage of farmers using a certain practice is exactly the same for Performance Group I and IV, while it is either higher or lower for the other two Groups. For item No. 57, the relationship is negative; that is, more farmers in Performance Group IV have had their soils tested than farmers in Group I.

TABLE XI

FARM MANAGEMENT PRACTICES BY PERFORMANCE GROUPS

	Management Practice	Performance Group			
		I	II	III	IV
		- percentage per group -			
(52)	Use tested grain for seeding	80	67	73	80
(53)	Use treated seed	100	100	93	80
(55)	Use soil test to decide on quantities and types of fertilizer	40	61	27	20
(56)	Use chemical weed control	100	78	93	100
(57)	Have had soil tested	60	94	80	80
(58)	Use lime to correct pH	66	88	53	25
(59)	Correction of drainage:				
	a. surface ditches	100	75	89	100
	b. tiles	0	25	0	0
(60)	Maintenance of Equipment				
	a. during off-season	20	61	67	80
	b. as required	80	39	33	20
(61)	Store surplus hay and grain as precaution	20	33	13	20
(62)	Maintain written farm record	100	100	67	80
(63)	Make important decisions "on paper"	80	67	53	80
(34)	Agreement with other farmer to share equipment and/or labour	40	16	0	0

What inferences are possible on the basis of these results? Rust[1], in his farm survey conducted in 1958, observed largely positive relationships between farm practices and various "management groups". He found that a larger number of farmers in the upper management groups have had their soils tested, used certified and treated seed, used chemical weed control, and kept more accurate farm records, etc. than farmers in the lower management groups. On this basis, Rust concluded that a close relationship exists between farm practices and levels of managerial ability. The criteria which Rust employed to classify managers into groups[2] do lend credibility to his hypothesis. However, his conclusion cannot be invoked to explain variations in levels of performance and in the use of farm practices which are evident among farmers considered in this study.

It is suggested here, that factors other than managerial ability, explain why some farmers will use a certain practice, and others will not. Several examples will be considered to illustrate this point.

Probing was used to determine why farmers will use a certain practice, or why they fail to use it. It was found that farmers who do not use certified seed, will use their own seed for two or three years, until they switch to another variety, or until they decide that the purchase of certified seed can be justified. These farmers argued

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[1]R.S. Rust, Economic Annalist, 34, (Feb. 1964) p. 11

[2]The criteria employed by Rust were: annual increases in net worth for a period of years, and a subjective assessment rating.

that the differences in results between the use of certified seed and farm-produced seed is negligible, as long as the practice is not carried to extremes. Yet the savings which result because farm-grown seed is used can be considerable.

Farmers are generally aware of the benefits of commercial fertilizer. However, they are not convinced that the quantities recommended on the basis soil analyses are warranted in terms of the additional returns resulting from additional inputs. This decision obviously cannot be made in the soil laboratory, but must be based upon carefully kept farm records about fertilizer input and yield relationships. In this sense, the farmer who relies blindly upon soil analysis reports, may in fact be using more fertilizer than the economic returns warrant.

The benefits of lime in the correction of soil acidity have been demonstrated time and again, and subsidies are given to encourage the use of lime, yet, the high reserve acidity[1] of local clay soils may frustrate the efforts of even the most conscientious farmer, and lead him to the conclusion that what is good at the experimental plot is not necessarily economical for his own operation.

The advantages of underdrainage on heavy clay soils has also been demonstrated; again, subsidies are available, but the fact that only three farmers in the sample have installed tiles, illustrates the general consensus of farmers in the area: "why bother with tiles, when

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[1]Relating to the buffer capacity of a soil, i.e. the release of further H^+ ions once active acidity has been neutralized. See H.O. Buckman, N.C. Brady, The Nature and Properties of Soils (New York, 1960) pp. 361-74.

surface ditches will do the job".

Particularly revealing are differences among farmers relating to the maintenance, the repairing, and overhauling of farm machinery. Rust[1] noted that farmers in the upper management categories repair and overhaul their machinery during the "slack season", whereas farmers in the lower management groups do such work "only as required"[2]. Results obtained in this study are exactly opposite to Rust's findings. Eighty percent of farmers in Performance Group I will do repairs and maintenance jobs "only as required", whereas eighty percent of farmers in Group IV will use the "slack season".

Surely, this difference is not indicative of differences in managerial ability, but of differences in the quality of farm machinery used by farmers[3]. It is suggested that the people who are most likely to invest in new farm machinery, are those with operatins yielding the largest margin of profits. This is assumed to be the case, not only because these farmers are in a better position to afford new equipment, but also because they are the only people who will benefit from a depreciation allowance. This incentive is non-existent for the farmer who does not have a taxable income. To him, the depreciation allowance on

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[1]R.S. Rust, Economic Annalist 34, (Feb. 1964) p. 14

[2]Presumably as a break-down occurs.

[3]Rust's findings and conclusion are not contested. All farmers in his sample were Veterans, also, differences in the age and quality of farm machinery in use on different farms were probably less in 1958 than they are now.

a new machine would simply be another item of expense without any "tax benefits", because the taxable income surplus, which might be reduced, isn't there in the first place.

There is considerable evidence that farmers in Performance Group I for example, generally have fewer machines, more specialized and more recent equipment, and less capital invested in machinery and equipment, than farmers in Group III or IV[1]. Several farmers also pointed out that they will replace all major items of equipment before the need for expensive repair and overhauling jobs arise. In contrast, the farmer with very limited funds available to invest in machinery, will "shop around" and look for "bargains" in an attempt to stretch his machinery dollar as far as he can. If he is a good mechanic and knows something about farm machinery, he may save large sums of money, and his time spent in making repairs during the winter months may be well-invested.

Thus, the argument presented here to explain differences among farmers in connection with the repair and the maintenance of farm machinery is, that farmers in the upper performance groups generally operate better equipment and fewer machines which do not break down frequently and which only need attention "as required". On the other hand, farmers who lack the necessary capital to purchase good equipment will "make do" with what they have or can afford, and are likely to

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[1]The average investment in machinery and equipment for farms in Performance Group I and IV is $12,614, $16,207, $13,914 and $14,786 respectively.

experience a greater need to make repairs and to do overhauling jobs, not only "as required" but also during the "slack season".

Finally, if the sharing of equipment or labour among farmers is considered a farm practice, it is again necessary to point to economic factors to explain why such arrangements are infrequent, and why they are more likely to occur among farmers with fairly efficient operations. First, it is hardly necessary to point out, that such an agreement in itself may lead to important reductions in costs per unit of output. Hence, a farmer, by reason of such an agreement, ought to be able to attain a higher level of performance or production efficiency than the farmer who does not benefit from such an arrangement. Secondly, such an agreement would necessitate some comparability in farm type and in the quality of machinery used by the two farmers. A joint purchasing and use agreement is even less likely to occur between two farmers of greatly dissimilar economic status. Thirdly, personal understanding, tolerance, and a willingness to forgo some measure of convenience are necessary on the part of the two farmers who enter such an agreement. This would seem particularly true where labour is being exchanged. Finally, such farms would have to be located within reasonable proximity to each other.

It was found that for a large number of both economic and social variables, the standard deviation, or variation within each Performance Group is least for Group I and greatest for Group IV. Thus, the probability for such an arrangement to occur is greater for farms in the upper performance categories than it is for farms in the lower catego-

ries. This would tend to explain why two farmers in Group I and three farmers in Group II have equipment and, or labour sharing agreements with other farmers, as compared to the non-existence of such agreements among farmers in Group III and IV. Although, the "other farmer" with whom the arrangement exists was never interviewed, enough information was obtained to suggest that the question of comparability is of considerable importance.

Summary

The question of farm practices in relation to levels of performance is examined.

A number of farm practices pertinent to the local area were selected.

A comparison of the four Performance Groups on the basis of frequency of use of certain farm practices shows that for some items such a relationship exists, while for others it does not. Variation in managerial ability is not considered a critical factor in explaining farm to farm differences in farm practices. Several examples are provided to illustrate the importance of economic considerations.

It is conceded that a specific examination of farm practices may yield results that are capable of establishing the existence of differences in managerial competence. However, evidence presented in this study, and information pertaining to farm practices, provide some support for the hypothesis, that in terms of managerial ability, most of the farmers interviewed comprise a relatively homogeneous group. This argument will be briefly examined in the next chapter.

CHAPTER X

THE UNEXPLAINED RESIDUAL

Only limited evidence was found in support of the hypothesis, that the level of economic performance of the farm firm can be explained in terms of individual items of information pertaining to the manager and to related social variables. While it was possible to show certain factors, such as motivation, to be related to performance, for many variables this relationship is often extremely obscure, not apparent, or contrary to reason.

It is clear that differences among farmers in levels of performance are not simply reconciled in terms of differences in age, education, attitude, aspirations and in decision processes and farm practices. Nor is it admissible to assume homogeneity in personal and management characteristics of any particular group of farmers of a high or low level of farm performance.

Since residual values could not always be adequately explained in terms of the variables and the data that were examined, the purpose of this chapter is to consider several hypotheses concerning the unexplained residual and the nature of performance variations. First, the question of data error will be considered, secondly, three potential reasons for farm inefficiencies are suggested, and thirdly, the proposal will be examined that in terms of managerial ability, most of the farmers interviewed make up a relatively homogeneous group.

10.1 The Nature of Data Error

The assumption that gross income is a function of inputs in land, labour, and capital need not be contested. However, the possibility of error in data employed to estimate predicted gross income cannot be ignored. It was shown that the two most important determinants of gross income are labour inputs and cash operating expenses. It is obvious that a wrong estimate in either one of these variables may place a farmer into a higher or lower performance category.

This problem is particularly critical with respect to information about cash operating expenses. For a certain farm, this sum may vary from one year to the next. Also, such fluctuations are greater for certain types of farms than for others. A well-established dairy farm, for example, may experience only a slight increase in operating expenses from one year to the next. A beef or hog farm on the other hand, where livestock is almost constantly being bought or sold, and where the purchase of livestock is treated as an item of expense, may experience very large fluctuations in both, gross income and cash expenditures. This is true for any year in which more livestock is bought than sold or vice versa. Factor cost and product price fluctuations can have similar effects, and again, such variations may be greater for one farm type than for another.

These problems were recognized prior to the time the data was collected. This difficulty can be resolved by obtaining for each farm an accurate inventory for the beginning and for the end of the year. In view of the inordinate length of the questionnaire, this procedure

could not be adopted. Instead, farmers were asked if their expenses and gross incomes for 1967 were higher or lower than in the previous two years, and the reasons for these differences. Farmers were also asked how many cows they normally milk, how many cattle they buy and sell every year, and the approximate age and price of such animals. Hog producers were asked how many litters they raise per year, and so forth. Adjustments were made in cash operating expenditure and gross income figures in a few instances where such adjustment could be justified. While estimates of investment in livestock were based upon average numbers of animals the farmer normally keeps.

A problem of a different nature is evident in connection with the imaginary boundary which separates one perfromance group from another. With a standard error of estimate of $1,572, and the use of this figure as a group interval, it is clear that considerable variations exist within each group, and that many farms could be in either a higher or in a lower performance group.

The extent to which data inaccuracies have led to an incorrect classification of farms is not known. Although on subjective grounds, that is, on the basis of fairly detailed personal information by the author about each of the forty-three farmers in the sample, it is suggested that the grouping of individual farms on the basis of production function residuals is reasonable.

10.2 Potential Factors Leading to Economic Imbalance at the Farm Level

If taken at its face value, the residual is an indicator of the relative efficiency in the allocation of all inputs used by the

farmer. Thus the farmer with the largest positive residual has in effect achieved the most profitable combination among all inputs used. Relative to other farmers, he is obtaining the largest number of units of output with the least units of input. This also means that among all farmers, he comes nearest to producing at the point where marginal revenue equals marginal cost. Of course, the opposite is true for the farmer with the largest negative residual.

In theory, all farmers in the sample ought to achieve the level of performance demonstrated by the best farmer in the group. If all farms were completely comparable, residual values would be true indicators of levels of efficiency. It is recognized that, despite various adjustments that were made, complete comparability of dissimilar farms was not achieved. However, while part of the unexplained residual is explained by this inadequacy, other factors are equally or more pertinent. In the light of the findings of this study, three "summary hypotheses" are proposed in explanation of variations in levels of farm performance. These relate to:

1. The nature of the farmer's personal incentives
2. The nature of economic incentives, and how they are perceived by farmers
3. Processes of farm adjustment and expansion, and associated inefficiencies.

Hypothesis One:

> Limited personal incentive on the part of the farmer may lead to an inefficient allocation of resources and to an unbalanced operation.

In chapter one, it was suggested that family goals and aspira-

tions constitute the primary motivating force in the formulation of farm goals and production objectives. It was argued that ambitious and materially-oriented family goals will lead to production objectives which will aim to satisfy these demands. On the other hand, it was suggested, that where this source of motivation is weak, farm goals also will be less ambitious.

In chapter 5.6, this proposal was examined in some detail. It was found that each of the four unmarried farmers has a negative production function residual. Since reasons exist to believe operations, it is concluded that limited personal incentives on the part of the farmer explain the low levels of performance.

A similar relationship was found between levels of performance and mean family achievement scores. This suggests that a family's level of aspirations does in fact have an important bearing on the manner in which the farm is adapted to satisfy these demands.

Finally, a relationship was also observed between levels of performance and the percentage of farmers that are paying a mortgage. The inference is that the absence of the financial commitment entailed in a mortgage, constitutes a reduction in the personal incentive of the farmer to aim for a high level of efficiency.

If the capital structure of a particular farm is adequate to meet the level of income desired by a farmer, and if that level of income is achieved, but is achieved inefficiently, satisficing behaviour is a relevant consideration. Inefficiencies will result from a more casual approach to management decisions and productive actions.

Only the farmer with few pressing financial needs is in a position to afford such an approach. In such cases there may also exist a greater propensity for "convenience inputs" which do not yield any concrete economic results. Examples might be, the purchase by a farmer of an additional tractor which he doesn't really need, but which will make his work more pleasant, or the use of expensive herbicides, in cases where mechanical weed control would be less costly but equally effective.

Normally, this kind of behaviour would be equated with a lack of managerial competence. This argument is not convincing. Optimizing behaviour requires greater effort than satisficing behaviour. It is suggested that the farmer who does not have heavy financial obligations, may not be interested in expending the extra effort required to achieve optimum efficiency and to maintain his operation at that level.

In chapter 7.1, the relevance of the argument of satisficing behaviour was examined. It was suggested that the present economics of the farm provides little scope for such behaviour. Support for this assumption is provided by the fact that over half of all farmers in the sample are making efforts to increase farm profits and income, while those farmers who will maintain production, with few exceptions, either operate very efficient farms, or operate farms with such a low level of income that off-farm employment is necessary. The number of cases in which satisficing behaviour is the most plausible explanation of low performance is very small.

Notwithstanding the evidence presented for and against the argument of satisficing behaviour, it is a fundamental fact that farmers differ in personal incentives. Furthermore, there are farms with a greater total investment than would be required to satisfy family income demands, while there is a larger number of farms with insufficient fixed and variable capital to generate a level of income which is commensurate with the family's level of aspirations, and in some cases, needs.

The principle which emerges from this observation is, that the greater the lag between the family's actual income and "aspired" income, the greater will be the incentive to aim for a higher level of farm income and for a higher level of efficiency[1]. The smaller the lag between actual family income and desired income, the greater will be the propensity for satisficing behaviour and inefficiencies in production.

Hypothesis Two:

> Limited economic incentives in farming retard the progress of farm adjustment. Within a given region, variability in economic incentives as a result of differences in location, farm type, and capital structure of the individual farm, contribute to variations in levels of performance.

In chapter 7.2, three sources of economic incentives in farming were identified. These are

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[1]There is, however, an important "breaking point" if the farm cannot meet family needs, or if income over and above basic needs is persistently demanded, off-farm employment is the only alternative open to the farmer. But again, this may be regarded as an adaption to satisfy family income demands.

1. Farm perquisites

2. The possibility of an increase in farm net worth as a result of an appreciation in land values over and above the annual rate of capitalization and inflation

3. Opportunities for profits from the sale of farm products.

Since it is largely the performance of the full-time farmer with which this study is concerned, the first two of these sources of economic incentives need not be discussed at length. It was suggested that farm perquisites and the probability of speculative gains are important reasons for the persistence of many marginal and part-time farms. To the full-time farmer, on the other hand, farm perquisites represent "fringe benefits" which, from a standpoint of production decision, are only of importance in so far, as they will influence the distribution of net income between the farm and the family. Potential gains from an appreciation in land values are "unrealized profits" until the farm is sold. In that sense, these gains are equal to the accumulation of a retirement savings fund. Without this incentive, many people might not farm, however, this factor is not significant in influencing day by day farm decisions which influence levels of production and degrees of operational efficiency.

Thus, economic incentives to the full-time farmer relate almost solely to profits in farming derived from the sale of farm products. It is this factor which explains the critical "other half" of the farmer's decision behaviour. Personal incentives of the farmer set the stage for productive effort, but economic incentives in farm

profits will determine in large part the alacrity of the response that will be evoked. Griliches[1] was quoted earlier to illustrate the importance of the role of economic incentives in the diffusion and adoption of hybrid corn. In chapter 7.1, it was shown that farmers who have attained a certain level of income and a certain level of efficiency refuse to expand their operation. This is not because they are satisficers, or because they lack a high degree of economic motivation or personal incentive, it is because the state of economic incentives for the particular type of farming in which they are engaged is such that additional effort is not warranted.

In the previous two chapters, it was shown that farmers are either in possession of knowledge and information on how efficiency and output might be increased, or they know where and how such information can be readily obtained. Failure to use such knowledge is not because farmers are a "stubborn lot" as many people have argued, but because economic incentives are limited.

It is argued here, that limited economic incentives are not only at the root of the efficient farmer's decision not to expand beyond a certain level, but that low incentives also stifle the efforts of the farmer who is aiming for a higher level of efficiency. The fact that farm adjustment[2] is occurring at all cannot be interpreted

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[1] Z. Griliches, Science, 132 (1960), 275-80

[2] "farm adjustment" used in a general sense, referring to either increases in total farm capital, or attempts on the part of the farmer to produce more efficiently, or to both.

as being indicative of an increase in economic incentives in farming, but rather, reflects the farmer's effort to cope with the price-cost squeeze, and in that sense indicates a response which is well epitomized in the dogman "expand or expire".

Variations in levels of performance among farmers of a certain area, also are due in part to differences in the level of economic incentives associated with different rates of returns. These relate to location, farm type, and capital structure of the operation.

Location is of importance with respect to edaphic and climatic factors, as well as accessibility to markets. Only the first of these factors is relevant to farms included in the sample. It was assumed that variations in soil quality were compensated for by adjusting the acreage of land for each individual farm. Yet it is of some relevance that 75% of the twenty farmers comprising Group III and IV are located on Haldimand Clay, whereas only 52% of the twenty-three farmers making up Group I and II are located on this soil type of lower productivity. The inference is, that the adjustment should have been even greater. However, it may also be the case that the difficulties and higher costs associated with farming on this particular soil type are a real deterrent to make improvements which might result in greater profits. This does not mean that the problems of farming on heavy clay soils are incapable of solution, it is simply argued here, that the farmer is not interested in seeking solutions as long as the economic incentives are lacking. Why, for example, have only three farmers installed tiles? If they could grow tobacco in the

area one may surmise they would all resort to underdrainage.

Economic incentives also differ with farm type. For technical reasons, no distinction was made between different farm types. But again, it is relevant to point out that none of the fluid-milk dairy producers is in Performance Group III or IV. For obvious reasons, farms of different enterprise types are not comparable in terms of input-output ratios. However, one might also argue that economic incentives for the dairy farmer are greater than for the hog producer, because the former can more accurately predict the outcome of his decisions, whereas the hog producer has to cope with uncertainty entailed in considerable price fluctuations.

Finally, the capital structure of the farm itself has a crucial role to play in determining the relationship between inputs and returns. The farmer who is forced to work with old and unreliable farm machinery cannot possibly reap the full benefits of mechanization. Nor can the farmer, whose enterprise requires sound farm structures, expect to be efficient if such buildings are inadequate or in poor condition. Ready-made advice to such people may be very liberal. The question is, will the farmer heed such advice, if experience has taught him that his operation will only produce an annual return of six percent on his investment, even though his more provident neighbor may achieve a return of twelve percent? In other words, it is argued here, that the farmer's own experience will provide the most significant guidelines in the formulation of his input-output models. Obviously, if this argument is carried to extremes, there would be little

scope for improvement. In other words, a farmer would only improve his efficiency if he accidentally stumbled upon a more "profitable solution". This is not the case. It is merely suggested, that empirical observations and inductive reasoning are more relevant in the farmer's process of reaching conclusions, than information which may pertain to his operation but which was generated elsewhere. Evidence for this assumption is found in farmer's evaluation of the usefulness of information sources, and in the observation that several of the less efficient farmers who are paying mortgages seem to attach greater importance to a reduction of their debts, over and above what is required, than upon additional farm inputs which might yield increased returns. Admittedly, in some of these cases, limited managerial or business ability may be a factor.

In summary, it is argued that limited economic incentives in farming tend to inhibit farm progress and adjustment. Variations in levels of performance may be due to actual differences in economic incentive because of differences in the types of products sold, differences in location and production costs, and differences among farmers in efficiency itself and consequently in their perception of economic incentives and in their formulation of decision models.

The corollary which follows is, that the greater the actual or perceived economic incentive in farm profits, the greater will be the response and willingness on the part of the producer to undertake changes and improvements which will lead to greater efficiency and to higher levels of production.

Hypothesis Three:

> The probability of inefficiencies during the process of farm adjustment and expansion is very high. This situation is aggravated if insufficient capital necessitates or induces a protraction of this adjustment process.

In chapter 7.1, it was shown that 24 farmers in the sample are currently taking measures to increase annual net income. In every case, specific examples of changes were provided which will affect the economics of these farms. Evidence from interviews suggests that the proposed changes mentioned by farmers are generally part of a larger farm plan, the implementation of which began in the past and will extend into the future. Depending on the magnitude of these changes, and upon the manner in which they are undertaken, inefficiencies and disequilibrium in production, while these changes are in progress, are virtually inevitable.

To illustrate this point, one may consider the following example. In an effort to increase total production as well as net income, a dairy farmer is planning to expand the size of his productive herd from 15 to 25 cows. To meet the increased feed requirement without increasing his present acreage of cropland, he decides to switch from his current methods of pasture feeding to a dry-lot feeding system and the use of silage. The change will involve the construction of a silo, a pole barn, and an enclosure. Additional capital is required to purchase a forage harvester and blower, milking machines, a bulk cooling system, and ten dairy cows. He estimates that a total investment of approximately $25,000 is necessary. Two basic choices are

open to him: he may borrow the total sum of $25,000 and undertake all necessary changes within a single production year; alternatively, he can borrow a smaller sum, commence his improvement program with the construction of the silo and the barn, allow his herd to expand gradually through natural increase, and acquire the additional equipment as capital becomes available.

The first method will allow the farmer to re-establish an equilibrium level of production in a relatively short time, although new management problems arising out of the adjustment may initially cause considerable inefficiencies. The second method, on the other hand, is bound to involve very large inefficiencies throughout the entire process of expansion. The choice which a farmer in this particular situation would make, might be an indication of his business and management ability. However, his present financial status, his level of income, and other factors affecting his ability to take financial risks are likely to be the critical elements in his decision.

Evidence available from the interviews suggests that most of the farmers undertaking programs of farm improvement and expansion do so in stages, usually involving a time period of several years. While the improvements that were cited by farmers are generally less ambitious than those of the hypothetical case discussed previously, the possibility that some of the farms considered here have negative residuals as a result of various forms of adjustment, is nevertheless very real.

10.3 The Uniform Sample, A Hypothesis about Full-time Farmers

Throughout this study repeated reference was made to the question of managerial ability. While no actual measurement of this factor was made, it was suggested that the inference of differences in managerial ability because of evidence of differences in levels of performance does not generally appear valid and acceptable. Observations made in this study also show that many social variables are not consistent with the performance criterion that was used.

It is proposed that in terms of managerial competence, the majority of full-time farmers considered in this study comprise a relatively homogeneous group, even though individual members of the group differ in biographical characteristics, attitudes, management practices and so forth.

This hypothesis draws considerable support from the sequence of events that have characterized agricultural change in the Niagara Economic Region over the past decade. In chapter 1.2, reference was made to the fact that over the period between 1961 and 1966 the total number of farms in the region declined by 11.6%. It was also noted that this trend was paralleled by a decline in the total area of farmland. A withdrawal of some of the agricultural labour force, and of a certain amount of capital in the form of land is indicated. Since both the physical volume of production, and the total value of agricultural products sold have been steadily increasing, one may infer that fewer farms are producing more, and that very substantial productivity increases have been achieved as a result of increased investment

on the part of the remaining full-time farmers. In chapter 7.1, evidence was presented that such investment is in fact taking place, and that it is undertaken by people who obtain their livelihood from farming, and who are intent upon improving their economic position.

In the face of alternative employment and investment opportunities, a question of personal preferences and of opportunity costs must arise. It is suggested that the decision to leave the farm, or to turn to supplementary sources of income is in many cases not a question of choice, but is dictated by the present economics of farming. In other words, the individual who is unable or unwilling to make the adjustment imposed upon the industry by constantly rising production costs, must be prepared to accept an inevitable decline in his level of living, or must turn to alternative forms of employment and income. In view of the very large capital requirements necessary to achieve a satisfactory level of income in farming, it is clear that both capital and entrepreneurial skills are two essential prerequisites to the successful operation of a farm business. It is these prerequisites which will dictate the terms under which a man may farm. They also imply a selection process which does not discriminate so much on the basis of a farmer's age, education, attitudes and so forth, but on the basis of farm capital and the ability on the part of the farmer to manage it successfully. Recent declines in the total number of farms, and the relatively small proportion of commercial full-time operations remaining in most of the municipalities of the

region, suggest that this process is well advanced. As this process continues, one may expect that differences among full-time farmers in managerials skills will further diminish.

10.4 Summary

On the basis of the findings of this study, residual values are re-examined and a number of hypotheses about the nature of performance variations are considered.

It was suggested that certain farms may have higher or lower residuals because of data inadequacies. The problem of overlap between performance groups is considered. On subjective grounds, confidence is placed in the grouping that was obtained.

The question of causes of economic imbalance of production at the level of the farm is examined. Three hypotheses are considered. It is argued that limited personal incentive on the part of the manager tends to encourage satisficing behaviour, while a high level of aspiration and strong personal incentive will have the opposite effect. Observations from this study are provided in support of this argument.

Limited economic incentives in farm profits tend to retard the progress of agricultural adjustment and the adoption of factors which might bring about greater efficiency. It is suggested that economic incentives differ with enterprise type, location, and the manner in which incentives are perceived by different managers. It was noted that all dairy specialty farms are in the upper two performance groups. Also it was shown that a higher percentage of low performance farms, and operations owned by immigrants are concentrated on less productive

land. Preference on the part of some farmers for excessive debt reduction, and strong empirical orientation in the formulation of decision models, suggests the existence of differences among farmers in the perception of economic incentives in farming.

Finally, it was suggested that the probability of inefficiencies is very high for operations that are in a process of adjustment. Again, limited economic incentives tend to retard this process as is evidenced by the fact that many farmers prefer gradual adjustment over the risk involved in assuming a large burden of debts.

In section four, the relevance of managerial ability in relation to performance variations is considered. It is argued that most of the full-time farmers interviewed comprise a relatively homogeneous group in terms of management ability. Sufficient capital, a willingness to respond to economic change, and a high degree of managerial skills are the prerequisites which dictate the terms under which a man may farm on a full-time basis, and without being forced to accept a declining level of living. The exodus from the farm to the city and the high incidence of part-time farming in areas of alternative employment opportunities, suggest that this process of selection is well-advanced. The remaining group of full-time farmers may be very heterogeneous in terms of personal and biographical characteristics, but differences in managerial ability will diminish as this selection process advances.

CHAPTER XI

SUMMARY AND CONCLUSIONS

The aim of this study has been to describe and explain variations in levels of economic performance of a selected group of farms, by focussing attention upon the role of management and related social and economic variables.

Seneca Township was selected as the area from which to choose the farm sample. Selection of farms was made from township records. It was assumed that people listed as "farmers" and owning more than 95 acres of land would be potential full-time farmers. This criterion yielded a list of 148 qualified farms, from which a sample of 50 farms was selected on a random basis. Interviews yielded 43 usable sets of data or observations.

To facilitate the formulation of research hypotheses, a model of the farm manager was proposed. Decision and action processes of the farmer were seen as a response on his part to personal and family needs and aspirations on the one hand, and to economic incentives and opportunities to meet such needs on the other. Outcome and its quality were regarded as the result of a sequence of inter-related and continuous events, which lead from the questions of what is desired, to the formulation of family goals, farm goals, to production decisions, and to productive action. The attitudes, values, and abilities of the farmer were seen as the product of life experience. It was suggested that these personal attributes influence the conduct of family and business affairs, the formulation of family and farm goals, the making

of decisions, and the manner in which actions are performed.

Economic performance was defined as deviation from or agreement with a norm with which the outcome of a farmer's decision and actions can be compared. The norm was to be based upon the demonstrated performance of all farms in the sample.

Two basic types of data were required for this study:

1. data pertaining to the physical and economic characteristics of the farm
2. data and information pertaining to the manager and his family.

Data were collected by means of a one-call confidential survey questionnaire. Economic data were converted into usable form. Non-quantitative data were coded by determining the response range for each question and by devising suitable response categories. Converted and coded data were transferred unto standard eighty-column computer cards. Quantitative analyses of economic data were carried out on the University's IBM 7040 digital computer.

Preliminary analysis of economic data suggested that some differences in cost-return ratios may be due to differences in location with respect to soil type and differences in enterprise type. Some limited evidence was found that dairy farms obtain slightly higher returns per unit of investment in cash and labour inputs than other enterprise types. Similarly, it was noted that farms located on the two better soil types on an average obtain slightly higher returns on their investment than farms located on Haldimand Clay. Evidence was considered inconclusive, and the sample size insufficient to base any data adjust-

ments upon these findings. Because of technical difficulties, no attempt was made to compensate for differences in farm type, while adjustments in area of cropland were made for each farm on the basis of information obtained from aerial photographs and from the farmer's own assessment of the capability of his land.

To obtain an objective measure of performance, based upon the relationship between output and productive inputs, multiple regression analysis was used. The residual value was attributed to management. If the residual is large and positive, it was assumed that superior performance is indicated, while a large, negative residual was considered indicative of inferior performance. Farms were grouped into four performance groups, using the value of the standard error of the estimate of $1,572 as a group interval.

An examination of several biographical and related variables yielded some insights into their relative importance.

Place of birth of the farmer was not considered relevant to managerial ability, but since it does relate to the manner in which a farmer became established, it may be reflected in the level of performance of his operation.

Most of the farmers in the sample were born and raised on a farm, while those who did not have a farm background had nevertheless acquired relevant farming experience prior to the time they became established. No concrete conclusions can be made about the importance of this variable; however it was suggested that a farm background or relevant experience appear to be essential prerequisites to success in

farming.

Farmers were found to range from 28 to 67 years in age. Except for two farmers who are planning to retire, no evidence was found of differences in levels of performance which could be attributed to the age factor. On the other hand, it was noted that age differences did relate to levels of education, the extent to which farmers make use of credit, attitudes about the importance of education in farming, attitudes about future opportunities in farming, and opinions on the issue of farmer's unions.

Levels of performance were found to be strongly related to the number of years farmers had spent in work other than farming. It was argued that this is not primarily the result of a sacrifice of relevant farming experience, but rather that it relates again to the manner in which a farmer became established.

The relationship between levels of performance and levels of formal education was found contradictory to the pattern one would normally expect. While this observation does not negate the importance of schooling, it refutes the idea that the limited formal training of many farm people is indicative of limited mental abilities, or that they farm because they are unfit for other things. All the evidence that was obtained in this study suggests that limited formal education is related to the opportunities that existed during a person's youth.

It was noted that farmers lacking strong family commitments are in the lower two performance groups. This seems to indicate a lack

of strong personal incentives. To assess the role of the farm family as a source of motivation, a comparison was made on the basis of the subjective family achievement score. A relationship with performance was evident. Some evidence was found which suggests that inconsistencies in this pattern relate to differences among farmers in expenditure priorities between the farm and the family. In this assessment, it was also noted that a relationship exists between family achievement scores and levels of formal education of the farmer and his wife.

It was found that the percentage of farmers paying a mortgage is higher for Group I and II than for Group III and IV. This suggests that a farm mortgage can represent an additional incentive in striving for optimum returns. However, it was also noted that several farmers in the lower performance groups tend to overemphasize debt-reduction at the expense of additional farm inputs.

An examination of the attitudes and opinions of farmers on specific issues yielded some insights on how farmers feel and think, but failed to relate in a significant way to levels of performance. The kind of response provided to questions of this nature may be coloured by the farmer's mood at the time of the interview, by preceding questions, by the attitude of the person conducting the interview, and by a variety of other factors. Notwithstanding the probability of response error, some evidence was presented which suggests that similarities in age, educational background, economic status, and enterprise type are important bases for shared interests, feelings and attitudes of farm people.

The argument of low performance and satisficing behaviour was considered. The concept of satisficing behaviour was redefined to distinguish between farmers who accept their economic status quo and those who do not. It was found that farmers obtaining high returns on their investment generally plan to maintain present levels of production. On the other hand, farmers with low returns and with low levels of performance appear to be very much concerned with programs of adjustment that will lead to larger net incomes. Satisficing behaviour may be relevant for some managers in the upper performance groups. However, it was suggested that evidence of a high level of efficiency is generally indicative of optimizing efforts on the part of the farmer. In contrast, farmers who achieve only low returns and who have indicated that they will maintain present production, were generally found to have some other source of income.

In view of negative returns to family labour of nearly one third of farmers in the sample, the question of economic incentives in farming was raised. It was pointed out that all farms do achieve positive net incomes. However, if total production costs are calculated on the basis of total annual capital cost and cash operating investment, then all of these farms have gross returns which are insufficient. Three reasons were suggested to elucidate the question of negative returns to family labour. These are

1. An inordinate amount of unproductive capital in the form of land[1]

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[1]It is clear that some portion of the investment in buildings, equipment, livestock, etc. may also be unproductive. This suggests some explanation why all of these farms also have negative residuals.

2. The possibility that some farmers fail to consider the cost of that portion of capital which they have inherited. If this is true, they would tend to estimate their performance on the basis of returns to cash inputs rather than on the basis of returns to total investment

3. Chronic financial difficulties and slow capital formation of farms established with insufficient initial capital.

Three sources of economic incentive in farming may be listed:

1. Profits from the sale of farm products

2. Farm perquisites

3. Speculative gains.

It was suggested that profits from the sale of farm products represent the major economic incentive to the full-time farmer. Farm perquisites and anticipation of speculative profits appear to be cogent reasons for the persistence of the marginal farm. A low-income operation was examined to illustrate the importance of these incentives in farming.

A consideration of the models farmers use in formulating expectations about future factor costs and product prices, and about changes in government programmes and policies did not serve to explain differences in performance. It was found that enterprise type is important in influencing models for product price expectations, whereas the manner in which inputs are purchased is reflected in the factor-cost models that farmers use. Few farmers offered very precise political models.

Lack of basic farming information was not considered a valid reason for low levels of performance. Most farmers appear well-informed on matters pertaining to their own operation and production problems.

If outside information is required farmers generally have several sources from which pertinent information can be obtained.

A consideration of farm practices relevant to the study area, showed that for some practices a relationship with the performance criterion is evident, while for others it is not. It was argued that evidence of differences in farm practices does not necessarily permit the inference that these reflect differences in managerial skills. Several examples were provided to show that rejection or acceptance of a certain practice by a farmer hinges largely upon economic considerations.

The findings of this study suggest the following conclusions.

The equation employed to estimate gross income and to obtain residual values assumed complete comparability of all farms. The observation that all specialized dairy farms in the sample have positive residuals suggests that this condition was not fully met, and that some residual variation may be due to differences in enterprise type.

To achieve comparability of farms in terms of land capability, cropland acreages were adjusted for each farm. Despite this procedure it was found that a proportionately larger number of farms with negative residuals are located on Haldimand Clay[1]. One may infer that the adjustments that were made are inadequate. Alternatively, it is quite possible that over time, small differences in land capability and in

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[1]The least productive of the three soil types in the township.

farm profits have led to increasing differences in the type of investment undertaken by farmers and in the quality of material capital that is being used. A greater degree of farm specialization associated with the more productive land in the area tends to support the latter conclusion. However, this problem does require further study.

Negative residuals of operations owned by farmers without strong family commitments, and a positive relationship between family achievement scores and levels of performance supports the conclusion that the farm family constitutes a major source of motivation. Less frequent use of credit and a lower incidence of mortgage obligations on the part of older farmers further implies a difference in financial status or needs. For some farmers, the achievement of an adequate level of living and family income may be associated with a propensity toward satisficing behaviour. The opposite appears to be true for farmers who have sons that are committed for farming.

The manner in which a farmer becomes established, is clearly of considerable significance. His initial investment, the condition of the farm at the time of purchase, the stage of farm development, the rate of capital formation and reinvestment, are critical considerations. For these critical reasons, an objective appraisal of the performance of farms that were established only recently is very difficult.

A problem of a somewhat similar nature arises out of various forms of farm adjustments undertaken by farmers. Over half of the farmers in the sample have indicated plans for farm improvements or

expansion of one type or another. Farm to farm differences in the type, timing, and sequence of such changes are potential reasons for major performance variations.

A limited number of farmers with very low farm incomes and with negative residuals have indicated that they do not contemplate any production changes or farm improvements. In two instances, retirement and the sale of the property is imminent; in most of the other cases, income is supplemented by employment off the farm. It is suggested that the practice of part-time farming is both cause and consequence of low performance of most of these operations. Farm perquisites and potential speculative gains in land appear to be major reasons for the persistence of many marginal farms.

Questions aimed to ascertain farmer's attitudes and opinions on certain pertinent issues yielded little evidence in support of traditional beliefs about the alledged obstinacy and irrational economic behaviour of farm people. They may be prone to caution and reluctant to invest where profits are uncertain, but surely, these traits are not unique to any particular group of people.

Minor differences in management assessment scores and the information provided by farmers about decision models, the use of farming information, and the use or non-use of certain farm practices, point to the conclusion that differences in managerial skills among the full-time farmers in the sample are very small, and can at best account for only a very small portion of the residual variation.

Important socio-economic parameters in farm performance are

those which relate to the income needs and aspirations of the farmer and his family, to his past and present opportunities, and to the nature of economic incentives and rewards in farming.

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APPENDIX

FARM SURVEY QUESTIONNAIRE

1. Aerial Photo (boundary, land use, soil type, etc.)

	1967	1957
Total acreage owned	_____	_____
Cropland and rotation pasture	_____	_____
Permanent pasture	_____	_____
Woodland	_____	_____
Did you rent any land in 1967	_____	
Cropland and rotation pasture	_____	
Permanent pasture	_____	
Other land	_____	

2. Do you feel your present acreage of cropland and pasture is adequate?

_____

_____

3. (If inadequate) What would you say are the main reasons that prevent you from expanding your acreage by renting or buying additional land?

_____

_____

4. Roughly how much would you have to pay per acre of cropland in this area?

a. if buying _____ b. if renting _____

5. What distance from your farm would you be willing to travel?

a. to buy land _____ b. to rent land _____

6. Now, here is a system for classifying land on the basis of its usefulness for farming (read card and explain) Roughly what fraction of your land falls into each of these categories?

   Class I _____ Class II _____ Class III _____ Class IV _____

7. How much additional cropland would you require to have the kind of farm operation which you consider ideal?

   _____

8. What is the main soil type on your farm?

   _____

9. Have you ever had your soils tested? _____

10. Are your soils deficient in any way? _____

11. What have you done to correct these problems? _____

    _____

12. How do you decide what kinds of fertilizer to use for different crops and in what quantities?

    _____

    _____

Now, I would like to ask you a few questions about yourself and your family.

13. What made you decide to farm? _____

_____

Summary:	Operator	Wife
Born, raised on farm?		
Where and when?		
Occup. of father?		
Size of home farm?		
Type Enterprise?		
Brothers, Sisters?		
Inherited, bought?		
Formal education?		
Other training?		
Non-Farm work history?		

14. (If applicable) If you were asked to compare your father in terms of his ability as a farmer, with other farmers in the community in which you lived as a child, would you say he was like most other farmers in the community, or do you feel that he was more or less successful?

_____

_____

What are your reasons for feeling that way? _____

_____

_____

15. Do you remember off hand what grade he completed in school?

_____

16. Speaking about school, how much education do you need to be a farmer today? What do you think?

_____

_____

17. How many years of experience have you had operating your farm?

_____

18. Well, with this kind of background, do you feel that there is a future in farming for young people today?

_____

What are your reasons for feeling that way? _____

_____

_____

19. What do you personally like most about farm life? _____

_____

_____

20. What do you like least about it? _____

_____

_____

21. How does your wife feel about farm life? _____

_____

_____

22. Do you have any children? Could you please tell me their ages, and what each one is doing?

CH	M? F?	Age	M? S?	FE	OT	Where living				Occupation	Occupational Aspiration	
						H	OF	T	C		Parent	Child
1												
2												
3												
4												
5												
6												
7												
8												

23. Are there any other people living with you which are members of the family? (How many?) _____

24. Do you or your wife belong to any farm or community organizations or to any other organized groups?

Membership? Attend Meetings? Committee Member? Office Holder?

	Name of Organization		Husband					Wife			
			1 M	2 A	3 C	4 O		1 M	2 A	3 C	4 O
A.	RURAL	1.									
		2.									
		3.									
		4.									
		5.									
		6.									
B.	RELIGIOUS and COMMUNITY	1.									
		2.									
		3.									
		4.									
		5.									
		6.									
C.	OTHER	1.									
		2.									
		3.									
		4.									

25. What do you think about Farmers' Unions? _____

_____

_____

What are your reasons for feeling that way? _____

_____

_____

_____

26. Here are a few other things I wish to check off:
(for yes, X for no)

Electricity? House _____ Barn _____

Water piped into the house? _____ Hot _____

Central heating system? _____

Year house was built? _____ No. of rooms? _____

Television? _____ Radio? _____ Telephone? _____

Freezer? _____ Family car? _____

Year and Model of car? _____ Daily Newspaper? _____

Weekly Newspaper? _____

27. Farm Journals
Regular Public. of Farm
Organizations

Magazines

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

28. Who is the Agricultural Representative for your area?

_____

29. In the past year have you had any contact with his office either by writing _____ by telephone _____ or personally? _____

	Type and Number of Contacts		
	Writing	Telephone	Personal
O.A.C. or other Agric. Schools			
Ont. Dept. of Agric. excluding above			
Fed. Dept. of Agric. or V.L.A.			

30. Now, I wonder if you could please give me some information about your farm operation. I would like to know what livestock you have, what equipment you are using, approximately how much labour is required to operate your farm, what sort of operation and production costs you encounter, and some estimate of your gross income.

Livestock	How Many	Approx. Value Each
Dairy Cows (total)		
Dairy Cows (milked)		
Dairy/Beef Cows		
Heifers		
Steers		
Calves		
Hogs		
Weanlings		
Laying Hens		
Broilers		
Turkeys		

Comments:

31.

Equipment hp Model	Year built	Year bought	Price paid	Replacement value
Tractor				
Tractor				
Tractor				
Combine (sp) (pt)				
Swather (sp) (pt)				
Forage Harvester & Wagon				
Seed Drill				
Dairy Equipment				
Baler				
Sprayer				
Cultivating Equip.				

32. Speaking about farm machinery, did you hear about the recent government inquiry into the cost of farm machinery?

What do you think about it? _____

P. _____

33. Do you repair and overhaul your machinery yourself? _____

What time of the year is that usually done? _____

Do you have a machine shed or a work shop in which you can do this kind of work?

Do you have your own welding equipment? _____

Labour

34. Could you please give me as close an estimate as possible of the hours of work spent on your farm by yourself, and by people helping you?

	Operator			Wife									Hired Help		
Month	h/d	d/w	w/m	h/d	d/w	w/m	h/d	d/w	w/m	h/d	d/w	w/m	h/d	d/w	w/m
January															
February															
March															
April															
May															
June															
July															
August															
September															
October															
November															
December															

Off-Farm Employment

		Operator	Wife	Son
35.	Place:	_____	_____	_____
	Type of Work:	_____	_____	_____
	No. of Months:	_____	_____	_____

Operating Expenses

36. Do you know what your total operating expenses for 1967 were? _____

1. Feed, Concentrates, Supplements _____
2. Farm Chemicals, e.g. weedkillers, seed treatment _____
3. Fertilizer _____
4. Veterinary Fees _____
5. Veterinary Medicine _____
6. Equipment Repair and Parts _____
7. Fuel Cost i.e. Gas, Oil, Lubricants _____
8. Hydro and Telephone _____
9. Rental of Equipment _____
10. Wages for hired help _____
11. Wages to family members for farm help _____
12. Custom work done for you _____
13. Property Taxes _____
14. Rent for land _____
15. Payments on Machinery _____
16. Mortgage Payments on land and bldgs. _____
17. Total Interest paid on loans, mortgages _____
18. Capital Cost Allowance _____
19. _____ _____
20. _____ _____

37. Farm Products Sold, Price Range

	Units Sold	Price/Unit	High	Low (1967)
Fluid Milk				
Cream				
Eggs				
Steers				
Other Cattle				
Calves				
Hogs				
Weanlings				
Poultry				
Grain				
Hay				

Did you have any income from Custom Work _____
Rental of Equipment _____
Rent for Land _____

What was your total farm income in 1967? _____

38. Would that be higher, lower, or about the same as your income in each of the previous three years?

_____

How do you account for that? _____

_____

Here are a few questions about farm management and farm practices.

39. The operation and management of a farm obviously involves a great many decisions to be made, such as how much to plant of each crop, how much money to spend on fertilizer, what feed combinations to use for livestock and so on.

Now, could you tell me something about how you make these decisions, do you "figure things out" in your head or do you make paper calculations?

_____

_____

_____

_____

40. What factors do you consider when making an important production decision? For example, a farmer may wish to add a few animals to his dairy herd, but decides against it because it would take him too much additional time to look after a larger number of animals. In this case the amount of labour required was an important point in his decision.

What factors do you usually consider?

_____

_____

_____

_____

41. Do you have any important long-range goals, that is, plans for your farm which you may wish to put into effect in the next few years?

_____

_____

For what reasons do you plan these changes? _____

_____

_____

42. How far ahead can you usually plan? _____

_____

_____

43. How much cash do you think a farmer should have over and above his total expected yearly expenses to take care of unforeseeable circumstances?

_____

44. Do you usually have hay left over i.e. more than you need in a normal year? _____

P. _____

_____

45. Do you usually keep more grain in store than you actually need just in case you have a bad year?

_____

46. Many farmers today make use of loans for farm improvements, to purchase new equipment, or to increase the size of their operation. How do you personally feel about the use of short or long term loans in connection with your farm business?

_____

_____

P. _____

_____

47. Availability of credit? _____

_____

48. Do you usually buy tested grain for seeding? _____

Reasons? _____

49. Do you usually plant treated seed? _____

_____

50. Do you use atrazine, 2-4D or any other chemical to control weeds in your fields? _____

How do you control weeds? _____

_____

51. Do you keep any written farm records? _____

What kind of information would you be able to obtain from your records?

A. itemized expenses
B. itemized receipts
C. prices received or paid/unit
D. quantities of products produced
E. record of breeding dates
F. rates of fertilizer applied
G. yield relationships
H. household expenditures

other: _____

_____

52. Who does the record keeping? _____

53. Do you think there will be any changes in federal or provincial government programs and policies for farmers in the next two years? _____

P. _____

_____

_____

54. I think there is general agreement among farmers that the biggest problem facing them today are spiraling costs of production without commensurate increases in returns. I wonder if you have any ideas on what might be done to correct this situation?

_____

_____

_____

_____

55. Do you think the price of (important output) _____ will increase, decrease, or remain the same in the next 12 months? _____ In general, for what reasons do you expect that the price you will receive will be . . . .

_____

_____

56. What about the price you have to pay for fertilizer, do you expect it to increase, decrease, or remain the same? _____

_____

In general, for what reasons do you expect that the price you will have to pay for fertilizer will be _____

_____

57. From time to time there are new developments in agriculture, such as a new crop variety, better livestock, an agricultural chemical to spray weeds or to control insects, a new machine to save labour, or a new farming method such as zero grazing.

Could you tell me please, if in the last two or three years you have begun using one or several improvements of this kind?

_____ Which ones? _____

_____

(Select one) Who was the first farmer in this area to use ...?

_____

How did you first find out about it? _____

_____

What was your main reason for changing to ...? _____

_____

58. How do you generally find out about new developments in farming such as the ones I have mentioned? _____

_____

59. Now, here is a list of different sources of information which a farmer may use at one time or another to make farm decisions.

Could you please tell me how useful these sources of information have been to you in the past, by placing a check mark in the appropriate box.

If there is any source of information which you have never used then just leave the box blank.

SOURCE OF INFORMATION	OF NO USE	OCCASION. USEFUL	FREQUENT USEFUL	ALWAYS USEFUL
1. PAST EXPERIENCE				
2. EXPERIMENTATION ON YOUR OWN FARM				
3. FARM RECORDS				
4. OBSERVING OTHER FARMERS				
5. FARM MAGAZINES				
6. NEWSPAPER				
7. RADIO				
8. TELEVISION				
9. FARM ORGANIZATIONS				
10. ONTARIO COLLEGE OF AGRICULTURE				
11. TALKING TO A SUCCESSFUL FARMER				
12. GOVERNMENT PUBLICATIONS				
13. NEIGHBORS				
14. MACHINERY & SUPPLY DEALERS				
15. AGRICULTURAL REPRESENTATIVE				
16. FAIRS, FIELD DAYS OR DEMONSTRATIONS				
17. BANKS FARM CREDIT CORP.				
18. AUCTION SALES				

VARIABLE CODE AND DEFINITION
SIXTY-EIGHT ECONOMIC AND SOCIAL VARIABLES

V 1 SAMPLE NUMBER 1 TO 43

V 2 FARM TYPE
1 SPECIALIZED DAIRY FLUID MILK FARMS
2 SPECIALIZED DAIRY NON FLUID MILK FARMS
3 SPECIALIZED HOG FARMS
4 SPECIALIZED BEEF FARMS
5 MIXED FARMS (MOSTLY TWO ENTERPRISE TYPE FARMS)

V 3 SOIL TYPE
1 BRANTFORD CLAY LOAM (CLASS I LAND)
2 ONEIDA CLAY LOAM (CLASS I AND II LAND)
3 HALDIMAND CLAY (CLASS II AND III LAND)

V 4 TOTAL ACRES

V 5 ACRES CROPLAND (TILLABLE ACRES)

V 6 ACRES CROPLAND ADJUSTED
1 ACRE CLASS I LAND = 1 ADJUSTED ACRE
1 ACRE CLASS II LAND = .87 ADJUSTED ACRE
1 ACRE CLASS III LAND = .75 ADJUSTED ACRE

V 7 LAND VALUE PER ACRE
TOWNSHIP ASSESSMENT VALUE X8 DIVIDED BY TOTAL ACREAGE

V 8 CAPITAL INVESTED IN LAND
TOWNSHIP ASSESSMENT VALUE X8

V 9 CAPITAL INVESTED IN FARM BUILDINGS
TOWNSHIP ASSESSMENT VALUE X4 MINUS ESTIMATED VALUE
OF FARM RESIDENCE

V 10 CAPITAL INVESTED IN MACHINERY AND EQUIPMENT
INFORMATION GIVEN BY FARMERS AND MACH. DEALERS

V 11 CAPITAL INVESTED IN LIVESTOCK
AV. VALUES BASED UPON QUOT. IN LIVESTOCK MARK. BULLETIN

V 12 TOTAL FARM CAPITAL
TOTAL VALUE OF FARM MINUS VALUE OF FARM RESIDENCE

V 13 TOTAL MAN HOURS PER YEAR

V 14 CASH OPERATING EXPENSES
ALL OP. EXP. EXCLUDING INTEREST PAYM. AND DEPRECIATION

V 15 CAPITAL COST
TOTAL FARM CAPITAL X 0.06

V 16 TOTAL OPERATING COST
CASH OP. EXP. PLUS CAPITAL COST (V14+V15)

V 17 TOTAL FARM EXPENDITURES
INCLUDING INTEREST PAYM. AND DEPRECIATION ALLOWANCE

V 18 GROSS FARM INCOME

V 19 NET FARM INCOME (V18 MINUS V17)

V 20 RETURNS TO FAMILY LABOUR
GROSS INCOME - (CAPITAL COST + CASH OP. EXP.) V18-(V15+V14)

V 21 CAPITAL TURNOVER
NO. OF YEARS REQUIRED FOR GROSS INC. TO EQUAL TOT. FARM CAP.

V 22 GROSS INCOME PER ACRE OF ADJUSTED CROPLAND

V 23 HOURLY WAGE
RETURNS TO FAM. LABOUR DIVIDED BY TOTAL MAN HOURS

V 24 AGE OF FARMER

V 25 PLACE OF BIRTH (LOCAL=1, CANADA =2, OTHER COUNTRY =3)

V 26 FORMAL EDUCATION, INCL.UNIV.,TECHN.SCHOOL

V 27 AGRICULTURAL SCHOOL

V 28 FARM BACKGROUND NO=0, YES =1

V 29 YEARS OF NON-FARM EXPERIENCE

V 30 YEARS OF MANAGERIAL EXPERIENCE

V 31 ACQUISITION OF FAR(INHERITED =1, BOUGHT =2, VLA =3

V 32 MORTGAGE ON FARM NO =0, YES =1

V 33 JOINT OPERATION NO =0, YES =1

V 34 EQUIPMENT AND LABOR SHARING AGREEMENT, NO =0, YES =1

V 35 SON COMMITTED TO FARM, NO=0, YES =1, NA=99

V 36 MARITAL STATUS, S=1, M=2, W=3, DIV.=4

V 37 WIFE FARM BACKGROUND, NA =99, NO =0, YES =1

V 38 WIFE FORMAL EDUCATION, NA =99,

V 39 NUMBER OF CHILDREN

V 40 SCORE FAMILY ACHIEVEMENT (1 TO 10)

V 41 ATTITUDE CREDIT, DOES NOT USE =1,IF NECESS. =2, FREQUENTLY =3

V 42 ATTITUDE EDUCATION, NOT IMPORT.=1,SOME IMPORT.=2,VERY I.=3

V 43 FUTURE IN FARMING, NO FUT.=1, FUTURE BUT RESERV.=2, GOOD FUT.=3

V 44 ATTIT. NEW IDEAS IN FARMING, SLOW=1, MED.=2, FAST ADOPTER=3

V 45 ATTID. FARM UNIONS,NO USE=1,SOME USE =2, GOOD THING =3

V 46 FARM GOAL FORMULATION, DECREASE PROD.=1,MAINTAIN=2,EXPAND=3

V 47 FARM ORGANIZ. AND EXTENSION INVOLVEMENT SCORE

V 48 READERSHIP SCORE, ONE POINT PER FARM MAGAZINE

V 49 MODEL RE. PRICE OF FARM PRODUCTS, SUPPLY DEMAND =1
CYCLICAL =2, PAST TRENDS =3, GOVT. ACTION =4,SEASONAL =5,
SUBSTIT. PRINCIP. = 6, OTHER =7

V 50 MODEL RE. COST OF INPUTS, SUPPLY DEMAND = 1, SEASONAL =2,
TRENDS = 3, PRICE CUTTING =4, INC. LABOR COST =5,
REL.INPUT OUTPUT PRICE =6, OTHERS =7

V 51 MODEL RE. POLICY CHANGES, UNCOMMITTED =0,PAST PERFORM. OF GOVT.=1
PARTY POLITICS =2, GOVT. AS PROBLEM SOLVER = 3

V 51 USE TESTED GRAIN FOR SEEDING NO=0, YES =1, ROTATE =2

V 53 USE TREATED SEED NO=0, YES =1

V 54 USE FERTILIZER ON HAY, NO=0, YES =1

V 55 BASIS FOR AMOUNTS OF FERTILIZER, RULE OF THUMB =1,
RECOMMENDATIONS FROM DEALERS =2, SOIL TESTS =3

V 56 WEED CONTROL, MECHANICAL =1, CHEMICAL=2, CROPPING PRACTICES =3

V 57 SOIL TESTET NO =0, YES =1

V 58 CORRECTION OF ACIDITY, PH NO PROBLEM =0, YES =1, NO =-1

V 59 CORRECTION OF DRAINAGE, NO PROBLEM =0, YES SURFACE =1,
YES TILES =2, NO=-1

V 60 MAINTENANCE OF EQUIPMENT, OFF SEASON=1, AS REQUIRED =2

V 61 STORE SURPLUS GRAIN OR HAY, NO=0, YES =1

V 62 FARM RECORDS, KEEP BILLS AND RECEIPTS =1, RECORD THESE = 2,
FARM RECORD BOOK OR ACCOUNTING PROJECT = 3

V 63 METHOD OF DECISION MAKING, MOSTLY IN HEAD =1,
MOSTLY ON PAPER = 2, BOTH =3

V 64 SCORE ASSESSMENT OF FARM INFORMATION

V 65 SOLUTION OF FARM PROBLEM, GIVE SUBSIDIES = 1, SOFT LOANS= 2
RAISE FOOD PRICES = 3,VERT. INTEGR. =4, ORGANIZE =5,
GOVERNMENT CONTROL = 6, NO COMMENTS = 0

V 66 SUBJECTIVE ASSESSMENT OF FARMER, SCORE 1 TO 10

V 67 STATUS OF FARMER, FULL TIME = 0, PART TIME = 1, FULL TIME OFF= 2

V 68 NUMBER OF MANAGERS ON FARM

VALUATION OF LAND, BUILDINGS, LIVESTOCK, AND EQUIPMENT

1. LAND

All land valuations were based upon assessed values multiplied by eight. The actual township equalization rate is only 25%, this would not bring the value of land to its current market value, i.e. the prices farmers have been paying in the last few years.

Example:

A farmer has 100 acres of land assessed at	$ 1,550
Equilization rate = 25%, "Real Value"	$ 6,200

Value per acre = $62, no land is available in the township for as little as $62 per acre

Approximate market value = Assessed value times eight

1,550 x 8	$12,400
Price per acre	$ 124

2. BUILDINGS

Total investment in farm buildings was based upon assessed value times four. In this case the equalization rate was considered realistic.

To obtain an estimate of investment in farm structures only, the estimate value of the farm residence was deducted from the total value based upon the assessment figure.

Example:

A farmer has an assessment of $4,000 for all farm buildings. Approximate market value would equal $16,000. He lives in an old, but well-maintained stone house, estimated at $7,000. His total investment in farm buildings would be $9,000.

3. LIVESTOCK

All values are approximations based upon prices quoted by farmers, and quotations from the Toronto Livestock Marketing Bulletin.

a. Dairy Animals

	Purebred	Grade
Cow	$300	$260
Heifer	$220	$200
Calf	$100	$ 85

b. Beef Animals

Cow $240, Heifer $180 Calf $85
Steer $180, Bull - prices quoted by farmers

c. Hogs

Sows $90
Weanlings and Pigs up to 200 lbs. $16 to $50

d. Poultry

Laying Hens $1.70

4. EQUIPMENT

The following information was obtained from each farmer for all major items of farm machinery:

a. Type, Make and Year
b. Year of Purchase
c. Price Paid
d. Estimated Replacement Value

Regardless whether equipment was bought as new or as used, a depreciation rate of 10% was applied from the year of purchase.

Equipment that was depreciated but still in use, was assessed at the replacement value quoted by the farmer.

To total investment in machinery and equipment, an amount of ten percent was added for "unaccounted" equipment and tools.

YMAX	YMIN	XMAX	XMIN	HEIGHT	WIDTH
0.49000000E 02	0.	0.50000000E 02	0.	50	51

VARIABLE 6, ADJUSTED ACRES OF CROPLAND

CLASS INTERVAL 5.04 NO. OF CLASSES = 50 XMIN = 53.00 XMAX = 305.00 Y AXIS INCREMENT = 1.

YMAX	YMIN	XMAX	XMIN	HEIGHT	WIDTH
0.49000000E 02	0.	0.50000000E 02	0.	50	51

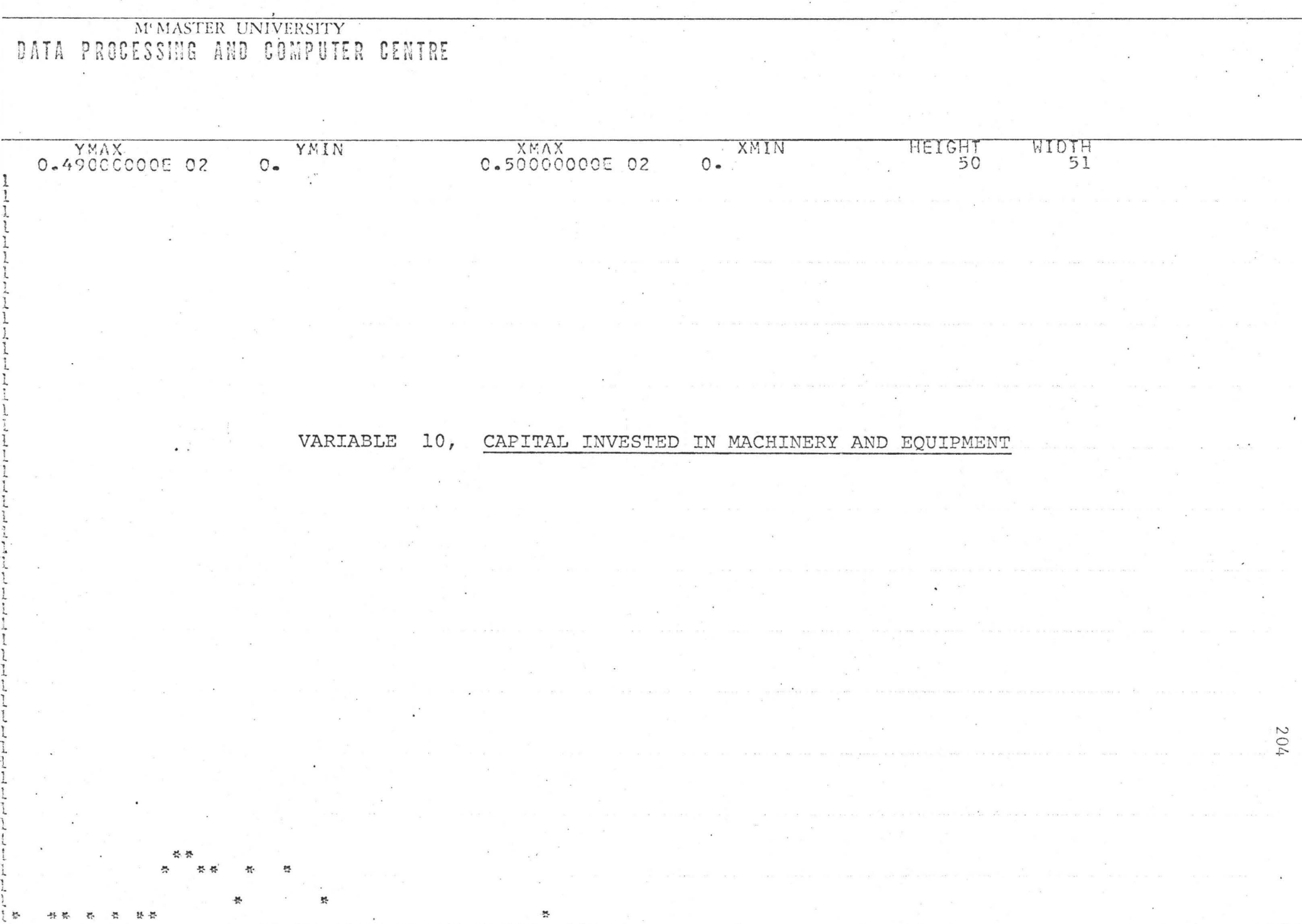
VARIABLE 9, CAPITAL INVESTED IN FARM BUILDINGS*

(*Excluding farm residence)

CLASS INTERVAL 427.76 NO. OF CLASSES = 50 XMIN = 3532.00 XMAX = 24920.00 Y AXIS INCREMENT = 1.

YMAX	YMIN	XMAX	XMIN	HEIGHT	WIDTH
0.49000000E 02	0.	0.50000000E 02	0.	50	51

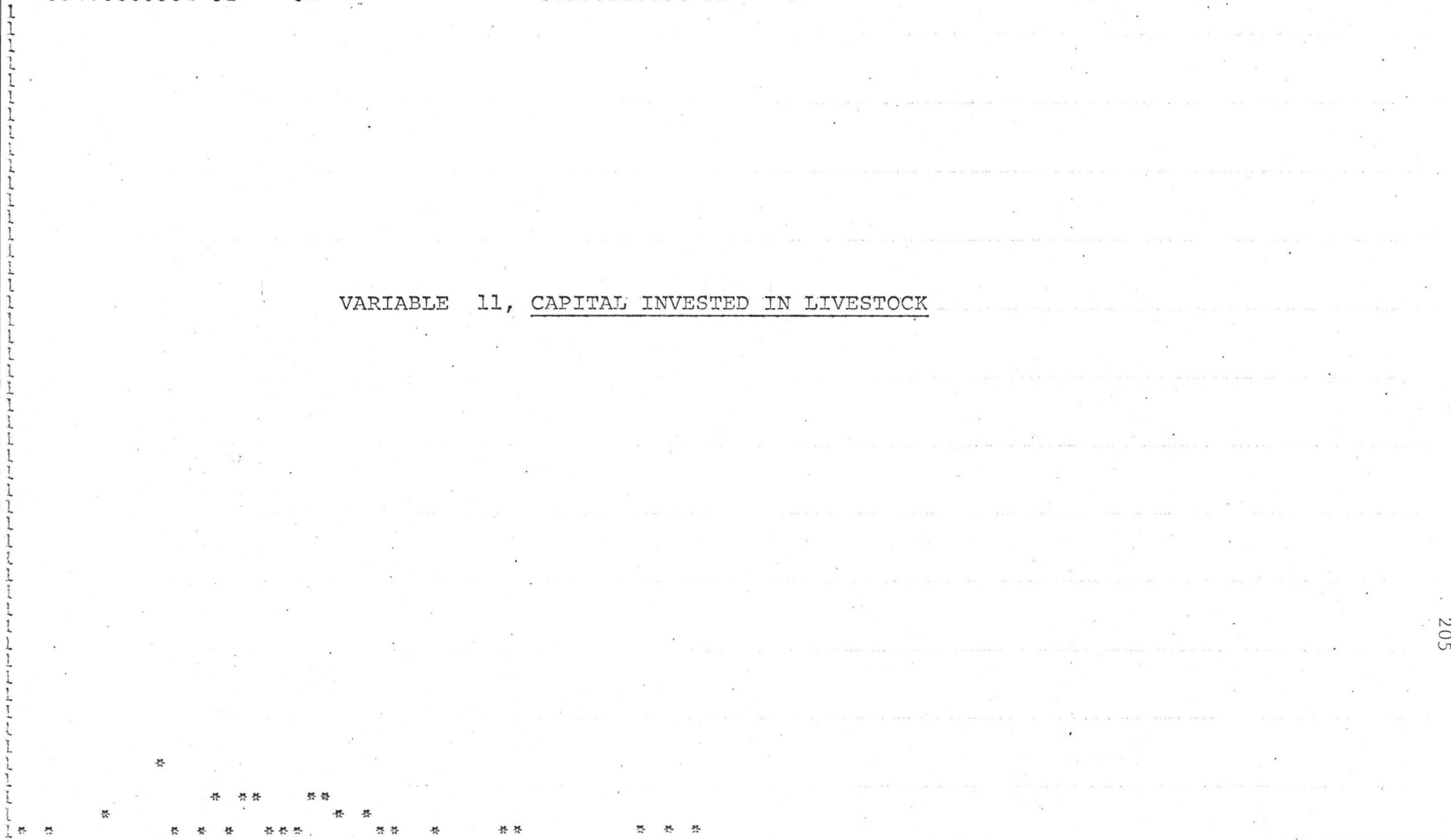
VARIABLE 10, CAPITAL INVESTED IN MACHINERY AND EQUIPMENT



CLASS INTERVAL 740.00 NO. OF CLASSES = 50 XMIN = 2500.00 XMAX = 39500.00 Y AXIS INCREMENT = 1.

YMAX	YMIN	XMAX	XMIN	HEIGHT	WIDTH
0.49000000E 02	0.	0.50000000E 02	0.	50	51

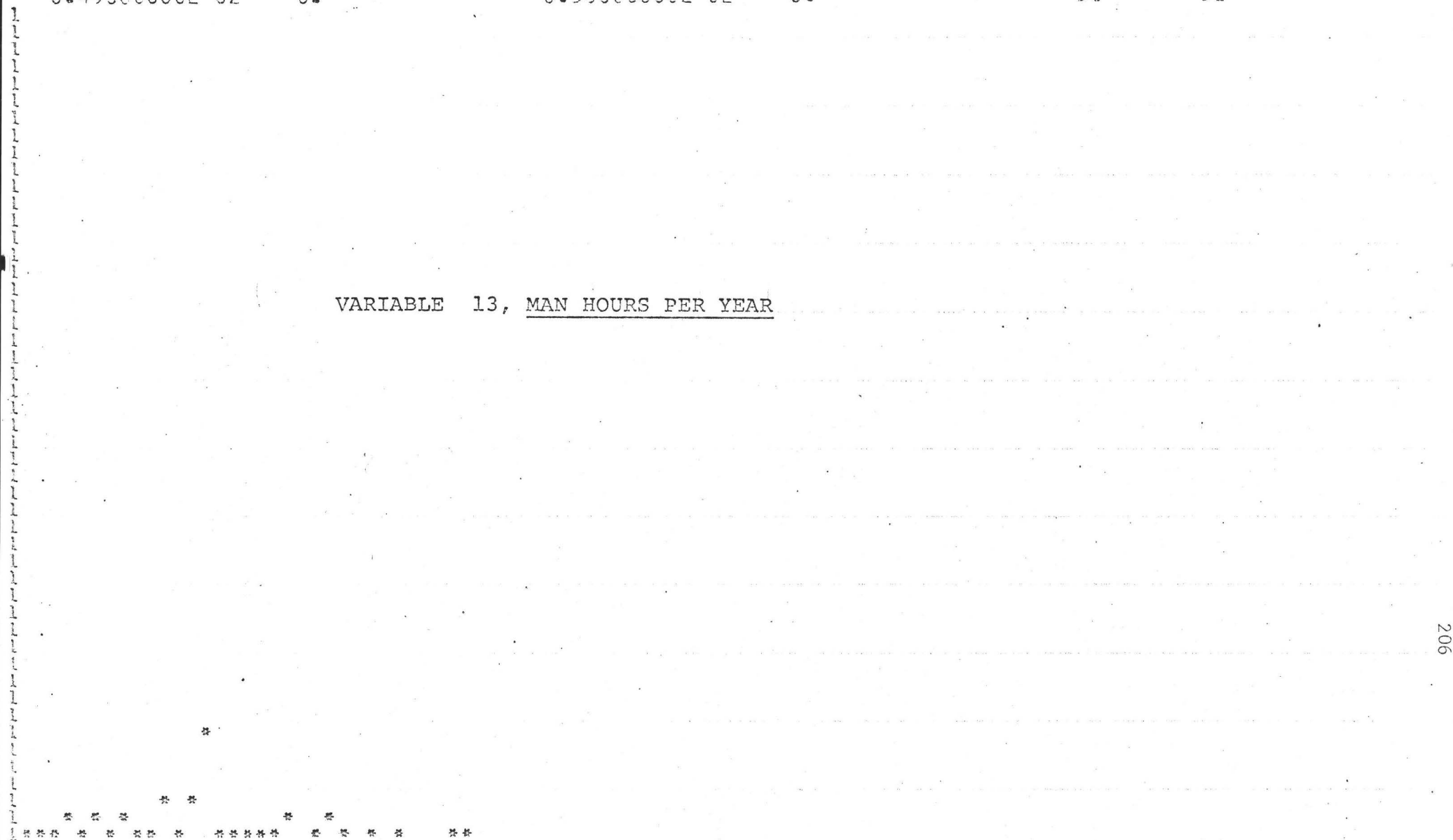
VARIABLE 11, CAPITAL INVESTED IN LIVESTOCK



CLASS INTERVAL 461.20 NO. OF CLASSES = 50 XMIN = 3840.00 XMAX = 26900.00 Y AXIS INCREMENT = 1.

YMAX	YMIN	XMAX	XMIN	HEIGHT	WIDTH
0.49000000E 02	0.	0.50000000E 02	0.	50	51

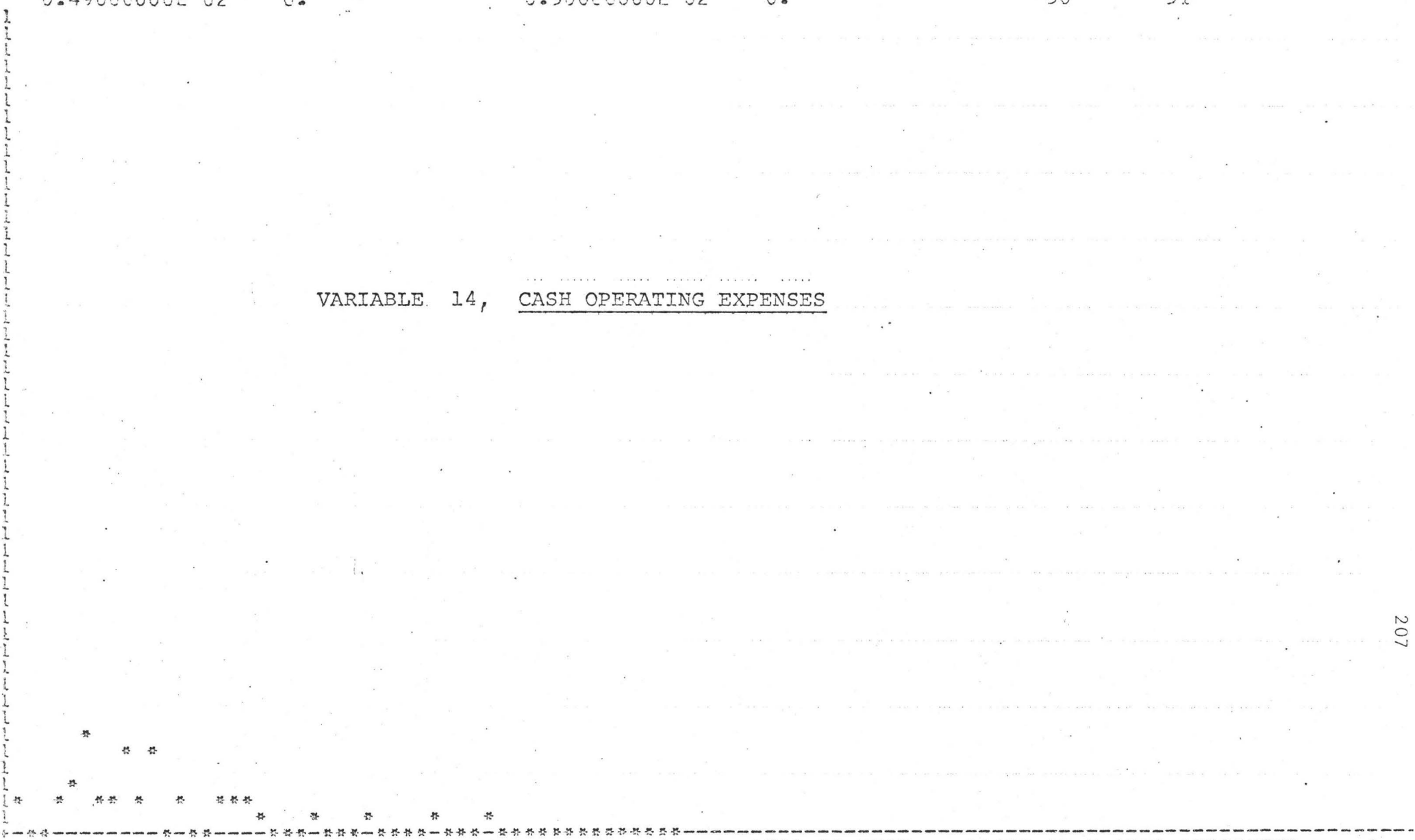
VARIABLE 13, MAN HOURS PER YEAR



CLASS INTERVAL 168.41 NO. OF CLASSES = 50 XMIN = 2062.80 XMAX = 10483.20 Y AXIS INCREMENT = 1.

YMAX	YMIN	XMAX	XMIN	HEIGHT	WIDTH
0.49000000E 02	0.	0.50000000E 02	0.	50	51

VARIABLE 14, CASH OPERATING EXPENSES



CLASS INTERVAL 857.58 NO. OF CLASSES = 50 XMIN = 1780.00 XMAX = 44659.00 Y AXIS INCREMENT = 1.

YMAX	YMIN	XMAX	XMIN	HEIGHT	WIDTH
0.49000000E 02	0.	0.50000000E 02	0.	50	51

VARIABLE 18, GROSS FARM INCOME

CLASS INTERVAL 1063.12 NO. OF CLASSES = 50 XMIN = 3056.00 XMAX = 56212.00 Y AXIS INCREMENT = 1.

VARIABLE NØ.	MEAN	STANDARD DEVIATIØN	CØRRELATIØN X VS Y	REGRESSIØN CØEFFICIENT	STD. ERRØR OF REG.CØEFF	CØMPUTED T VALUE	
6	146.58139	59.26503	0.35830	0.88801	4.90477	0.18105	Adj.acres
9	12060.18604	4992.40875	0.32507	0.06210	0.05868	1.05822	Cap.bldgs.
10	14822.79065	6402.33844	0.64111	0.05514	0.05412	1.01895	Cap.mach.
11	13408.44177	5381.64240	0.67238	0.08846	0.06699	1.32043	Cap.livest.
13	4481.68561	1603.10582	0.65755	0.17299	0.22256	0.77726	Man hours
14	11853.23254	8282.02161	0.98626	1.11217	0.04414	25.19803	Cash Expen.
DEPENDENT							
18	17299.81372	10141.88770					Gross Inc.

INTERCEPT 459.30469

MULTIPLE CØRRELATIØN 0.98964 FRACTION OF VARIABILITY ACCOUNTED FØR 97.8%

STD. ERRØR ØF ESTIMATE 1572.94090

Predicted Gross Income $= 459.305 + 0.888X_6 + 0.062X_9 + 0.055X_{10} + 0.088X_{11} + 0.173X_{13} + 1.112X_{14}$

ANALYSIS ØF VARIANCE FØR THE REGRESSIØN

SØURCE ØF VARIATIØN	DEGREES ØF FREEDØM	SUM ØF SQUARES	MEAN SQUARES	F VALUE
ATTRIBUTABLE TØ REGRESSIØN	6	**********	**********	285.01195
DEVIATIØN FRØM REGRESSIØN	36	89069152.00000	2474143.09375	
TØTAL	42	**********		

TABLE OF RESIDUALS

CASE NO.	ACTUAL	PREDICTED	RESIDUALS
1	33998.00000	35365.79248	-1367.79248
2	7112.00000	7380.06519	-268.06519
3	42000.00000	41603.96240	396.03760
4	20179.00000	18763.65576	1415.34424
5	12110.00000	10309.44800	1800.55200
6	14500.00000	14033.49829	466.50171
7	16500.00000	15959.59509	540.40491
8	17500.00000	13889.44421	3610.55579
9	23260.00000	21854.95654	1405.04346
10	3056.00000	3892.10126	-836.10126
11	11988.00000	10891.22900	1096.77100
12	16218.00000	16087.38245	130.61755
13	11771.00000	12120.62524	-349.62524
14	18900.00000	18148.35913	751.64087
15	8120.00000	9871.99622	-1751.99622
16	10412.00000	10690.51404	-278.51404
17	56212.00000	56404.63770	-192.63770
18	4117.00000	5037.94989	-920.94989
19	8110.00000	9472.24988	-1362.24988
20	21487.00000	25093.36377	-3606.36377
21	23056.00000	21680.35620	1375.64380
22	16210.00000	15943.37158	266.62842
23	7376.00000	8845.50745	-1469.50745
24	9800.00000	11886.48132	-2086.48132
25	13671.00000	14538.96729	-867.96729
26	31325.00000	30782.45459	542.54541
27	27064.00000	25872.21362	1191.78638
28	9900.00000	10413.13281	-513.13281
29	12500.00000	16549.19800	-4049.19800
30	11314.00000	11427.18774	-113.18774
31	10100.00000	10790.45752	-690.45752
32	8216.00000	8861.40503	-645.40503
33	30092.00000	31735.10278	-1643.10278
34	15378.00000	15374.18567	3.81433
35	17100.00000	15414.94055	1685.05945
36	18900.00000	16893.03052	2006.96948
37	14046.00000	13509.28955	536.71045
38	23987.00000	23676.92676	310.07324
39	23000.00000	22870.26074	129.73926
40	21770.00000	21808.82520	-38.82520
41	14500.00000	12158.04614	2341.95386
42	15037.00000	14203.79541	833.20459
43	12000.00000	11786.03149	213.96851

GRØUP 1 NØ. ØF ØBSERVATIØNS 5

VARIABLE	MEAN	STD.DEV	MINIMUM	MAXIMUM
2	1.80	1.79	1.00	5.00
3	2.20	0.84	1.00	3.00
4	187.20	71.39	98.00	290.00
5	164.60	57.31	96.00	250.00
6	149.20	60.68	84.00	246.00
7	174.80	26.41	141.00	210.00
8	32380.80	13490.05	20640.00	55264.00
9	10146.40	3710.39	6472.00	15720.00
10	12614.80	2525.92	9000.00	15000.00
11	12262.00	1231.19	10400.00	13700.00
12	67404.00	9351.42	59320.00	81136.00
13	3887.28	871.61	2822.40	4890.60
14	9044.00	1903.86	6300.00	11200.00
15	4044.24	561.11	3559.20	4868.20
16	13088.24	1969.94	10143.00	15559.60
17	10179.60	1796.41	7800.00	12502.00
18	16022.00	2704.15	12110.00	18900.00
19	5842.40	1305.64	4310.00	7700.00
20	2933.76	1286.96	1431.80	4720.80
21	4.32	1.05	3.40	5.60
22	124.60	58.55	59.00	204.00
23	0.74	0.22	0.50	1.10
24	40.00	7.52	30.00	47.00
25	1.80	1.10	1.00	3.00
26	9.20	3.19	5.00	14.00
27	0.80	1.10	0.00	2.00
28	1.00	0.00	1.00	1.00
29	1.40	3.13	0.00	7.00
30	11.00	4.80	6.00	16.00
31	1.60	0.55	1.00	2.00
32	0.80	0.45	0.00	1.00
33	0.20	0.45	0.00	1.00
34	0.40	0.55	0.00	1.00
35	79.20	44.27	0.00	99.00
36	2.00	0.00	2.00	2.00
37	0.80	0.45	0.00	1.00
38	11.00	3.61	7.00	16.00
39	1.80	1.10	0.00	3.00
40	7.20	0.45	7.00	8.00
41	2.60	0.55	2.00	3.00
42	2.20	0.45	2.00	3.00
43	2.00	1.00	1.00	3.00
44	2.20	0.84	1.00	3.00
45	1.40	0.55	1.00	2.00
46	2.20	0.45	2.00	3.00
47	18.80	22.91	4.00	59.00
48	6.60	1.67	4.00	8.00
49	3.00	1.73	0.00	4.00
50	2.80	1.10	1.00	4.00
51	0.60	0.89	0.00	2.00
52	1.20	0.45	1.00	2.00
53	1.00	0.00	1.00	1.00
54	0.60	0.55	0.00	1.00
55	2.20	0.84	1.00	3.00
56	2.00	0.00	2.00	2.00
57	0.60	0.55	0.00	1.00
58	0.20	0.84	-1.00	1.00
59	0.40	0.55	0.00	1.00
60	1.80	0.45	1.00	2.00
61	0.20	0.45	0.00	1.00
62	2.60	0.55	2.00	3.00
63	1.80	0.45	1.00	2.00
64	48.60	7.64	40.00	59.00
65	1.80	1.79	0.00	4.00
66	7.80	0.84	7.00	9.00
67	0.00	0.00	0.00	0.00
68	1.00	0.00	1.00	1.00

GRØUP 2 NØ. ØF ØBSERVATIØNS 18

VARIABLE	MEAN	STD.DEV	MINIMUM	MAXIMUM
2	2.94	1.92	1.00	5.00
3	2.44	0.70	1.00	3.00
4	215.33	126.58	98.00	643.00
5	173.22	70.97	96.00	350.00
6	146.00	54.17	83.00	305.00
7	159.00	20.55	123.00	209.00
8	33357.67	17867.69	16700.00	91975.00
9	13930.22	5960.53	3532.00	24920.00
10	16207.83	6420.85	10000.00	39500.00
11	15040.28	5256.20	8620.00	26900.00
12	78536.00	26187.84	53150.00	153130.00
13	5223.80	1860.12	3038.40	10483.20
14	13515.67	6107.88	6900.00	32305.00
15	4712.16	1571.27	3189.00	9187.80
16	18227.82	6947.24	10562.00	36719.40
17	14906.39	6838.35	8000.00	35000.00
18	20258.22	7622.97	11988.00	42000.00
19	5351.83	985.47	3755.00	7000.00
20	2030.40	1220.57	-123.80	5280.60
21	4.07	0.97	1.80	5.70
22	150.67	68.05	70.00	318.00
23	0.41	0.23	-0.00	1.00
24	47.00	12.07	28.00	67.00
25	1.78	0.81	1.00	3.00
26	10.28	2.63	6.00	15.00
27	0.22	0.65	0.00	2.00
28	0.78	0.43	0.00	1.00
29	1.89	2.78	0.00	7.00
30	16.61	10.53	1.00	35.00
31	1.67	0.59	1.00	3.00
32	0.44	0.51	0.00	1.00
33	0.11	0.32	0.00	1.00
34	0.17	0.38	0.00	1.00
35	33.44	47.70	0.00	99.00
36	2.00	0.00	2.00	2.00
37	0.72	0.46	0.00	1.00
38	10.44	2.28	6.00	14.00
39	4.11	2.22	1.00	9.00
40	6.78	1.06	4.00	8.00
41	2.67	0.59	1.00	3.00
42	2.44	0.70	1.00	3.00
43	2.44	0.70	1.00	3.00
44	2.28	0.67	1.00	3.00
45	2.11	0.83	1.00	3.00
46	2.72	0.46	2.00	3.00
47	20.39	16.50	0.00	61.00
48	6.83	2.12	4.00	11.00
49	2.50	1.54	0.00	5.00
50	4.11	1.28	1.00	6.00
51	1.39	1.38	0.00	3.00
52	1.00	0.59	0.00	2.00
53	1.00	0.00	1.00	1.00
54	0.61	0.50	0.00	1.00
55	2.28	0.96	0.00	3.00
56	1.89	0.47	1.00	3.00
57	0.89	0.32	0.00	1.00
58	0.67	0.69	-1.00	1.00
59	0.56	0.70	0.00	2.00
60	1.39	0.50	1.00	2.00
61	0.33	0.49	0.00	1.00
62	2.28	0.46	2.00	3.00
63	1.94	0.80	1.00	3.00
64	45.00	10.43	24.00	58.00
65	2.39	1.82	0.00	5.00
66	7.22	1.11	5.00	9.00
67	0.00	0.00	0.00	0.00
68	1.28	0.57	1.00	3.00

GRØUP 3 NØ. ØF ØBSERVATIØNS 15

VARIABLE	MEAN	STD.DEV	MINIMUM	MAXIMUM
2	4.47	0.99	2.00	5.00
3	2.60	0.74	1.00	3.00
4	185.07	88.83	99.00	380.00
5	163.20	80.44	60.00	350.00
6	141.53	68.00	53.00	301.00
7	154.33	20.72	116.00	201.00
8	27961.33	12624.26	15600.00	62700.00
9	9866.40	3235.55	5680.00	17320.00
10	13914.87	7960.54	2500.00	35000.00
11	11342.00	5393.71	3840.00	26500.00
12	63084.60	26111.78	31220.00	135560.00
13	3656.82	1068.12	2062.80	5956.20
14	10372.40	11558.23	1780.00	44659.00
15	3785.08	1566.71	1873.20	8133.60
16	14157.48	12666.69	3653.20	52792.60
17	11763.00	12895.36	2580.00	50815.00
18	14475.67	13817.30	3056.00	56212.00
19	2712.67	1237.32	476.00	5397.00
20	318.19	1239.42	-826.60	3419.40
21	6.03	2.51	1.60	10.20
22	119.53	150.43	34.00	641.00
23	0.05	0.29	-0.30	0.60
24	44.07	9.07	35.00	62.00
25	2.07	0.96	1.00	3.00
26	10.27	3.20	7.00	18.00
27	0.53	1.46	0.00	5.00
28	1.00	0.00	1.00	1.00
29	7.20	6.59	0.00	21.00
30	9.93	6.52	1.00	23.00
31	1.67	0.72	1.00	3.00
32	0.53	0.52	0.00	1.00
33	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00
35	79.33	40.71	0.00	99.00
36	2.00	0.65	1.00	4.00
37	20.33	40.72	0.00	99.00
38	27.73	36.97	6.00	99.00
39	2.47	1.96	0.00	7.00
40	5.80	1.32	4.00	8.00
41	2.40	0.51	2.00	3.00
42	2.47	0.74	1.00	3.00
43	2.13	0.74	1.00	3.00
44	1.73	0.59	1.00	3.00
45	2.33	0.72	1.00	3.00
46	2.33	0.62	1.00	3.00
47	10.73	12.36	0.00	41.00
48	4.33	2.23	0.00	8.00
49	2.27	1.28	1.00	5.00
50	4.20	1.21	3.00	6.00
51	1.00	1.07	0.00	3.00
52	1.00	0.53	0.00	2.00
53	0.93	0.26	0.00	1.00
54	0.00	0.00	0.00	0.00
55	1.80	0.86	1.00	3.00
56	2.07	0.26	2.00	3.00
57	0.80	0.41	0.00	1.00
58	0.07	1.03	-1.00	1.00
59	0.47	0.64	-1.00	1.00
60	1.33	0.49	1.00	2.00
61	0.13	0.35	0.00	1.00
62	1.73	0.59	1.00	3.00
63	2.00	0.85	1.00	3.00
64	46.40	11.22	24.00	61.00
65	2.53	2.56	0.00	6.00
66	5.00	1.60	2.00	7.00
67	0.40	0.63	0.00	2.00
68	1.07	0.26	1.00	2.00

GRØUP 4 NØ. ØF ØBSERVATIØNS 5

VARIABLE	MEAN	STD.DEV	MINIMUM	MAXIMUM
2	4.20	1.30	2.00	5.00
3	2.60	0.89	1.00	3.00
4	219.20	93.04	100.00	325.00
5	184.40	77.31	82.00	280.00
6	161.20	64.57	70.00	239.00
7	144.20	35.71	109.00	197.00
8	30340.80	11295.19	16160.00	44560.00
9	13823.20	4249.04	9240.00	20560.00
10	14768.40	3029.93	12000.00	19188.00
11	14879.60	7141.55	8640.00	25738.00
12	73812.00	25091.01	46560.00	110046.00
13	4879.08	1362.92	2995.20	6631.20
14	13120.20	7611.39	6110.00	24600.00
15	4428.72	1505.46	2793.60	6602.80
16	17548.92	8551.90	8903.60	29141.60
17	14760.80	8179.38	7430.00	26833.00
18	16399.80	9228.72	8120.00	30092.00
19	1639.00	1151.83	500.00	3259.00
20	-1149.12	1455.26	-2981.40	950.40
21	5.08	1.54	2.50	6.60
22	105.80	50.84	62.00	189.00
23	-0.24	0.29	-0.60	0.20
24	43.60	9.29	34.00	53.00
25	1.60	0.89	1.00	3.00
26	10.40	0.55	10.00	11.00
27	0.00	0.00	0.00	0.00
28	0.80	0.45	0.00	1.00
29	8.40	11.19	0.00	25.00
30	12.00	3.08	7.00	15.00
31	1.40	0.55	1.00	2.00
32	0.00	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00
35	59.60	53.95	0.00	99.00
36	2.00	1.22	1.00	4.00
37	59.60	53.95	0.00	99.00
38	63.40	48.75	9.00	99.00
39	2.20	2.68	0.00	6.00
40	4.80	1.92	3.00	8.00
41	2.20	1.10	1.00	3.00
42	2.40	0.55	2.00	3.00
43	2.40	0.55	2.00	3.00
44	2.00	0.71	1.00	3.00
45	1.80	0.84	1.00	3.00
46	2.60	0.89	1.00	3.00
47	11.60	8.17	5.00	21.00
48	6.60	1.82	5.00	9.00
49	2.60	1.82	1.00	5.00
50	3.80	0.84	3.00	5.00
51	1.80	1.30	0.00	3.00
52	0.80	0.45	0.00	1.00
53	0.80	0.45	0.00	1.00
54	0.20	0.45	0.00	1.00
55	1.40	0.89	1.00	3.00
56	2.00	0.00	2.00	2.00
57	0.80	0.45	0.00	1.00
58	-0.40	0.89	-1.00	1.00
59	0.40	0.55	0.00	1.00
60	1.20	0.45	1.00	2.00
61	0.20	0.45	0.00	1.00
62	2.00	0.71	1.00	3.00
63	1.60	0.55	1.00	2.00
64	43.80	7.12	36.00	55.00
65	1.00	1.73	0.00	4.00
66	5.20	1.64	4.00	7.00
67	0.60	0.89	0.00	2.00
68	1.00	0.00	1.00	1.00

DATA MATRIX

43 FARMS, 68 ITEMS

V1 SAMPLE NUMBER	V2 FARM TYPE	V3 SOIL TYPE	V4 TOTAL ACRES	V5 ACRES CROPLAND	V6 ACRES CROPLD. ADJ.	V7 LAND VALUE P.ACRE	V8 CAPITAL LAND	V9 CAPITAL BUILDINGS	V10 CAPITAL EQUIPMENT	V11 CAPITAL LIVESTOCK	V12 TOT.FARM CAPITAL	V13 TOT.MAN HOURS	V14 CASH OP. EXP.	V15 CAPITAL COST	V16 TOT.OP. COST	V17 TOT.FARM EXPENDIT.
1	3	2	100	60	53	163	15600	10560	16550	10500	53210	3487	28556	3192	31748	30685
2	5	3	118	100	87	163	19280	9800	6120	6750	41950	2062	4445	2517	6962	4861
3	5	3	225	157	132	123	27688	10440	14956	20490	73574	10483	32305	4414	36719	35000
4	1	3	316	305	175	168	53363	17040	14700	13840	98943	5288	12715	5936	18651	13615
5	5	3	200	185	161	162	32400	8380	11000	12270	64050	2822	6300	3843	10143	7800
6	2	3	147	130	109	146	21488	12100	13200	11260	58048	3861	9292	3482	12774	9841
7	2	3	200	170	148	132	26400	13168	11700	10520	61788	6318	10684	3707	14391	11500
8	1	3	148	142	124	171	25360	8160	13800	12000	59320	4258	9220	3559	12779	9800
9	1	2	260	160	138	144	37600	22820	17200	14700	92320	4703	15100	5539	20639	17400
10	5	3	126	105	91	138	17440	7440	2500	3840	31220	2502	1780	1873	3653	2580
11	5	2	213	198	172	144	30768	3532	10000	8850	53150	3038	7373	3189	10562	8233
12	1	3	195	155	135	139	27192	13272	12500	14410	67374	4354	10760	4042	14802	11375
13	5	2	220	175	150	141	31096	6852	11500	11590	61038	3837	7894	3662	11556	8246
14	1	3	100	96	84	167	16700	12340	13000	14000	56040	3285	12880	3362	16242	14000
15	4	3	100	82	70	161	16160	9240	12260	8900	46560	2995	6110	2793	8903	7430
16	5	3	248	212	183	155	38480	10900	12533	12130	74043	4188	6207	4442	10649	7346
17	5	3	380	350	301	165	62700	11360	35000	26500	135560	5956	44659	8133	52792	50815
18	5	3	132	110	92	149	19760	5680	5365	8960	39765	2620	2340	2385	4725	2876
19	3	3	99	95	81	177	17552	9720	7400	6880	41552	2356	6216	2493	8709	6816
20	5	3	325	280	239	137	44560	20560	19188	25738	110046	6631	16781	6602	23383	19181
21	5	2	150	130	113	170	25752	10800	13500	24750	74802	3258	15243	4488	19731	17944
22	5	3	245	240	205	171	42112	8172	14700	15690	80674	3978	10707	4840	15547	11325
23	2	3	133	130	112	144	19168	6548	12790	11610	50116	4165	4880	3007	7887	5460
24	2	3	200	160	136	109	21920	11676	12000	8640	54236	4192	7580	3254	10834	8360
25	5	1	160	158	158	201	32240	10820	21369	12080	76509	4302	9240	4590	13830	10108
26	1	2	294	234	201	154	45360	20380	39500	20000	125240	7383	21269	7514	28783	24895
27	5	2	643	350	305	143	91975	24920	19500	16735	153130	5896	18000	9187	27187	21000
28	5	3	150	145	123	167	25128	13244	21000	10260	69632	3697	5680	4177	9857	7400
29	5	3	300	240	202	117	35240	13040	16394	17850	82524	5241	10530	4951	15481	12000
30	5	3	250	215	184	132	33216	13600	17296	13830	77942	4937	6230	4676	10906	7959
31	4	3	360	313	260	116	42056	17320	13800	15600	88776	3790	5600	5326	10926	6500
32	5	3	150	140	117	139	20936	6112	13000	5200	45248	2667	5647	2714	8361	6347
33	5	1	171	160	159	197	33824	14600	14000	13270	75694	5335	24600	4541	29141	26833
34	1	3	160	156	134	175	28056	9128	16600	14490	68274	5616	9945	4096	14041	10745
35	1	2	98	96	84	210	20640	12000	14274	12940	59854	4329	10300	3591	13891	11296
36	1	2	200	150	131	141	28240	15720	15000	13700	72660	4890	11200	4359	15559	12502
37	5	3	122	114	99	170	20720	6428	19187	8620	54955	4564	8949	3297	12246	9865
38	5	3	100	97	83	170	17024	9644	12098	26900	65666	7534	16360	3940	20300	17112
39	1	2	268	198	173	157	42080	21640	18900	10780	93400	5850	16100	5604	21704	17000
40	5	1	150	140	131	165	24768	8040	12500	14400	59708	4280	16212	3582	19794	18446
41	1	1	290	250	246	190	55264	6472	9000	10400	81136	3135	8200	4868	13068	9500
42	5	1	140	130	125	180	25200	16880	13500	16010	71590	4329	8700	4295	12995	9465
43	2	1	98	98	97	209	20960	18040	17000	8680	64680	4284	6900	3880	10780	8000

V1	V18 GROSS FARM INCOME	V19 NET FARM INCOME	V20 RETURNS TO FAM.LABOUR	V21 CAPITAL TURNOVER	V22 GROSS INC.ACRE ADJ.CROPLD.	V23 HOURLY WAGE	V24 AGE OF FARMER	V25 PLACE OF BIRTH	V26 FORMAL EDUCATION	V27 AGRIC. SCHOOL	V28 FARM BACKGROUND	V29 YEARS NON-FARM EXPERIENCE	V30 YEARS MANAG. EXPERIENCE	V31 ACQUISITION OF FARM	V32 MORTGAGE ON FARM	V33 JOINT OPERATION	V34 EQUIP.SHARING AGREEMT.
1	33998	3313	2249	1.6	641	0.6	45	3	8	0	1	3	12	2	1	0	0
2	7112	2251	150	5.9	82	0.1	40	3	8	0	1	17	5	2	1	0	0
3	42000	7000	5280	1.8	318	0.5	62	3	6	0	1	0	12	2	1	0	0
4	20179	6564	1527	4.9	115	0.3	31	3	15	0	0	5	1	2	1	1	1
5	12110	4310	1967	5.3	75	0.7	34	3	5	0	1	7	7	2	1	0	1
6	14500	4659	1725	4.0	133	0.4	49	2	8	0	1	7	21	3	1	0	1
7	16500	5000	2108	3.7	111	0.3	62	3	9	2	1	0	6	2	1	0	0
8	17500	7700	4720	3.4	141	1.1	47	3	9	2	1	0	10	2	1	0	0
9	23260	5860	2620	4.0	169	0.6	28	3	9	0	1	0	2	2	1	0	0
10	3056	476	-597	10.2	34	-0.2	62	3	10	0	1	8	23	3	1	0	0
11	11988	3755	1426	4.4	70	0.5	51	2	8	0	1	5	25	2	0	0	0
12	16218	4843	1415	4.2	120	0.3	48	1	13	0	1	6	22	2	0	0	1
13	11771	3525	214	5.2	78	0.1	39	1	13	0	1	2	9	1	0	0	0
14	18900	4900	2657	3.0	225	0.8	31	2	15	2	0	0	10	2	1	0	0
15	8120	690	-783	5.7	116	-0.3	52	2	10	0	0	15	14	2	0	0	0
16	10412	3066	-237	7.1	57	-0.1	43	3	12	0	1	3	11	2	0	0	0
17	56212	5397	3419	2.4	187	0.6	35	3	18	5	1	5	3	2	1	0	0
18	4117	1241	-608	9.7	45	-0.2	61	3	16	0	1	21	1	3	0	0	0
19	8110	1294	-599	5.1	100	-0.3	41	3	9	3	1	16	3	2	1	0	0
20	21487	2306	-1896	5.1	90	-0.3	45	1	11	0	1	2	12	1	0	0	0
21	23056	5112	3324	3.2	204	1.0	44	1	9	0	1	0	10	1	0	0	0
22	16210	4885	662	5.0	79	0.2	67	1	8	0	1	0	35	1	0	0	0
23	7376	1916	-511	6.8	66	-0.1	39	2	7	0	1	8	15	2	0	0	0
24	9800	1440	-1034	5.5	72	-0.2	34	1	11	0	1	0	7	1	0	0	0
25	13671	3563	-159	5.6	87	-0.0	36	1	8	0	1	0	8	1	0	0	0
26	31325	6430	2541	4.0	156	0.3	48	1	10	0	1	0	15	1	0	0	0
27	27064	6064	-123	5.7	89	-0.0	36	1	10	0	1	0	10	1	0	0	0
28	9900	2500	42	7.0	80	0.0	38	1	8	0	1	10	11	1	0	0	0
29	12500	500	-2981	6.6	62	-0.6	53	3	10	0	1	25	15	2	0	0	0
30	11314	3355	407	6.9	61	0.1	51	2	8	0	1	10	15	1	1	0	0
31	10100	3600	-826	8.8	39	-0.2	56	1	10	0	1	0	21	1	0	0	0
32	8216	1869	-145	5.5	70	-0.1	36	1	10	0	1	5	8	1	1	0	0
33	30092	3259	950	2.5	189	0.2	34	1	10	0	1	0	12	1	0	0	0
34	15378	4633	1336	4.4	115	0.2	47	1	13	0	1	0	28	1	0	0	0
35	17100	5804	3208	3.5	204	0.7	45	1	9	0	1	0	16	1	1	0	0
36	18900	6398	3340	3.8	144	0.7	44	1	9	0	1	0	16	1	0	0	0
37	14046	4181	1799	3.9	142	0.4	53	2	8	0	1	0	18	2	0	0	0
38	23987	6875	3687	2.7	289	0.5	60	2	8	0	1	0	35	1	0	0	0
39	23000	6000	1296	4.1	133	0.2	53	1	12	0	1	0	24	1	1	1	0
40	21770	3324	1975	2.7	166	0.5	39	1	9	0	1	0	4	1	1	0	0
41	14500	5000	1431	5.6	59	0.5	30	1	14	2	1	0	6	2	1	1	1
42	15037	5572	2041	4.8	120	0.5	48	1	12	0	0	6	21	2	0	0	0
43	12000	4000	1219	5.4	124	0.3	28	2	12	0	0	5	4	2	1	0	0

V1	V35 SON COMMTD. TO FARM	V36 MARITAL STATUS	V37 WIFE FARM BACKGROUND	V38 WIFE FORMAL EDUCATION	V39 NUMBER OF CHILDREN	V40 SCORE FAM.ACHIEVEMENT	V41 ATTITUDE CREDIT	V42 ATTITUDE EDUCATION	V43 FUTURE OF FARMING	V44 ATTIT.NEW IDEAS	V45 ATTIT. FARM UNIONS	V46 FARM GOALS	V47 INVOLVEMT. SCORE	V48 READERSHIP SCORE	V49 MODEL PRICE OF FARM PROD.	V50 MODEL COST OF INPUTS	V51 MODEL RE.POLICY CHANGES
1	99	2	1	8	0	4	3	3	2	3	3	2	5	6	2	3	0
2	99	2	1	10	7	5	2	3	1	1	2	3	4	3	3	3	0
3	1	2	1	6	5	6	3	2	1	2	3	3	23	8	2	5	0
4	99	2	1	11	2	8	3	3	2	3	3	3	5	4	4	5	0
5	99	2	0	8	2	7	3	2	1	2	2	2	4	4	4	3	0
6	0	2	0	10	9	7	2	2	1	3	3	2	35	6	1	5	3
7	1	2	1	10	8	7	3	3	3	2	3	3	9	4	3	4	0
8	99	2	1	7	0	7	2	2	3	3	2	2	7	8	4	1	2
9	99	2	0	10	2	7	3	3	2	3	3	3	26	6	3	6	0
10	99	4	99	99	1	6	2	3	3	1	3	1	9	0	1	3	3
11	0	2	1	9	4	6	2	1	2	1	1	2	0	4	1	4	2
12	1	2	1	9	3	8	2	3	3	2	1	2	9	8	0	4	0
13	99	1	99	99	0	4	2	3	3	2	3	3	7	5	1	6	2
14	99	2	0	11	1	8	3	3	2	3	1	3	51	11	4	1	0
15	99	2	0	9	1	5	1	2	2	1	2	1	7	5	1	5	2
16	99	2	0	6	3	6	3	3	1	2	2	2	0	3	2	6	1
17	99	2	0	13	1	6	3	1	3	2	3	3	4	3	5	6	2
18	0	2	0	14	3	7	2	3	2	1	2	2	2	3	1	5	1
19	99	2	0	7	3	7	2	1	2	1	1	2	0	3	2	3	1
20	1	2	1	11	4	8	3	3	2	2	1	3	20	9	5	4	3
21	99	2	0	13	5	6	3	2	2	3	2	3	21	8	1	5	2
22	1	2	1	11	5	7	2	3	3	2	3	3	22	4	5	4	3
23	99	2	1	11	2	4	2	2	1	2	1	3	6	2	3	5	3
24	99	1	99	99	0	3	1	2	3	2	1	3	5	5	4	3	1
25	99	1	99	99	0	4	2	2	2	2	3	2	7	8	2	4	0
26	1	2	1	8	3	7	3	3	3	3	2	2	19	8	4	5	1
27	99	2	1	14	8	6	3	2	3	2	1	2	0	7	2	4	3
28	99	2	1	10	5	6	2	2	2	2	2	2	6	5	4	3	1
29	0	4	99	99	6	4	3	3	2	2	3	3	5	6	2	3	3
30	1	2	1	10	3	7	3	3	3	2	3	3	32	6	2	5	0
31	1	2	1	10	2	7	2	3	3	2	2	2	27	6	1	4	0
32	99	2	1	6	3	6	3	3	2	1	2	3	11	4	1	3	1
33	99	1	99	99	0	4	3	2	3	3	2	3	21	8	1	4	0
34	0	2	1	14	4	8	3	3	3	2	3	3	61	9	1	4	0
35	99	2	1	16	3	7	2	2	2	2	1	2	16	8	0	3	1
36	0	2	1	12	2	8	3	2	1	1	1	2	8	7	4	3	0
37	0	2	0	8	3	6	3	1	3	1	2	3	9	5	2	4	3
38	1	2	1	8	3	4	1	2	2	2	1	3	22	7	2	4	3
39	1	2	1	13	3	7	3	3	3	2	2	3	31	8	4	4	0
40	99	2	1	14	4	8	3	2	2	2	3	2	41	8	4	4	0
41	99	2	1	12	2	7	3	3	3	3	1	3	59	6	3	4	0
42	1	2	1	10	3	8	3	3	3	3	2	3	18	10	5	5	3
43	99	2	1	13	3	6	3	2	3	2	2	3	6	6	1	1	2

V1	V52 USE TESTED GRAIN	V53 USE TREATED SEED	V54 USE FERTILIZ.ON HAY	V55 DECIS.RE.AMTS. FERTILIZ.	V56 WEED CONTROL	V57 SOILS TESTED	V58 CORRECTION ACIDITY	V59 CORRECTION DRAINAGE	V60 MAINTENANCE EQUIPMT.	V61 STORE SURPLUS GRAIN	V62 FARM RECORDS	V63 METHOD DECIS.MAKING	V64 SCORE FARM INFORMATION	V65 SOLUTION FARM PROBLEM	V66 SUBJ.ASSESSMT.FARMER	V67 STATUS OF FARMER	V68 NO.OF MANAGERS ON FARM
1	1	1	0	1	2	1	1	0	1	0	2	2	33	6	7	0	1
2	1	1	0	3	2	1	1	0	1	1	1	3	40	1	4	0	1
3	0	1	1	3	2	1	1	1	1	1	2	2	45	1	6	0	3
4	1	1	1	3	2	1	-1	1	1	1	3	3	54	3	8	0	1
5	1	1	0	2	2	0	-1	1	1	0	3	2	43	4	8	0	1
6	1	1	1	1	2	1	1	0	1	0	2	2	50	0	8	0	1
7	1	1	0	3	2	1	1	0	1	0	2	2	39	5	6	0	1
8	2	1	1	1	2	0	0	0	2	0	3	2	40	2	9	0	1
9	2	1	1	3	2	1	1	2	2	0	3	2	57	5	8	0	1
10	0	1	0	1	2	1	1	-1	2	0	1	1	32	0	2	0	1
11	0	1	0	2	2	0	1	0	1	0	2	3	35	3	6	0	1
12	1	1	1	3	2	1	1	1	2	0	2	2	41	3	8	0	1
13	1	1	0	1	2	1	-1	1	2	0	1	1	54	0	5	0	1
14	2	1	1	3	2	1	1	1	2	0	3	2	47	3	9	0	1
15	1	1	0	1	2	1	-1	0	1	0	2	1	36	0	4	2	1
16	1	1	0	1	3	0	-1	1	2	0	2	2	24	0	5	0	1
17	2	1	0	3	2	1	1	1	2	0	3	2	56	2	7	0	2
18	1	1	0	2	2	0	1	1	2	0	2	3	61	5	3	0	1
19	1	1	0	1	2	0	-1	0	1	0	1	1	34	0	3	1	1
20	1	0	1	1	2	1	1	1	1	0	3	2	55	0	7	1	1
21	2	1	0	3	2	1	1	0	1	0	2	1	38	4	7	0	1
22	1	1	1	3	2	1	1	1	1	0	3	2	49	1	8	0	2
23	1	1	0	2	2	1	-1	1	1	0	2	1	51	4	4	1	1
24	1	1	0	1	2	0	-1	0	1	0	1	1	40	0	4	0	1
25	1	1	0	2	2	1	-1	0	1	0	1	1	55	0	5	0	1
26	1	1	1	2	2	0	1	0	2	0	3	1	58	1	7	0	1
27	0	1	0	2	2	1	-1	0	2	1	2	1	24	4	5	0	1
28	2	1	0	1	2	1	1	1	1	0	2	2	51	3	5	1	1
29	0	1	0	1	2	1	-1	1	2	0	2	2	45	1	4	0	1
30	1	1	0	1	2	1	-1	1	1	1	2	3	57	5	6	1	1
31	0	0	0	3	2	1	1	1	1	0	2	3	49	0	7	0	1
32	1	1	0	3	2	1	-1	0	1	0	2	3	55	6	5	2	1
33	1	1	0	3	2	1	0	0	1	1	2	2	43	4	7	0	1
34	1	1	1	3	2	1	1	2	1	0	2	1	55	5	9	0	1
35	1	1	1	3	2	1	0	0	2	1	2	2	53	3	7	0	1
36	1	1	0	2	2	1	1	1	2	0	2	1	48	0	7	0	1
37	1	1	0	1	1	1	1	1	2	1	2	1	54	2	7	0	2
38	1	1	1	0	3	1	1	0	1	1	2	3	45	3	7	0	1
39	1	1	1	3	2	1	1	0	1	1	2	3	36	0	7	0	2
40	1	1	0	2	2	1	1	0	1	0	2	2	44	6	7	0	1
41	1	1	1	3	2	1	1	0	2	0	3	2	59	0	8	0	1
42	1	1	0	2	1	1	0	0	1	0	2	1	57	0	8	0	1
43	1	1	0	1	1	1	0	0	2	0	2	3	26	0	6	0	1

DATA MATRIX

43 FARMS

68 ITEMS