

THE STRUCTURE OF MANITOBA'S AGRICULTURAL GEOGRAPHY
1951 - 1964; ITS SIGNIFICANCE IN RELATION TO
PROJECTED FUTURE TRENDS

THESIS PRESENTED TO
THE FACULTY OF GRADUATE STUDIES AND RESEARCH
THE UNIVERSITY OF MANITOBA

IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS

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October, 1966



ABSTRACT

The subject of this thesis is a study of Manitoba's agricultural geography and its changes from 1951 to 1964 with inferences concerning the future. Previous analysis of the areal variations of the small scale producing structure in the province appears to be almost entirely lacking. This lack of analysis is striking in view of the existance of three fairly large scale demand - orientated economic forecasts all of which expect a major change in the type of agricultural production on the Prairies to begin by about 1970. The major change is from cash crop to beef production. The evidence from this study may therefore be useful in assessing the extent to which this change may have begun, and the likelihood of its being achieved as forecast.

The data used is almost entirely of secondary origin, most of it being census material. Since the only standard of relevance for a small scale study of this sort is its accuracy at the functional level of the farm it was necessary to analyse the bias in the aggregate census units which had to be used. Following tests of homogeneity forty of the hundred or more municipalities in Manitoba were chosen as being

relatively free from heterogeneity. The two measures used to study economic efficiency were input and output intensity. Input intensity is defined as the value of all inputs per improved acre, and output intensity as the value of all outputs per improved acre. These measures are comparable between different areas and over time, within certain limits. The ratio of output intensity to input intensity gives a measure of economic efficiency or return upon resources used.

Calculations were made, using these measure, for the forty municipalities for the years 1951 and 1961, and using other secondary data available for some parts of the province these calculations could be extended to 1964. The procedure of factor analysis was used in order to rationalize and explain the many patterns produced by these calculations. It appeared that from 1951 to 1961 the northern half of the sample had tended to experience falling intensity while the south had experienced large rises. Factor analysis showed that the smaller the increase of intensity the larger was the increase in farm size over the decade. Based upon the concept of minimum overhead costs it seemed reasonable to assume that between 1951 and 1961 the north, which had smaller farms, was

adjusting its economic efficiency in contrast with the south. At the same time a significant lack of correlation was noticed between increases of livestock and livestock orientated municipalities. Factor analysis showed a strong negative correlation between livestock increases and output increases. This implied that livestock output was not in general an area of profitable expansion over the decade. More detailed comparisons between different parts of the sample were also made in terms of their structure and expansion or contraction over the decade.

Based upon the structure and trends shown for the sample comparisons could be made with the economic projections. For the period up to 1964 it appeared that two of the changes associated with the major change to livestock had begun in Manitoba. A sharp rise in land values and fertilizer use was noticeable after 1959. These changes correlated with a rise in the index for grains, so that the most likely explanation for them was that they were due to a rise in crop prices. No striking increase in the cattle population could be observed before 1964. Thus it could not be said that the changes which had occurred were necessarily associated with a trend towards livestock production. However some estimate of the realism of the projections could

be made. This was made by taking the forecast proportion of the total output which would in 1980 be livestock, and by employing a land use map, defining the areas which in 1980 should logically be in livestock production. Using the evidence produced by this study the existing geography of agricultural supply could be compared with that forecast for 1980. The major deduction from this comparison was that the more fertile part of the northern half of the province, from which the major livestock increase would have to come, could in no way be expected to achieve such an increase. Adjustment of economic efficiency was still needed in many parts of Manitoba in 1961, and was not likely to have been achieved by 1975 if the economic forecast for 1975 were correct. Since economic efficiency is desirable, and even if the forecast livestock increase has been given the wrong time period, a more rapid rate of adjustment is necessary. However adjustment in agriculture is, from the nature of the industry, a slow process. Consequently it was suggested that indirect government action should be taken to quicken the rate of adjustment. Such government action, to be effective, would need to be in the form of an areally varying policy based upon geographically precise data.

PREFACE

Agricultural geography has not been a very intensively studied part of the field up to the present stage in the history of geography. There is therefore an incentive for the student to explore it. This does not explain an interest in the specific topic of Manitoba. The origins of the study lie in fact merely in the desire of an Englishman to see North America. Once arrived however a series of field trips organized by the Geography Department at the University of Manitoba soon created an interest in the agricultural geography. The mere fact of complete ignorance of the province provided an incentive to obtaining some grasp of its workings. It is hoped that this form of hybrid vigor has outweighed the effect of unfamiliarity with what is known to French geographers as the "personality" of the region. Certainly the study of geography provides one with something very material to grasp when in a new country.

A great many people have been kind enough to help me. Dr. T.R. Weir, Head of the Geography Department at the University of Manitoba, fully deserves the first place in the list of those to whom I am grateful. Without his help I

should never have come to Manitoba, nor settled down as quickly when arrived. Dr. J.C. Gilson, Head of the Department of Agricultural Economics and Farm Management put the original idea into focus and made several other important suggestions. Also in that Department the organizers of the two Farm Business Associations (Mr. J.P. Hudson and G.A. Ackerman) were kind enough to discuss their respective sets of data. A graduate student of the same Department, Mr. T. Friedgut supplied many of the indices required in the calculations of constant dollars. Mr. L.M. Johnson, of the Economics Branch, Canada Department of Agriculture, in Winnipeg, showed great courtesy in providing access to data. Dr. A. Ridley, Messrs. J. Friesen and H. Tolton were most helpful in allowing me to copy unpublished parts of the Soil Productivity map. Gentlemen, who prefer to remain anonymous, from several fertilizer selling organizations went out of their way to supply data. Dr. B.A. Hodson, Head of the Computing Science Department, allowed me the use of the computer, while Dr. J.E. Klovan of that Department discussed the details of factor analysis. The operators of the computer itself showed almost unflinching patience to a beginner.

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NOTE ON PROCEDURE

Since this study employs a much greater number of maps than is usual, even in a geographical thesis, some deviations from conventional procedure were made. Their aim is to relieve the difficulty of reading a work in which so many cross references are necessary. The first concerns the position of cross references themselves. Since there are frequently many to a page the conventional method of placing the page numbers at the bottom of the text would lead to a confusion of figures there. It appeared much simpler to place each cross reference in brackets immediately after the reference to it. From the point of view of the reader this means that for each cross reference he is saved the trouble of looking to the bottom of the page and selecting the correct superscript before turning to the cross reference itself. The other breach of convention is of the same nature. It enable the reader to determine whether a cross reference is to a page or to a map. Since there are forty nine maps, scattered fairly evenly through the study, a separate reference system does not involve very much danger of the reader being unable to locate a given map. On the other hand it may be of some assistance to know whether the reference is to the text or to a map. Each reference in the text to a map is denoted by a lower case (m) (for example m. 21). Page references are shown in the conventional way by a lower case "p".

SECTION 1: INTRODUCTION

The purpose of this section is to outline the aims of this study, to define the more important terms used, and to give reasons for having dealt with this subject.

The aim of this thesis is to measure the producing efficiency of the agricultural area of Manitoba, and how this pattern changed from 1951 to 1964. From a geographical point of view it is interesting to measure and account for the areal variations in producing efficiency, which is done by using the smallest census unit - the census subdivision. The results of such analysis should be useful in assessing the future trends in the different agricultural regions of the province. Since economic forecasts are available which plot future agricultural trends these results can in fact be compared with such trends in order to observe what reorganization of the producing pattern may be necessary. The value of a geographical approach to this subject is that the producing structure of different regions of Manitoba can be compared, so can the changes in production, so that judgements concerning reorganization can be clearly related to each district. The major part of the study is concerned with establishing a common measure of efficiency, calculating values for it, and relating these values to other relevant variables in order to assess the structure of each area. The fourteen year period for which data is studied allows noticeable changes in this structure to be observed.

The knowledge provided by these calculations leads by itself to several definite conclusions, but is also put to practical use by being used to evaluate future changes in terms of forecast agricultural trends.

Before further discussion of the subject matter it is necessary to define the more important terms used in the study. The main term requiring definition concerns what was referred to in the previous paragraph as "producing efficiency". It is clear that the efficiency of production in agriculture, as in other industries, means the ratio of all outputs to all inputs. The points which require clarification are the way in which inputs and outputs are to be measured and how the ratio between them is to be made comparable between different areas. There appears to be no previous reference which clarifies these points. The question of efficiency is closely related to the intensity of production. It is inferred in the following quotation from E. O. Heady: "The optimum degree of intensity (yield per acre of for a farm of given size)"¹. In this sense intensity provides an answer to the second point above, for as comparing outputs from different areas is concerned. The Concise Oxford Dictionary defines "intensive", in an economic sense, as "serving to increase production of given area"². This implies that intensity is confined to the output

¹•E.O. Heady, *Economics of Agricultural Production Functions and Resource Use* (Prentice Hall, 1952) P. 598

²•The Concise Oxford Dictionary of Current English (4th ed. Oxford University Press, 1961), p. 621

of a given area, as in Heady's statement quoted above.

Measuring efficiency in a way which can be compared between areas clearly involves relating inputs and outputs to a given area and then expressing the latter as a ratio of the former. The dictionary confined intensity to measuring the output of a given area. Examination of the literature leads to several more definitions being found. In the same work by Heady he says "The method of this chapter is to consider one factor as variable and all others as constant. Many farms decision fall within this frame work. The problem is one of intensity of production"³. This statement implies a broader definition not confined to output or to area. Another source states "The relationship between labour, capital and management on the one hand, and land on the other, is one degree of application of those other factors to land. This determines the intensity with which land is used"⁵. This suggests that input for a given area is meant. Further reading of agricultural economics texts yielded no set definition of "intensity" although the word is fairly frequently used in the various senses illustrated above. Since it is essential to have a defined measure of the geography of agricultural efficiency it is necessary to suggest new terms.

³Heady loc. cit., p. 26

⁵S. Sinclair Elements of Land Utilization as they affect Real Estate value (Address to 2nd Annual Conference, Assn. of Assessing Officers of Manitoba, April 25th, 1958), p. 3

The most accessible form of measure for inputs and outputs is monetary value. All output and nearly all inputs, except imponderables like management ability, can be expressed in dollars. Thus for a measure of efficiency the value of all output for a given area would be compared with the value of all inputs. The former can logically be called output intensity, and the latter input intensity. This geographical approach of relating value to area has the additional advantage that the structure of agriculture can be compared between areas by examining the intensity of the different components of the total input.

In order to complete the definition of input and output intensity it is necessary to decide what "given area" shall be used in this study. Assuming that only land in farms is to be considered, the choice lies between occupied areas (all land in farms), improved areas, and improved acres minus summerfallow. Unimproved land, at the present stage in the history of Prairie agriculture, is not usually of great economic importance to farmers, except perhaps on the fringes of the agricultural area. Since the percentage of unimproved land on farms varies widely over the province its inclusion would give a biased picture of intensity. Hence unimproved land will be excluded. It is then necessary to decide whether or not to include land in summerfallow. Land in summerfallow is not necessarily less fertile than the rest of the improved area, and the land involved varies from year to year. As is mentioned later (p. 11)

the practice of summerfallowing is not unavoidable over most of Manitoba. As a result the decision as to what percentage of the improved area to summer fallow represents a decision by the farmer as to how and where to invest in production. Consequently in comparing farms with the same improved acreage but widely different amounts of summer fallow it is more accurate to relate input and output to the total improved acreage. If summerfallow were subtracted in this case it might appear that the farmer with more summer fallow had a higher intensity which would be misleading since in fact he merely decided to concentrate production upon a smaller part of the area available to him. Consequently improved acres will be used as the unit of "given area".

Summarising these definitions, output intensity is the dollar value of all agricultural output per improved acre. Economic efficiency can be calculated by expressing output intensity as a fraction of input intensity. These measures can be applied to any farm, or aggregate of several farms and are comparable between regions. They therefore satisfy the need for measures of efficiency expressed at the beginning of this section.

Reviewing the subject in the light of these definitions it will be seen that input and output intensity provide both a way of establishing relative economic efficiency and also of comparing the farming structure of the different parts of Manitoba. When account is taken of the changing value of the

dollar and of changing demand these comparisons can be extended over time, so that the measures can be used throughout this study.

The last part of this section will be directed to placing the subject of this study in relation to existing knowledge of Manitoba's agricultural geography and to pointing out some reasons for the relevance of a study of this subject at this scale. Concerning the structure of the agricultural geography there have not been any extended analysis of it in Manitoba. The Economic Atlas of Manitoba⁶ is primarily descriptive as would be expected from the purpose of an atlas. It does not show a very fine degree of detail. A series of publication by the Economics Branch of the Canada Department of Agriculture in Winnipeg do give original data at a much smaller scale (the township). One of them, by Garland and Riecken,⁷ contains an extremely interesting analysis of the agricultural land of Manitoba based chiefly upon an original map showing net value of agricultural production by township. This study was therefore analysing productivity rather than efficiency (although, of course, they are related) and was not directly concerned with the producing structure. In the terminology used here, it was concerned with output intensity alone.

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Economic Atlas of Manitoba (T. R. Weir, ed.) (Dept. of Industry and Commerce, Province of Manitoba, 1960)

⁷ S. W. Garland and T. O. Riecken A General Classification of Land for Agricultural Use by Townships, Manitoba (Economics Branch, Canada Department of Agriculture, Winnipeg, 1963)

Another publication from the same source, by Johnson and Riecken⁸ provides another original map. It is of land values, based on average land sales, and contains detail within townships. It is therefore an important source of information, but again does not analyse the agricultural structure. Apart from these sources there are none which analyse Manitoba's agricultural geography as a whole. There are many analyses of individual types of enterprise and several of individual small areas, but none which set out to compare the producing efficiency of different regions of the province. It can therefore be said that there has been relatively little analysis of this aspect of agricultural geography in Manitoba.

The fact that this subject has not received a great deal of attention does not necessarily mean that it is useful to analyse. However, there are two main reasons which make it appear that the topic and location are, in fact, important. The first is the existence of economic forecasts, discussed in the next section (p. 10), which imply that Manitoba will undergo a major reorientation of its agricultural production by 1980. These projections base their forecasts mainly upon trends of demand and do not analyse in detail the small scale supply situation. There is therefore scope for such analysis to discover how for the agricultural regions of Manitoba are

⁸L. M. Johnson and T. O. Riecken Manitoba Farm Land Values 1956-1961 (Economics Branch, Canada Department of Agriculture, Winnipeg, 1964)

prepared for, or are experiencing, the trend towards beef production which is expected. The second reason is related to the first in that it concerns the lack of areal studies at fairly small scales, such as would be necessary to discuss the problems mentioned in the previous sentence. The lack of such studies has been noted both by agricultural geographers and agricultural economists. In the case of geography Lloyd Reeds said "It is my contention that attention should be shifted from the general studies of broad regions which usually produce only a few significant conclusions to the more intensive studies of small areas⁹". From the point of view of the agricultural economist James T. Bonnen stated "The author finds arguments for the regionalisation or spatialisation of the analytical framework convincing. This seems to be one of the first steps necessary to bridge the great void between macro-level analysis and the farm-household or micro-level¹⁰". These two judgements suggest not only that there is a lack of fairly small scale geographical studies of agriculture but that there is a need for them.

This introductory section has attempted to describe the subject of this thesis, define the terms and, show the reasons for undertaking such a study. In summary, the central topic is the

⁹Lloyds Reeds "Agricultural Geography: Progress and Prospects Can. Geog. VII : 2, 1964, p. 52

¹⁰James T. Bonnen, in "Agricultural Supply Functions (E.O. Heady Ed.), Iowa State University, Press 1961) p. 258