

THE EVOLUTION OF FARM MANAGEMENT RESEARCH
IN THE UNITED STATES

by

PETROS MICHAEL YIASSEMIDES

M. R. A. C., Royal Agricultural College, 1962

N. D. A., Royal Agricultural Society, 1962

B. Sc., Kansas State University, 1964

A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

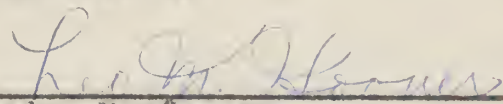
MASTER OF SCIENCE

Agricultural Economics
Department of Economics

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1965

Approved by:


Major Professor

Y
1
Y
e

10
1955
1955
1955
1955

ACKNOWLEDGMENT

The author is grateful to his major advisor,
Professor Leo M. Hoover of the Economics Department of
Kansas State University for his assistance and guidance in
preparing this report.

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENT	11
 Chapter	
I. INTRODUCTION	1
II. EARLY YEARS UNTIL 1910	5
Pioneer Farm Management	5
Farm Cost Analysis	9
Model Farm Approach	11
Farm Management Survey Approach	11
Thomas Hunt and George Warren	13
III. THE PERIOD FROM 1910 TO THE END OF WORLD WAR I	16
Recognition of Farm Management as an Applied Science	16
Survey Method	17
Cost Studies	20
Reorganization of the American Farm Management Association	23
IV. THE DECADE OF 1920-1930	26
Rapid Growth of Farm Management	26
Cost Studies	28
Price Studies	34
Outlook Reports	35
Budgeting	37
Farm Welfare Studies	39
Input-Output Studies	41
V. DEPRESSION YEARS	44
Broadening the Scope of Farm Management	44
Influence of Economics, Mathematics and Logic on Farm Management Research	49
Agricultural Adjustment and Farm Management Research	55

Chapter

Page

VI. WORLD WAR II AND POSTWAR YEARS 59

 Farm Management Research During the War 59

 Farm Management Service Associations 62

 Production Function Studies 65

 Post War Developments in Farm Management
 Research 68

 Studies of the Managerial Element 74

 Linear Programming in Farm Management
 Research 75

 Use of Computers 77

VII. THE PAST AND THE FUTURE 79

 The Past 79

 The Future 82

SELECTED BIBLIOGRAPHY 84

APPENDIX I 86

CHAPTER I

INTRODUCTION

Recognition of the importance of management in general dates back to the time when human beings started thinking of ways to improve their material well-being. The ancient Greeks were aware of the advantages of good management and they discussed the principles of good OIKONOMIA, which translates into "home management". The home of those days provided most of the necessities of life and we can think of it as a farm home.

The scope of management increased as the economy was transformed from a subsistence to a market economy and the word OIKONOMIA came to mean what we refer today as economics.

Early civilizations tried to improve their farm practices. Among others, the early Romans studied farm practices and recorded their findings. Many concepts related to improved farm practices were recorded in the following centuries, but were not synthesized into a systematic plan for managing a farm. The emphasis was on distinct production techniques within individual enterprises. The science of farm management originated at the turn of the twentieth century and grew tremendously since then.

Contributing reasons include highly developed

transportation system, freedom of trade over a large area having variable natural adaptation in the production of farm commodities, the exhaustion of virgin land, highly mechanized agriculture, and development of research and extension programs to assist the development and application of improved farm practices. These influences transformed the subsistence type of agriculture into a specialized business requiring specialized business-like management.

The purpose of this report is to present a historical review of farm management research in the United States by describing advances made in research. The study is divided into five chronological periods which mark decided changes in trends or indicate interruptions which have caused changes in emphasis. The existing situation of each period will be dealt with briefly as this sheds light on the significance of changes in old ideas and the growth of new ones. Influences affecting the development of farm management include academic environment and training of investigators, their attitudes and personalities, developments in other sciences, changes in farm technology and practices, and supply of and demand for farm products. Evaluation of their impact on the development of farm management will be attempted.

Historically the science of farm management in the United States breaks into five natural time divisions. The early years until the organization of the American Farm Management Association in 1910 were years of discerning and reconciling the different points of view. Organization of the

Association led to a definition of the field of farm management which was to serve as a guide for future developments. During the next ten years more complete recognition of the field of farm management in colleges, research, and extension developed rapidly. More funds were made available for farm management work and this stimulated growth and development.

World War I marks the end of this period and the beginning of the next. College attendance was reduced to a low level and a great deal of the established research was abandoned in favor of the more urgent war needs: emergency campaigns to increase the production of certain foods. At the close of the war the re-organization of the Office of Farm Management and the establishment of the Bureau of Agricultural Economics in the U. S. Department of Agriculture directed attention toward re-assessment of the work of farm management.

The severe depression of the thirties with the accompanied low farm product prices and the initiation of new federal programs marked a shift in farm management emphasis to agricultural adjustment studies and the effects of governmental actions on farming.

The impact of World War II brought a sudden change in objectives from the production control of the thirties to all-out production to meet wartime demands. Fulfillment of this objective became the goal of farm management. High postwar demand for farm products encouraged a continuation of the technological progress in agriculture. This did not continue for long. Soon a surplus problem was created. Adjustments

had to be made in farm management research and extension from a wartime to a peacetime basis, and from a high demand situation to one of surpluses.

The study of farm management research by dividing it into distinct chronological periods has the disadvantage of necessitating letting lose some threads of development to be regathered later. This disadvantage, big as it is, is more than compensated by greater clarity of understanding related aspects of progress within the whole field of farm management, and better appreciation of endogenous and exogenous forces influencing evolution of the discipline.

CHAPTER II

EARLY YEARS UNTIL 1910

Pioneer Farm Management

During the nineteenth century, and to a lesser extent during the first twenty years of the twentieth century, the official view in the United States was that fair prices for farm products were attainable without artificial price supports, and without government control of production. It was believed that the real world corresponded to the classical model, and that with full information farmers would adjust their production and plan their marketing in a way that would result in supply and demand prices being fair prices.

Not much information was needed in the predominantly subsistence economy of the earlier years of the United States. Information was more and more needed as the market grew due to better transportation facilities and expanding population. The whole structure of agriculture was changing from a semi-subsistence type into a market type, and farmers needed information to adjust their activities to the new conditions. For this reason agricultural information services were initiated by the government long before agricultural economics developed in educational institutions. The first agricultural census was taken in 1840 and the first crop estimate was made in 1841

in response to the needs of farmers who sold their products in distant markets.¹

Rapid settlement of new fertile lands combined with improved technology and its successful application by farmers caused agricultural production to increase more rapidly than demand for farm products. The resulting fall in farm prices was accentuated by a concurrent deflation of the currency and finally by general economic depression in 1893. Prices fell to extremely low levels, debt replacement by farmers was often impossible, and mortgage foreclosures were common.

Farm leaders and farm organizations, especially the Farmers Alliance and National Grange, promoted the idea that the government should assist in the solution of farm problems. Proposals included regulation of railroads, future trading, and the meat packing industry; government credit to farmers at lower rates; farm commodity loans; price supports; and better information on crop and livestock. Many of these proposals were put into effect during the following half century and the ideas and activities of the 1890's made a lasting impression on the young men who later pioneered in the development of farm management research.²

Professors of economics also recognized the existence of the agricultural depression and they, too, tried to

¹Henry Taylor, A Story of Agricultural Economics in the U. S. A. 1890-1932 (Ames, Iowa: The Iowa State College Press, 1952), p. xii.

²Ibid., pp. 25-29.

determine its causes. The American Economic Association took up the subject in 1896 under the title "Is there a distinct agricultural question?" The interrelation of the agricultural question with other industries and its international scope was realized:

The agricultural question is a question of maladjustment of agriculture to other industries. It is not national but international in its scope, and is to be settled only with reference to other nations.³

Ability to adjust was the prescribed therapy.

In order to be prosperous again the farmers of the depressed regions must adjust their production and their methods to the new conditions, and they must acquire such business experience and foresight as will enable them to keep their industry in proper relations to the rapidly changing needs and conditions of nineteenth century industrial life.⁴

William Coutts, analyzing the agricultural depression, pointed out that adjustment is difficult, as it is not easy to reduce production when farmers have high costs, and that demand of agricultural products is affected by population growth and by prosperity and as a result is less stable than it was previously thought.⁵

Efforts to identify and define the problem and suggest remedies drew the attention of many able men, who were later

³ American Economic Association, Is There a Distinct Agricultural Question, Supplement to Economic Studies (February, 1897), p. 2.

⁴ Ibid.

⁵ William C. Coutts, Agricultural Depression in the United States: Its Causes and Remedies (Michigan: Michigan Political Science Association, 1897).

responsible for the development of the disciplines known today as farm management and agricultural economics.

During the nineteenth century the physical and biological aspects of farming received primary attention. Economic aspects received little or no attention. Thomas Hunt was the first to understand modern agriculture in all its aspects, physical and biological, as well as economic. His philosophy is reflected in the following few sentences:

Agriculture is an economic production of living things. Agriculture, therefore, has two important aspects. One is that it deals with life. . . . The other aspect of agriculture is that it is commercial. . . . The emphasis in agricultural education must, therefore, be placed on biology and economics.⁶

The rapid growth of agricultural economics and farm management since 1900 came as a result of this vision of modern agriculture.

The need for farm management research arose as farming became more commercialized and capitalistic. Experience and personal observation as tools to run a farm became inadequate and research facts and economic principles were needed to strengthen or replace experience. The years between 1890-1910 was a period of discerning and reconciling different points of view concerning the explanation and remedies of the farm problem. Two points of view regarding the remedies of the unprofitability of farming helped to direct attention to farm management. One view held that farmers should receive a

⁶Taylor, op. cit., p. 61.

price equal to the cost of production for their products. The second view was that farmers needed to become more efficient in their farm operations. This meant operating in a more business-like manner.

These two points of view became the stimuli for the pioneer farm management research, which followed three major lines or approaches: cost routes, model farms, and farm surveys. These early researchers were not trained in economics. Their training was in the physical and biological sciences, and this is reflected in their work. Inspiration rather than experience was their guide. Pioneers in farm management made advances which laid the foundations for later development in the field. Their main contribution was that they gave farm management scientific standing.

Farm Cost Analysis

Many studies of the cost of production of selected crop and livestock enterprises were initiated to determine the costs and cost variation between areas and between farmers in the same area. The original cost studies were carried out in North Dakota in 1893. Some of the first cost of production studies was done in the Minnesota Agriculture Experiment Station in 1902 under the general charge of Andrew Boss and Hays. These studies continued uninterrupted since 1902, with the exception of the war years 1918-1919. The aim was twofold. First to discover, by using bookkeeping records, mailed questionnaires, and data from experiment station plots, the exact contribution

of each enterprise to the overall profitability of the farm. Second, either to eliminate the unprofitable ones, or put them on a remunerative basis. Thus attention was given to the internal analysis of the farm business. Though the major aim of the cost analysis was to encourage more efficient technological production of the particular commodity, some emphasis was placed on the study of the farm as a whole and efforts were made to determine the profitability of different crop rotations. Andrew Boss believed that cost studies would contribute to an understanding of the economics of farm management. The objectives as he himself stated in 1945 were:

The effort was not made to find costs for costs' sake or with the expectation of determining an exact cost to be used in price making. Rather the objective was to secure basic data at first hand that would be used in determining which crops gave the greatest net profits when grown for the market and which crops could best be worked into farm crop rotations that, over a period of years, would yield the best returns to the farmer. . . . The whole enterprise was aimed at better farm organization, improved farm operations and the development of information that would be useful in teaching school and college classes in farm management and to build up literature on farm management.⁷

The reason for initiating cost studies at North Dakota and Minnesota is to be found in the problems which the farmers of these areas were facing. Prairie land was being brought into cultivation, diversified farming was possible as many crops could be grown, new settlers were adjusting to new conditions, and little was known about what crops or proportions of crops were best adapted to the region. It was only

⁷Andrew Boss, "Forty Years of Farm Cost Accounting," Journal of Farm Economics, XXVII (February, 1945), p. 10.

practical and logical to study the relative costs of growing different crops and the interrelationships between farm enterprises.

Model Farm Approach

Spillman was the first to emphasize the usefulness of model or successful farms as guides to improve farm management. The model farm approach tried to discover the interrelationships between different farm enterprises and operations but in the early years no attempt was made to use economic principles in solving production problems of the individual farm. Lack of financial records dictated reliance upon description of practices and systems rather than financial analysis of the farm.⁸

Model farms of this era were ahead of their time because there were no standards with which to compare them and for this reason farmers were not convinced of their superiority. Only during later years, when complete physical and financial data became available, model farms became a good extension medium for demonstrating better farm practices by showing the relative profitableness of the model farms with alternative systems of farming.

Farm Management Survey Approach

The term agricultural survey is used to designate a

⁸Harold Case and D. B. Williams, Fifty Years of Farm Management (Urbana, Ill.: University of Illinois Press, 1957), p. 19.

great variety of "look and see" methods of gathering facts essential to creating a picture of the agriculture in any given area. We can distinguish three main types of agricultural surveys. When the unit is a region and the material gathered describes the biological, physical and economic features of that region, the survey is referred to as regional. When the unit is a single farm and the facts presented are from specific farms the survey is called farm survey. These facts may relate to the biological, physical or economic characteristics of the farm. If the survey deals primarily with the economics of farm management, it is called farm management survey. In the latter the farmer is asked to give the facts about his business. This includes inventories at the beginning and at the end of the year, receipts and expenditures, crop areas and yields, livestock enterprises, etc. The facts tabulated relate to the organization and operation of the individual farm. Outside material is not included though it is realized that many activities on the farm are influenced by conditions exogenous to the farm.

The farm management survey method was developed at Cornell University by Thomas Hunt and George F. Warren. This method was an outgrowth of the cost route method. It attempts to analyze the farm as a unit rather than considering different enterprises separately. It developed at Cornell because the areas under study were old farm areas where types of farming were well established but earnings were low. It was logical to study earnings from the entire farm. A major

limitation of this method was that data obtained from a single visit were incomplete and inaccurate. It must be kept in mind that at that time few farmers kept farm records. Though inaccurate, the first surveys were able to point out extreme differences between farms by getting a quick picture of the entire farm business.

Thomas Hunt and George Warren

The names of Thomas Hunt and George Warren deserve some detailed coverage because of their great impact on agricultural economics in general.

Hunt was a pioneer in agricultural college experiment station work at the turn of the century. He was an all-round agriculturist who recognized the physical, the biological, and the economic aspects of farming. He was interested in soils, climate, plants, animals, farm management, and markets. He made a historical approach to all aspects of farming. This gave him a sense of the dynamic forces to which farmers have to adjust their activities. He saw agriculture in its geographic environment and emphasized the importance of the study of comparative agriculture as a background for identifying the rules of good husbandry, which must fit the circumstances. A change in circumstances--depleted soils, new and better technology, better varieties and breeds--may make necessary a readjustment in the farmer's operations. This mode of thinking was in contrast with the thinking of his contemporaries who, as a rule, failed to see the comprehensive picture of

agriculture and focused their attention upon soils, or livestock. Hunt also recognized that the quality of a man was a factor in the financial success of a farmer.

In his book, How to Choose A Farm, Hunt dealt with the physical and biological aspects of a farm more specifically than with the economic aspects but he emphasized the economic importance of the biological and physical aspects. He discussed the kind of farming as affected by the value of the farm, its fertility and physical properties of the soil, size of farm, its shape and topography, climate, water supply, location with respect to markets, buildings, fences, etc. He also recognized that farmers vary in respect to their abilities and that this affects their choice of farm. Hunt was a pioneer in considering the differences of individuals as a factor affecting choice making.⁹

By using both the historical and the comparative approach, Hunt tried to emphasize the dynamic character of agriculture. By demonstrating the unique biological and economic aspects of each farm, he introduced the study of the individual farm. In 1906 he undertook a general study of agricultural conditions in a part of Tompkins County, New York. The central feature was the application of his method of case studies to all farms of the area.¹⁰

⁹Thomas Hunt, How to Choose A Farm (New York: The MacMillan Co., 1906).

¹⁰Taylor, op. cit., p. 357.

George Warren took over when Hunt went to Pennsylvania State College to become Dean of the School of Agriculture and Director of the Pennsylvania Agriculture Experiment Station in 1907. Warren developed the survey method with the calculation of labor income as a unique feature first conceived by Hunt. But he dropped the budgeting idea and emphasized averages in an effort to determine the most profitable type of farming for the area studied. He simplified his problem by not considering differences in the efficiency and capacity of farmers themselves and by assuming that what one man can do another can do. As a result of these changes Warren's studies were entirely different from what Hunt had done. Hunt's view of a dynamic and individualistic agriculture was lost for the time being, to be rediscovered and used many years later. His case study partook of the character of what, in later years, was to be called farm budgeting.¹¹

¹¹Ibid., p. 358.

CHAPTER III

THE PERIOD FROM 1910 TO THE END OF WORLD WAR I

Recognition of Farm Management as an Applied Science

The year 1910 is an important landmark for the development of farm management. On July 27, 1910 the American Farm Management Association was formed at Iowa State College. This was the first step towards the recognition of farm management as an applied science and an attempt to harmonize points of view into an orderly program and define the field. Farm management was defined as the applied science which deals with the rural problem from the individual or private point of view. It differs from agricultural economics or rural economy and from rural sociology in that these subjects view the rural problem from the national point of view.¹ By 1910 the administrators in the United States Department of Agriculture and the Land-Grant colleges accepted responsibilities in the field of farm management and acknowledged it as an applied agricultural science. Once this was done its development and

¹American Farm Management Association, Report to the First Annual Meeting (Ames, Iowa: American Farm Management Association, 1910), p. 4.

expansion was rapid. Many Land-Grant colleges established courses in rural economy or farm management in an attempt to incorporate the separate contributions of research workers in many fields into a body of knowledge and principles applicable to the organization and operation of the farm as a whole rather than to a single enterprise.²

The second decade of the century, a decade during which agriculture experienced a period of rising prices and a better economic position, was one of consolidation and broadening of the field. Expansion of the survey method, wide introduction and use of farm account books, continuation of cost studies, linking of extension work with farm management, and reorganization of the American Farm Management Association, are the most important highlights of the period.

Survey Method

During the first half of the decade the survey method expanded, mainly due to the influence of Warren, and replaced the emphasis on model farms. Warren set out three rules of farm management surveys which are still applicable today: (1) classification of farms should be done by cause and not by effect; thus labor income should not be used as a guide for classification; rather the farms should be sorted on the basis of causal factors, such as soil fertility, so that the influence of that factor can be studied; (2) invisible variables

²Case and Williams, op. cit., pp. 111-116.

should be sought and their effect considered; and (3) data should be published in physical quantities so as to be applicable when prices change.

In discussing the methods of doing agricultural survey work Warren said:

Perhaps the first object of a survey is to find out the normal conditions. After this information is obtained it is possible to study the more successful and less successful with intelligence. The striking unusual has too often been accepted as a model. Bulletins have been written describing in detail the methods used on some peculiar farm, under the impression that it was doing much better than the normal, less spectacular enterprise. Survey methods often show that such farms or practices are really not successful. . . . Some facts can be determined only by studying farms. There are many kinds of agricultural information that can be determined only by survey methods, because the facts exist on the farm and nowhere else. The cost of production of a crop may be determined for a college farm, but this tells very little about the cost on regular farms.³

In discussing the factors contributing to the success as a farmer, and the usefulness of surveys Warren stated:

It is frequently stated that success depends on the man. To some this seems a full and satisfactory explanation. But it explains nothing. It merely dodges the question. Success comes from doing certain things. The farmer does not sell himself. He sells milk, potatoes, hay, apples. It is such things as cost of production, amount sold, and price that determine his profits. The only way that a good farmer can express himself is by doing certain things. These things are fairly easy of analysis. If one farmer sprays his apples and another does not, it is the arsenic that kills the worms. Any other person can duplicate the result by spraying in the same way. . . . Certainly some persons will succeed where others will fail because they do things differently.⁴

³George Warren, Agricultural Surveys (Ithaca: Cornell Agriculture Experiment Station, 1914), pp. 420-422.

⁴George Warren, Some Important Factors of Success in General Farming and in Dairy Farming (Ithaca: Agriculture Experiment Station, 1914), p. 659.

What Warren failed to realize and to analyze was the factors that determine what people do, and why people do things differently. This would involve analysis of the manager as a decision-making person.

The intensive statistical type of farm management survey was useful as a means of supplementing the available census material. It provided more detailed information needed in studying types of farming and in comparing the profits of individual farmers. It was also useful in these pioneer days of farm management as it provided county agents and farm management demonstrators with a quick way of getting acquainted with the economics of agriculture of a particular area. Published information was based on averages and had limited usefulness in the solution of problems of individual farmers.

The evolution of the specialized type of survey was a result of the need for more specific studies. The earlier general, descriptive survey gave way to a more narrow survey, directed to particular problems. Many research workers who were using the survey method were compelled to narrow the range of problems included in a single survey study. Another new development came from the many responsibilities of farm management towards extension. Many farm management workers modified the method so the data obtained could be used in farm demonstrations.⁵

Farm surveys required but failed to secure accurate

⁵Case and Williams, op. cit., p. 83.

farm records. The development of farm account books grew out of the need for securing dependable data from farms. By 1915 the emphasis was shifting from surveys to accounting records as many farmers were reluctant to accept recommendations based on survey records which depended on averages of large numbers of farms. As a result many research workers placed their faith in record books rather than in the well established survey method. This critical attitude toward the survey method paved the way for the work of Taylor, who was to lead in the establishment of a general program of agricultural economics in the United States Department of Agriculture during the 1920's.

Cost Studies

Cost studies at Minnesota and other research establishments continued with some change in emphasis with respect to the subject matter and methodology. In some cases attention was shifted from studies of the farm as a whole to studies of enterprises. Methodology, too, evolved. In the initial years of farm cost studies, emphasis was directed toward determining costs in money values. The thought was that money values would serve as a common denominator in making comparisons of costs, financial returns and profits from various crops and classes of livestock. Experience gained from analysis of the data recorded indicated that this measure in itself was not entirely satisfactory. Fluctuations of prices, variations in seasonal climatic conditions etc., complicated the results and made interpretation difficult and unsatisfactory. In the

search for satisfactory measures of costs emphasis was turned toward determining physical factors of costs entering into the production of farm commodities.⁶

A stimulus for cost studies was provided by the decrease in prices of farm products and the demands by farmers that the government should do something about it so prices could be fixed at a level at least equal to the cost of production. The limited usefulness of the cost of production studies as a basis for fixing prices was realized as it was impossible to determine a true cost of producing a certain commodity because of variations in the seasonal conditions, regional differences, and variations in the methods of operation.

The growing political interest in agricultural cost studies pointed toward prices rather than farm efficiency. Efficiency was not overlooked altogether as both prices and efficiency could be attained to a great extent by the same effort. The peak of cost accounting was reached during the years of 1919-1923.⁷

The price fixing experiments of the war period threw some light on the question of the relation of cost of production and price and difficulties in determining true costs. Some economists looked upon costs as if they were a definite uniform thing on all farms producing the same commodity.

⁶Boss, op. cit., p. 13.

⁷Ibid., p. 10.

Others accepted F. A. Walker's theory of differences in efficiency of managers as a cause of variability in costs and profits. The figures gathered supported this theory. To some this result led to confusion of thought, but to those who were thinking in terms marginal costs as the price determinant, variations in costs were what was expected. By marginal cost was meant the production cost of the least efficient or marginal producer who was needed to supply the market.⁸ It became obvious that if prices were fixed upon the basis of cost to those who were producing at the greatest cost, the price would be too high and overproduction would result. Hence, the marginal cost could not be used as a basis of price fixing. The average cost was considered and found wanting. If average cost were used as the criterion it would not stimulate production because it would leave too large a percentage of the producers in the losing side.

Finally the 'bulk line' theory was used by the price fixing experts in Washington during World War I. This was really a cut-and-dry method of fixing the price at a point which would stimulate adequate production. As such it had merit, but it took on such definite statistical form in some cases as to obscure the fact that the 'bulk line' theory could only point out, in a general way, that in fixing prices the price does not have to equal the cost to those producers

⁸This definition of marginal cost is different from the present day definition, e. g., the cost of the marginal unit of production.

who produce at highest cost. Long before that point is reached the stimulus to the more efficient producers is adequate to bring forth the needed supply.⁹

Joint costs, common in agriculture, were even more confusing than variable costs and it was more difficult to apply the 'bulk line' theory where several commodities were produced under the same management with many costs in common. These difficulties made the task of price fixing arbitrary and in many cases production did not behave as the government officials expected.

Reorganization of the American Farm Management Association

The reorganization, in 1919 of the American Farm Management Association, by its merging with the American Association of Agricultural Economists, into the American Farm Economics Association broadened the scope and interests of farm management to include the ideals and goals previously defined and held by agricultural economists. The objectives of the American Association of Agricultural Economists, as stated in their first conference in 1906, were:

1. To unite the interests of agricultural economists.
2. To promote the study of various phases of agriculture economics; to encourage research and the discussion of problem and subjects pertaining to the theory or practical application of the principles of agriculture economics.

⁹Taylor, op. cit., p. 498.

3. To disseminate information relating to the subject of agriculture economics.
4. To collect and disseminate information concerning agrarian legislation; and to analyze, digest and classify agricultural laws in their economic application.¹⁰

It can be seen from the above that the interests of agricultural economists were of a much broader nature than those of farm management, and were particularly concerned with problems of agricultural policy. The merging of the two associations widened the scope of farm management and also marked the public recognition in the United States of the close relationship between theoretical economics and practical farm management.

The reason for making the change in the name of the American Farm Management Association was that:

. . . the work which the Association is doing has gradually expanded until it includes a very great deal more than farm management; also that the men who are now associated with the organization have included in their work a very great deal more than they originally contemplated . . . (such as) . . . work in the field of price fixing, which is a subject beyond any limit properly given to the name of farm management.¹¹

The merging of the two associations indicates recognition of their mutual dependence on similar ideas and their dedication to a common objective; the betterment of the farmer's economic and social status. It also indicates that the suggestion of earlier economists that the tools of economics--

¹⁰Case and Williams, op. cit., p. 142.

¹¹Ibid., p. 143.

and of social sciences in general--can be used for the solution of the practical problems of farm management, was well received by those working in the field of farm management. The merger increased the number and quality of the tools available for the solution of farm problems. This was reflected in the phenomenal advancement of farm management during the 1920's and later years.

CHAPTER IV

THE DECADE OF 1920-1930

Rapid Growth of Farm Management

The years between World War I and the depression of the thirties were significant for the growth of farm management. The close of the war gave an opportunity to reappraise farm management research and teaching, which had been curtailed during the war. Re-evaluation was needed to determine the best way in which to allocate research funds, re-establish extension projects, and determine what types of research contribute most to a farm management teaching program, in the light of new developments in agriculture.

The climate of this period was favorable to a rapid growth of agricultural economics and farm management. The Furnell Act of 1925 provided funds for research and extension in farm management. The period was marked by freedom from urgent and immediate responsibilities imposed by war or by the economic depression of the thirties. Yet enough changes occurred to create and direct new developments. The problems of the 1920's were those which accompanied turbulent price fluctuations and growth of public pressures channeled through farm organizations.

A list of the types of studies will indicate the

prolificacy and originality of the period. These include studies on the demand for agricultural products, prices and price trends, welfare and the income of farmers, marketing, outlook reports, supply response to price changes, cost of production, input-output, and, finally, factors determining the farmer's choice of enterprises.

Important concepts in relation to farm management had their origin in this period: budgeting, risk and uncertainty, historical and geographical approaches, and correlation analysis were all products of this era. Although not fully developed in some instances, they all pointed toward the eventual establishment of farm management as a science. In short the scope of farm management expanded and the material content and methodology was improved.

The goal of farm management research and extension during this decade was to give the individual farmer the tools and the information required for making the necessary adjustments to meet the changing conditions, especially prices, of his environment. Research became more purposeful and problem solving oriented. Emphasis shifted from fact gathering to the resolution of specific farm problems.¹

Violent price changes made it necessary for farm management researchers to consider the importance of any expected changes in costs and prices. The development of studies of farm costs, marketing, and price changes reflect this.

¹Ibid., pp. 200-201.

Cost Studies

Cost studies reached their zenith in this decade and since that time there has been no great change in the methods of cost analysis used and the interpretation of the results. More attention was given to the relative merits of the cost route, account books, and survey methods of collecting cost data. Attention was devoted to determining the relative usefulness of different types of studies to the solution of definite problems and to suitable methods of data analysis and interpretation. This was in contrast with previous cost studies which had centered on the general state of affairs.² Work directed toward the determining cost of production was, and still is, of sufficient importance to warrant detailed examination of the studies done so a better understanding of the meaning, the implications, and limitations of cost of production studies be obtained.

By 1907 rising prices of farm products began to alarm urban dwellers. This led to a new pressure, this time by consumers, on the agricultural experiment stations and on the United States Department of Agriculture to study cost of production in order to discover cheaper methods of production. Cost of production estimates were wanted to provide an upper limit to prices rather than as a basis of price guarantees to farm producers. Producers wished prices to be independent of previous costs. War time inflation was followed by a collapse

²Ibid., p. 175.

of prices. This changed the attitude of producers who now demanded minimum guaranteed prices in order to avoid losses.³

As experience with cost of production studies increased, monetary costs were found disappointing in many respects. Cost in terms of requirements of labor, land feed, capital, etc., were found useful in planning the operation of the individual farm as well as in examining the variations in efficiency on different farms.

Methods of obtaining the basic data for cost of production estimates were grouped under three general headings: (1) the method of estimation; (2) the survey method; and (3) the detailed accounting method.⁴

The method of estimation used secondary data already gathered by someone else, or general information. On the basis of these the final cost figures were obtained. The disadvantage of this method was that the data used were rough. This method was used widely in the early years of the present century before accurate and detailed farm records became common.

In the survey method data were secured from questionnaires. The questions asked in the survey either covered the entire farm or were restricted to a single enterprise. The use of the questionnaire instead of an actual record assumed the dependability of farmer's memory. At least it assumed

³John Hopkins and P. Taylor, Cost of Production in Agriculture (Ames, Iowa: Iowa State College of Agriculture, 1935), pp. 390-393.

⁴Ibid., pp. 397-399.

that errors would be balanced out. This was not always true. It was generally admitted that wide errors were common in the information given by farmers.

The advantage of this method was that it was less expensive than detailed records and that it permitted information to be obtained from a greater number and variety of farms with the same amount of funds. It also had the advantage of permitting the data to be gathered in considerable less time, where results were wanted urgently.

The detailed records method of gathering cost information was the most dependable method. The detailed accounts were kept, usually, by the farmer himself but under the supervision of a field man. The use of elaborate set of labor record, feed records, etc., was necessary in order to be able to distribute expenses to individual products of practices.

Cost was a major disadvantage of this method. About twenty-five farms were generally considered as many as a field man could handle. Extensive supervision was necessary in order to secure dependable data. Another drawback was that the men who were interested in keeping records were better than the average farmer.

But accurate information was not adequate in securing valid cost figures. The first difficulty arose from the difficulty in distinguishing necessary cost elements. The only indisputable test was to raise the question whether production of a commodity ceased or was notably reduced when the charge in question was not paid. Hired labor and interest on capital

met this test and could be considered as necessary costs. But when management was considered the case was not so clear because management was considered as the combination of several different factions: manual labor, supervision work, decision-making, risk bearing, etc. The difficulty increased because one farm manager differed from his neighbors in the success with which he performed his services and thus no standard rate of remuneration could be determined. With land the difficulty arose from the fact that the value of land depended on the value of what it produces. Rent also was not fixed but was determined by the price of produce rather than price by rent. After deciding what was to be counted as an element of cost another problem arose: just what rate of valuation ought to be placed on it?

Where the cost element was recently bought outright on the market there was little room for argument, when the purchased item was used for a specific enterprise. Often, however, the cost element was used jointly. Various methods of computation had been used in an effort to minimize this difficulty. The most common method was to distribute costs on the basis of relative market price of the products. This method was, of course, arbitrary and had no foundation in reason.

A second problem of valuation of cost elements arose when no actual outlay occurred. The answer to the question at what rate cost elements of this type were to be valued remained arbitrary, too. Examples of this situation were the farmer's own labor, use of capital owned by the farmer, etc.

Allocation of joint and fixed farm costs--common in agriculture--to specific products presented another problem. This was difficult whenever more than one product was produced on the farm. Many methods were used in allocating these costs. All of them were arbitrary and as a result allocation of joint and fixed cost was entirely arbitrary and hence unsatisfactory. The costs of livestock products were particularly susceptible to inaccuracy on account of problems of allocation.

We now turn to the consideration of the uses of cost of production figures. Cost of production figures were put into many uses. The five most prominent are: (1) as a basis for price guarantees; (2) as a basis for tariff rates; (3) in railway rate hearings; (4) as a means of rising the interest of farmers; and (5) as farm efficiency factors.

The least questionable use of cost per unit of product seemed to be for the purpose of improving efficiency in production. Cost figures in this case were used as efficiency factors or measures. Such use was limited to groups of farms operating under essentially similar conditions during the same year. In fact they were seldom used in this manner because of the expense involved in their collection.

Cost of production figures were discredited as a basis for price fixing and for tariff determination. The problem of what price to guarantee was not solved satisfactorily. The problem of stabilizing the price at the artificial level was not given a promising answer. The question can also be raised why the level of costs previously incurred should be used as

the basis for artificial price control. Furthermore the question of whose costs the price should approximate can be asked. Finally researchers faced the difficulty that the data were not, in most cases, accurate enough to be used as the basis for price fixing.

Cost figures were used in various public hearings but figures which were more readily understandable and not open to challenge were ordinarily preferable as well as more pertinent.⁵

John A. Hopkins and P. Taylor were of the belief that the farmer could find his interest served better by careful budgeting of planning for the future than by any estimation of his past costs. Budgeting has the advantage of being applicable to the farm as a whole and shows each enterprise in its proper relationship to the rest of the farm business.⁶

This does not mean that cost data were of no use. For more modest purposes they can be valuable. They provided a fund of information not otherwise accessible on past changes in the conditions of agricultural production. They seemed capable of throwing some light on the theory of cost-and-price relationships. When expressed in physical terms they provided useful information to farmers in the form of standards of efficiency for conducting specific operations in restricted localities. They also provided the means of a

⁵John Hopkins and P. Taylor, op. cit.

⁶Ibid., p. 388.

thorough understanding of the problem of low prices and contributed in its solution by indicating the required adjustments. The degree of their utility depended upon the circumstances. One thing is certain. Their utility in the future will be less than that assumed by their advocates in the past.

Price Studies

Study of marketing aspects of farming reflects the concern with price adjustments at the time. Public opinion demanded that more efficient methods of marketing be devised. It was believed that distribution costs of some farm products were unreasonably high, and as a result lower prices were received by the farmer. At that time many economists were of the opinion that price stabilization could be achieved only through cooperative action, and cooperative marketing studies were done in order to determine the best methods of marketing agricultural produce. Products such as eggs, milk, cheese, grains, and livestock were under consideration.⁷

The desirability of being able to anticipate future prices stimulated price studies. Statistical methods were used to determine factors affecting supply of and demand for agricultural commodities. Studies of demand came into their own during this period. Analysis of supply response was considered to be relevant to adjustment problems and studies tried to determine the variations in producer responses to price

⁷Taylor, *op. cit.*, pp. 641-700.

changes in different parts of the country.⁸ Price analyses studies provided the foundation on which outlook reports developed.

Outlook Reports

Outlook reports providing anticipated changes in costs and price were needed for farm planning and budgeting. Farmers had been forced to base their plans on their own price expectations with little market information and efforts were made to supply them with more and better information about the future, so they could increase the accuracy of their forecasts. Price trends of individual farm products were given in the form of price indexes. Farm price indexes were compared with wholesale price indexes in an effort to provide a picture of agricultural welfare as affected by the price level and to compare, by combining historical and geographical data, farmers' welfare with that of nonfarmers. The use of index numbers to measure agricultural welfare pointed the way to more detailed analyses which in later years matured into the concept of parity prices for agriculture. Many research workers felt that the outlook information was more useful to the farmer who was facing price problems than cost of production studies.⁹

Outlook data were used by extension personnel to

⁸Harold Case and D. B. Williams, op. cit., pp. 150-151.

⁹Jesse W. Tapp, "Research Problems in Providing Continuous Economic Information to Farmers," Journal of Farm Economics, XI (January, 1929), p. 95.

suggest probable economic trends and recommend means by which the individual farmer could best adapt his farming operations to the expected conditions. During the early years outlook reports served primarily as a guide for farmers but later they also were used as a guide to national policy formation and as the basis for several price support programs.

Outlook reports were an anticipation of the introduction into farm management of the concepts of risk and uncertainty, which came to the forefront of economic analysis several years later, though the first publication on these two concepts was in 1921 with Frank Knight's book titled, "Risk, Uncertainty and Profit."¹⁰ The main contribution of this book was the distinction between risk and uncertainty in the discussion of the functions of the entrepreneur in a world of uncertainty:

. . . . It will appear that a measurable uncertainty, or "risk" proper as we shall use the term, is so far different from an unmeasurable one that it is not in effect an uncertainty at all. We shall accordingly restrict the term uncertainty to cases of non-qualitative type.¹¹

Discussing the function of the entrepreneur and his reward Knight said:

With uncertainty absent, man's energies are devoted altogether to doing things; it is doubtful whether intelligence itself would exist in such a situation. In a world so build that perfect knowledge was theoretically

¹⁰ Frank Knight, Risk, Uncertainty, and Profit (Boston: Houghton Mifflin Co., 1921).

¹¹ Ibid., p. 20.

possible, it seems likely that all organic adjustments would become mechanical, all organisms automata. . . . The produce of society is . . . divided into two kinds of income, and two only; contractual income which is essentially rent, as economic theory has described income, and residual income or profit. But the differentiation . . . is never complete; neither variety is ever met with a pure form, and every real income contains elements of both rent and profit.¹²

The implications of these concepts on farm management were of extreme significance.

Budgeting

Numerous commodity studies were made in which both production and demand received attention. These studies were designed to determine whether the supply could be increased with profit, or whether it should be decreased in the interest of higher prices. These studies, when combined with farm organization studies based on cost accounts, provided the basis for looking ahead and planning future enterprise combinations, to maximize profit in the light of anticipated prices and costs. These calculations of expected costs, returns, and profits came to be called budgeting. Thus budgeting rests on two pillars: cost estimation and price forecasting. Cost estimating in this sense--estimation of expected costs--needs to be carefully differentiated from enterprise and cost of production studies.

By using the budgeting technique farm management research workers were able to by-pass the difficulties of

¹²Ibid., pp. 268-271.

allocating fixed and joint costs among enterprises and products. In budgeting the problem of cost allocation does not exist. To arrive at the optimum farm plan there is no need to allocate costs to individual products or enterprises. In complete budgeting total costs for alternative farm plans need be calculated. In partial budgeting only changes in total costs need be considered. These changes are usually changes in variable costs. Changes in total fixed costs can also be taken into consideration. By overcoming the cost allocation problems budgeting became a more useful research tool than the cost of production studies.

In later years budgeting was to become a widely used tool in farm management research. Generally four steps are followed in developing a budget: (1) the systems to be budgeted are selected; (2) the technical coefficients of production are specified; (3) the prices of factors and products are specified; and (4) the costs and returns are calculated.

The possible applications of budgeting include the wide range of activities where purposeful actions by farmers and public administrators require an assessment of the consequences of certain changes. In the private areas, for example, selection of a cropping or livestock system may utilize the budgeting technique. The technique may also be useful in gaining insight into problems of public policy. Some insight of the consequences of a given public action can be gained by employing the budgeting technique.

One of the limitations of budgeting has been the

inability to draw inferences from the budget for a particular farm to farms having resources that differ from those of the budget model. While much can be borrowed from one budget there are certain differences in resources and organization that must be adequately accounted for if the end result is to be reliable. If the production data used are based directly on experimental data, the applicability is, usually, confined to farms: (1) having soils similar to that of the experimental plots; (2) having similar weather conditions; and (3) following similar cultural practices. Standard budgets have been used effectively in areas where resources and conditions effecting production are fairly homogeneous.

Budgeting usually fails to consider the role of risk and uncertainty in arriving at the optimum solution. Such budgets can be modified to deal with multiple value expectations, e. g., coefficients could be given a range of values and the results given accordingly. Accurate specification of the technical coefficients under different farming conditions and practices represents a major difficulty. Farm management researchers have to constantly estimate productivity coefficients because changes in technology change the productivity of resources.

Farm Welfare Studies

Measurement of farmers' income as the basis of welfare comparison received considerable thought as farmers were demanding a fair share of the national income. This interest

in income started discussions on the usefulness and limitations of different methods of income measurement, such as "labor income" and "rate earned on investment." Myers pointed out that no one farm income measure could serve all instances. Labor income ignored the debt status of the farmer and did not accurately measure the comparable incomes of farmers and city workers, for it included no allowance for farm benefits, such as value of the home and the value of farm produce used by the farm family. However, labor income might be a satisfactory measure of the farmer's business success and useful in determining the principles affecting farm returns as it included a return for the managerial skill of the operator, as well as for his manual labor. The usefulness of the "rate of return on investment" as a measure of farm income depended on the relative importance of capital used on the farm. Myers believed that the annual use of capital is less important to the farmer than the return for his labor and for that of his family.¹³

Studies of the principal factors determining the farmer's choice of enterprise and analysis of farm account books over a series of years resulted in the establishment of farm management principles supported by data. These principles, which guided farm management extension, were summarized by Case and Wilcox:

¹³William Myers, "Farm Business Analysis," Journal of Farm Economics VIII (January, 1926), p. 80.

The most important of these principles as they apply to Illinois may be stated as follows:

1. Good yields tend to reduce the unit cost of producing crops.
2. A large percentage of land in the higher profit crops means larger profits.
3. Livestock production as a means of marketing crops makes for larger farm income.
4. Efficient feeding and handling of livestock materially reduces costs of production.
5. A large volume of business is necessary for profitable farming.
6. A well organized system of crop and livestock production helps use available man labor advantageously.
7. Costs are reduced when the supply of horse and mechanical power fits the farm needs and is economically handled.
8. Buildings, machinery, and other equipment expense must be kept under control if low production costs are to be obtained.
9. A good farm layout and a well-developed farmstead make for economical operation.
10. Diversity of crop production helps to insure long-time profits.
11. Production planned in accordance with market demands makes for a larger margin of profit.¹⁴

Input-Output Studies

Another important development of this decade was the input-output study. This was an application of the statistical method of analysis to the enterprise type of study. The

¹⁴ Harold Case, R. H. Wilcox, and H. A. Berg. Organizing the Corn-Belt Farm for Profitable Production, (Illinois: Illinois Agricultural Experiment Station, 1929), p. 262.

analysis was based on the assumption that the success of farm operations was dependent both on the proper combination of enterprises and on the performance of each of the major enterprises. Individual enterprises were studied and variations in output were expressed in relationship to changes in input. The technique consisted of a detailed analysis of variations in inputs, methods and practices, and the effect of these variations upon output. Least cost combination of inputs was estimated by combining physical data with prices.¹⁵ The multiple correlation method was used to differentiate and quantify the many influences which affected yields. These studies provided a more accurate measure of the effects of variations in input than had previously been available.

The need for a more definite expression of the relationships between enterprises was met by the development of the substitution method by John D. Black. He pointed out that enterprises may be supplementary, complementary, or competitive and that the nature of their relationship affects the choice and the size of enterprises. He also emphasized that the method of substitution was superior to the accounting cost method as a basis for choosing enterprises and the determining the proportions in which to combine them. This new method consisted in estimating in advance the effect on the total net

¹⁵H. R. Tolley, J. D. Black, and M. J. Ezekiel, Input as Related to Output in Farm Organization and Cost of Production, U. S. Dept. of Agriculture, Bulletin No. 1277 (Washington: U. S. Government Printing Office, 1924), p. 2.

income of the business of substituting possible new combinations of enterprises for the present combinations.¹⁶ As such it was in fact, partial budgeting. This technique was to be perfected and widely used in later years.

¹⁶John D. Black, Introduction to Production Economics (New York: Henry Holt & Co., 1926), p. 236.

CHAPTER V

DEPRESSION YEARS

Broadening the Scope of Farm Management

By 1930 the main framework of the science of farm management had been more or less constructed. The cost route, enterprise cost studies, farm account books, and survey methods were all well established and their limitations and usefulness well understood. The value of outlook information had been recognized, though more work was needed in the interpretation of the effects of uncertainty on the individual farm. Methodological issues had been discussed and applications of economic theories to farm management had been made. During the years of 1930-1940 farm management research workers used mainly the already available methods in their efforts to estimate the impact on farms of the economic and political events, and attempted to solve the new farm management problems created by these changes. This is not meant to imply that there was no constructive work being done during this decade.

A brief examination of the social, economic and political conditions of the thirties would help provide a better appreciation of the forces which made farm management assume

a new role. The world-wide depression of the early thirties led to the adoption of nationalistic trading policies by most countries. These measures caused erratic changes in world trade. United States farmers lost their foreign markets. The dramatic decrease in agricultural exports is clearly indicated by Table 1. Statistics show clearly that the grain and dairy products industries, which had expanded during the war years, were most severely affected by the decrease of foreign purchasing power.

The depression was not confined to agriculture. It spread through the entire economy to such an extent that the whole social and political philosophy of the United States changed. There arose a concept of government intervention and positive government planning. Faith in the price mechanism as an adjustment device was weakened in favor of state planning. Welfare became the topic of many discussions in political circles and among economists. R. W. Souter challenged Lionel Robbins' positive economics: that economics must take ends as given and be neutral among ends.¹ Souter maintained that economics must try to measure interpersonal satisfaction in order to formulate policies. He realized that the problem of distribution be solved only if economists were aided by philosophers,

¹Lionel Robbins, An Essay on the Nature and Significance of Economic Science (London: MacMillan Co., 1937), Chapter II.

TABLE 1

INDEX NUMBERS OF QUANTITIES OF PRINCIPAL AGRICULTURAL EXPORTS, UNITED STATES, 1921-22 TO 1934-35
(1909-10 TO 1913-14 = 100)

Year Beginning July	Forty-four Commodities	Cotton Fibre	Grain and Grain Products	Cattle and Meat Products	Dairy Products
1921-22	137	76	317	153	571
1922-23	112	59	246	169	406
1923-24	104	67	143	179	451
1924-25	126	95	225	140	396
1925-26	106	93	117	114	327
1926-27	136	131	188	98	288
1927-28	112	92	188	98	263
1928-29	117	99	174	102	243
1929-30	97	82	130	104	221
1930-31	90	81	104	74	190
1931-32	98	103	104	63	123
1932-33	85	100	42	63	74
1933-34	83	97	34	65	72
1934-35	54	60	21	36	82

Source: Table 424, Agricultural Statistics, Washington, USDA, 1936.

political scientists, and sociologists.² This intellectual synthesis is necessary for the solution of the welfare or

²R. W. Souter, "The Nature and Significance of Economic Science," Quarterly Journal of Economics, XXXVII (May, 1933).

normative problems of economics. Economists working alone in isolation cannot provide the answer. He sees economic philosophy as the last hope of economics: "The Mecca of economists may lie in economic biology rather than in economic dynamics. But it lies in economic philosophy rather than economic biology."³

The new ideas matured and found practical expression in the New Deal. Farm management of this era became involved with the new social and political philosophy of the New Deal, as this altered the environment within which the farmer had to operate. Production controls, new credit facilities, price supports and subsidies, were some of the new elements of the farmer's economic environment.

Widespread unemployment coupled with immobile labor created new problems in interpreting labor costs on farms. Many economists recognized that resource distribution and mobility were fundamental factors in national welfare. Farm management problems could no longer be confined to individual farm profits. Thus farm management assumed a new role in interpreting factors which influence resource allocation between agriculture and the other sectors of the economy, as well as between different agricultural industries and regions.

More than any previous time the emphasis was on welfare of farmers and the application of farm management principles to

³Ibid., p. 413.

problems of change and adjustment programs. Taylor declared that the business of farm economics was to help the farmer get better prices in order to assure him a fair share of the national income, for him this was the issue to which farm economists should give major attention.⁴

In the light of these developments farm management gained new importance in the interpretation of the individual farmer's role in the nationwide planning program. The scope of farm management as a science was vastly broadened. This can be seen from the definition of farm management by the Committee of Terms in farm management of the American Farm Economic Association:

Farm management is the science of the organization and operation of farms. It considers the effectiveness of different sizes of operating units and of combinations of productive resources, enterprises, and practices for operating units; programs of adjustment of agricultural areas; and the impact of public policies and programs on economic activities on farms.⁵

In a bulletin published by the Advisory Committee on Social and Economic Research some observations and recommendations were made regarding farm management research methodology. It was pointed out that many of the past studies were general purpose studies. These yielded results of broad implications only. Many pertinent general aspects of the farm were examined

⁴Henry Taylor, "The New Farm Economics," Journal of Farm Economics, XXXIII (January, 1938).

⁵H. M. Dixon (Chairman), "Report of the Committee on Definition of Terms in Farm Management," Journal of Farm Economics, XXIII (February, 1941), p. 372.

superficially. The need for more detailed or analytical studies was recognized in order to give the best results. The case study was considered to be more appropriate than the statistical.⁶

The Committee also noticed that the statement of the objectives of many studies was inadequate. It was suggested that more attention be given to the statement of the objectives of a study. This attitude represented an advancement in farm management research, though the need for a working hypothesis--a corollary--as a basis for fact collection and analysis was not emphasized.

Lastly, the Committee preferred the analytical as distinguished from the empirical type of project. The emphasis was on tracing relationships back to their antecedent probabilities, rather than merely determining associations which tend to occur together. This was a reflection of the economic influence which led to emphasize the usefulness of deductive methods in economic analysis.

Influence of Economics, Mathematics and Logic on Farm Management Research

The preoccupation of farm management workers with the immediate and urgent problems of adjustment did not prevent the continuance of some of the more fundamental studies of farm management research. Farm management research was thought of

⁶Ibid., p. 26.

as a continuous rather than as an intermittent or sporadic process. The boundaries of farm management expanded and merged with those of other phases of agricultural economics. Methodological discussions were centered upon the interpretation of the data rather than upon methods of collection.

Farm management research workers were assisted in their efforts of interpreting the activities of individual farms by the new analytical tools, concepts, and theories developed by economists. The most important of these were the increased discussion of the problem of monopolistic competition, the economics of the firm under conditions of uncertainty, and the new science of econometrics, which merged the attitudes and analytical techniques of the economist and the mathematician.

The theory of monopolistic competition presented by Champerlin⁷ found application in marketing studies. Product differentiation and agreement between sellers were considered when analyzing differences in prices between different farms or regions. The degree of monopolistic element in factor markets was studied as this affected the adoption of new farming methods.

The influence of mathematics on farm management was twofold. Firstly, mathematical logic was incorporated in the work of the economist, and secondly, it provided useful tools and concepts to aid the analysis of economic problems. In

⁷Edward Champerlin, The Theory of Monopolistic Competition, (Cambridge: Harvard University Press, 1932).

particular it stressed the importance of identification and explicit recording of the assumptions on which the economic conclusions were based. It also directed attention to the importance of logical methods when models are formulated and used to guide empirical research. Model formulation became the backbone of farm management research.

Koopmans, an economic theorist, in discussing the contribution of mathematics to economics and the nature of economic theory, pointed out that the mathematical approach has been of little practical utility and that further progress in economics will require more powerful logical tools. He favored the use of elaborate analytical tools and he looked upon economic theory as a sequence of conceptual models that seek to express in simplified form different aspects of an always more complicated reality. Each model is defined by a set of postulates of which the implications are developed to the extent considered worthwhile, in relation to the aspects of reality expressed by the postulates.⁸ He favored the explicit postulational approach of economic theory as this increases the communication among sciences, is efficient, and clear. Specialists in fields outside economics--such as mathematicians, logicians and philosophers--will readily contribute to economics if they are enabled to examine the reasoning on which economics rests in isolation from facts, circumstances, and

⁸Tjalling Koopmans, Three Essays on the State of Economic Science (New York: McGraw-Hill, 1957), p. 142.

interpretations, which the economist must have in mind when appraising the value to him of these pieces of reasoning. As a result cross fertilization among sciences would take place.⁹ This new way of thinking in economics was diffused into the work of agricultural economics and farm management.

During the thirties economic theorists continued their efforts to build a theory of dynamic economics. Great controversy arose in economic circles on the possibility of constructing a truly dynamic economic theory. Northrop argued that no scientific theory of economic dynamics exists.¹⁰ A true theory of dynamics exists for a given science when its concepts are sufficient to designate the specific state of a system at a given time, and its postulates permit the deduction of a specific state for any future time.¹¹

Northrop considered Robbins' concept of dynamics, based on the postulate that there is uncertainty of future scarcities, inadequate. To be able to construct a truly dynamic theory generic as well as specific properties are needed. The science of economics meets the requirement for generic properties as it makes use of the fact that each individual has wants and that these order themselves. But economics fails to meet the second requirement, e. g., to be able to connect the

⁹Ibid., pp. 144-146.

¹⁰Filmer Northrop, "The Impossibility of a Theoretical Science of Economic Dynamics," Quarterly Journal of Economics, LVI (November, 1941), pp. 1-17.

¹¹Ibid., p. 1.

specific state of a system at one time to a unique state at any other time. Economic dynamic theory fails to be specific by not being able to quantitatively measure individual wants and thus does not provide connections between specific time periods. Northrop concludes that economic dynamics is impossible within the framework of contemporary economic theory. In spite of this weakness, Northrop continues, economic theory provides a theory of economic statics which enables us to deduce other characteristics of the state of a system at a given time. It also is of great aid with respect to dynamic problems as it enables us to foresee in part the more probable economic developments by combining the generic properties of the economic system, designated by its postulates, with specific empirical characteristics.¹²

In spite of the obvious weakness of contemporary theory of economic dynamics, economic research workers attempted to apply it to the problems they were facing. Hicks was the first to try in his book "Value and Capital". He defined economic dynamics as that part of economic theory in which every quantity must be dated.¹³ A major problem was that the goods of the future are associated with an element of uncertainty as to their exact nature and quantity. The problem was to express the utility of these future and uncertain goods in terms which

¹²Ibid., p. 16.

¹³John R. Hicks, Value and Capital (Oxford: Clarendon Press, 1939), p. 115.

would enable economic principles of choice to be applied to them. In addition, the effect of increased uncertainty on utility was incorporated in the analysis.

Farm management researchers faced similar problems when dealing with problems of production involving the use of expendable assets. Considerations of soil conservation, where sacrifice of income in the immediate future was necessary to ensure a greater future return, is an example of the application of these problems. The theory of economic dynamics was reinforced, from the viewpoint of farm management, by the significance attached to expectations as a link between the different positions of a firm at various times.

Studies of the managerial element were undertaken as it was realized that management problems arise only under conditions of uncertainty. The farmer himself was now considered to be more important than previously. The earlier studies of the management element were concerned with the attributes of the efficient farmers. The new studies, however, considered the nature of the entrepreneurial function as differentiated into two phases. One involving the choice of means of execution of technical problems and the other involving the choice of enterprise combinations and the nature of adjustments under uncertain knowledge of future costs and prices.

Schultz suggested that the actions of the economic firm be analyzed in terms of three methodological devices: (1) price and technical expectations; (2) the production plan; and (3) the time span of the production plan. The importance in

decision-making of the technical and price expectation was realized and more attention was directed on expectations in future studies.¹⁴

Agricultural Adjustment and Farm Management Research

The efforts of the Agricultural Adjustment Administration, established by the Agricultural Adjustment Act of 1933, to reduce agricultural production stimulated farm management research to try to interpret the role of the individual farmer in the national planning and adjustment problem. Most of the research was oriented to the urgent need of adjustment. This period can be called the era of adjustment studies.

A nation wide project was undertaken by the forty-eight state agriculture experiment stations in cooperation with the Agricultural Adjustment Administration and the Bureau of Agricultural Economics with the following objectives:

1. To differentiate the agriculture of the State into type-of-farming areas, having similar conditions of soils, crops and livestock systems and farm practices.
2. To assemble, coordinate, and interpret existing data and judgment of agricultural specialists, in order to determine the nature and extent of desirable adjustments in farming in the different type-of-farming regions and areas within each state from the standpoint of good farm management

¹⁴Theodore W. Schultz, "Theory of the Firm and Farm Management," Journal of Farm Economics, XXI (January, 1939).

practice and conservation of agricultural resources.

3. To estimate the probable change in terms of acreage and volume of crop and livestock production, if the adjustments indicated as desirable were carried into effect, and to determine their probable effect on farm income.¹⁵

The work in delineating type-of-farming areas, started during the thirties, provided the basis for regional adjustment programs incorporated in the New Deal. Adjustment in most cases meant reduction of production.

Outlook reports continued, though their usefulness in helping farmers to adjust was limited especially in areas which were dependent upon one or two lines of production. In such areas only monetary reward or compulsion would lead farmers to reduce their production. Even in areas of diversified production outlook reports were not of great influence because price outlook was not the only factor influencing production plans:

When formulating their production plans, individual producers were influenced by considerations other than the price outlook. For instance, the tendency to maintain fairly stable rotations and crop combinations restricted farmers year-to-year changes in line with price outlook. This fact . . . seemed to indicate that adapting systems of farming to particular local condition represented a more important aspect of production adjustment than did year-to-year changes in response to market condition.¹⁶

¹⁵Case and Williams, op. cit., p. 229.

¹⁶Report of the Activities of the Agricultural Adjustment Administration (Washington: U. S. Government Planning Office, 1939), pp. 126-127.

Adjustment in land use, especially of the Western lands, was an urgent problem and emphasis was put on improving land use by withdrawing land from cultivation and putting it under grass. Soil conservation and adjustment programs drew attention to the need of fitting the type of farming to the environmental conditions. Efforts were made to establish "land-use capabilities" and to adapt land use to these capabilities. Farm planning came into close association with land-use planning. An outstanding contribution of the Soil Conservation Service to farm management was the establishment of a land classification system based on land-use-capabilities. This classification was based on the physical inventory of the area, field by field and farm by farm. Physical facts including soil, slopes, and erosion were considered in relation to the rainfall, growing season, and other climatic factors to determine the land capability. Eight land capability classes were distinguished.¹⁷

Land-use-capabilities have since become a basic starting point in developing farm plans or budgets. The emphasis of the Soil Conservation Service on individual farm planning helped to make it clear that the science of farm management was useful in promoting adjustment programs, such as soil conservation.

¹⁷Roy D. Hockensmith, and J. G. Steely, Classifying Land for Conservation Farming, U. S. Dept. of Agriculture, Bulletin No. 1853 (Washington: U. S. Government Printing Office, 1943), p. 9.

The urgent adjustment problems gave a new stimulus to the budgeting technique as a means of determining the best combination of farm enterprises. Two new concepts were incorporated in budgeting: soil-conserving and soil-depleting crops. The role of these crops in the rotation and proper land use was studied and recommendations were made for the individual farmer's problem. Farmers started to appreciate budgeting more as now farm management research provided information on the relative profitability of different enterprise combinations. Some estimate of the future was incorporated into the budget and this enabled farmers to make use of outlook data.

Fixity of farm resources was the major obstacle preventing farm production adjustments. This indicated the need to find out the extent to which fixed costs were dictating production habits and probable shifts in the production of different products and areas due to social action. Such knowledge could be used to analyze the welfare position of different areas and pass judgment on whether or not such a change was desirable.

CHAPTER VI

WORLD WAR II AND POSTWAR YEARS

Farm Management Research During the War

World War II changed the agricultural production philosophy and, as a result, the problems which farm management was trying to solve changed, too. During the depression of the thirties the adjustment problem was one of restricting production. The new conditions dictated increased production to meet the war program. Farmers had to adjust their methods so as to produce more by making the most efficient use of farm resources. All out production was the aim of the administration and farm management researchers were called upon to contribute toward the solution of three broad problems:

1. Reallocation of farm resources for the production of essential products by shifting resources from the non-essential products in accordance with the production goals.
2. Provide guides for efficient use of factors of production and determine the most efficient scale of operations.
3. Help in the pricing of factors of production and farm products.

Production of agricultural commodities increased considerably during the war. This increase was the joint product of several factors. The weather was favorable in the war years,

but only one-fourth of the increase in output can be attributed to better than average weather. The other three fourths were due to the successful application of better technology by farmers, e. g., improved crop varieties, more effective pest and disease control, better methods of feeding livestock, wider use of fertilizers, etc. A small increase in the area of land used for crops was responsible for a small part of the increase in output.¹

Wartime increases in production continued after the war as many of the factors responsible for the increase persisted. This was especially so for improved production practices. Most of them were land and/or labor saving in their effects and most of them were management consuming, in the sense that more managerial effort was required to operate the new type of farm business successfully. A large number of the improved practices were also capital consuming and this meant that farmers became more vulnerable to losses from crop failures and low prices. These added uncertainties increased the importance of insuring, formally and informally, against instability of farm income. These changes gave farm management researchers a great task to perform, namely, to provide the necessary information and advice which farmers could use in order to meet the challenge of the dynamic farm environment, an environment characterized by large operating units, rapid

¹Sherman L. Johnson, "Agricultural Production After the War," Journal of Farm Economics, XXVII (February, 1945), pp. 261-262.

changes in technology, and increasing farm surpluses.

Studies of the human element involved in the more efficient use of labor were initiated in response to the acute farm labor shortage created by the movement of farm workers to non-farm jobs. The establishment of the so called "war unit" was used by the local draft boards in deciding whether a farm laborer should be deferred from military service.

Farm work simplification studies were started to determine methods of increasing labor efficiency through the use of better production techniques. This type of research, based on earlier studies with industrial workers, was aiming at improving the arrangement of buildings and equipment on farms to economize labor, especially during harvest and in storing and handling feed and livestock products. Two distinct methods of research were employed; operational and comparative. The former was used when the researcher studied individual operations on a relatively small number of selected farms to determine how labor can be saved by the use of motion studies. The comparative method was used on a large number of farms so alternative ways of doing a task could be observed and be compared. The comparison of work hours required before and after the work simplification methods had been introduced was found a more reliable method by which the easiest, most efficient, and economical way to do a job was determined and put into use.²

²Harold Case and D. B. Williams, op. cit., p. 284.

Interregional competition in several major enterprises--cotton, corn, soybeans, wheat, and peanuts--became increasingly important as rapid technological change altered the comparative advantage of alternative enterprises in an area. For example the introduction of large and expensive machinery into the wheat belt changed the size of the most efficient farm and made desirable calculation of optimum size and of the effects of these changes on other regions.

Cooperative research was undertaken among several state experiment stations and between state experiment stations and various federal agencies. This trend continued with marked increase in later years in the extent to which research is undertaken on a regional basis and by cooperation between neighboring states.³

Farm Management Service Associations

The establishment of farm management service associations in 1931 marks the beginning of an era in which farm management is established on a firm basis of usefulness and permanency. The willingness of farmers to bear most of the cost of the associations indicates that the farmers themselves realized the value of the services and advice provided by farm management experts. Farmers joined together to employ a field-man to assist them in keeping proper accounts, in analyzing their business, and in planning improvements in the

³Ibid., p. 298.

organization and operation of their farms. Associations were originally formed, and rapidly expanded, in five states: Illinois, Kansas, Iowa, Minnesota, and Wisconsin. These associations work closely with the college of agriculture of the state Land-Grant Colleges. In later years associations were formed in most of the other states.

Each association publishes an annual report. This report presents a summary and an analysis of the farm accounts. Analysis of each individual farm is also carried out. The analysis figures for each farm show the important factors of production, costs, efficiency, organization, and income. Comparisons of farms are done based on level of income, size of farm and type of farm. Figures are stated in averages. These averages help demonstrate the characteristics of high income farms, the advantages of large size of business and comparisons of various types of farms. Standards of performance for the different types of farming are estimated from the analysis of farm record books.

Analysis of record books often fails to tell the farmer what adjustments should be made or how to make these adjustments. Standards of performance may indicate that resources on one farm are used more efficiently than on another one. This analysis, however, does not indicate whether the present use of resources is the optimum. Farm records cannot measure resource efficiency among different enterprises and thus they cannot indicate whether resources are being used on enterprises that are the most profitable.

Farm record analysis can demonstrate general trends in size of farms, gross and net income, costs, yields, acres per man, investment per acre, substitution among factors, etc. This information can be of value in formulating long run production policies on an individual, regional, or national basis.

The fieldmen provide personal advisory services to the 150-225 farmers to whom each is responsible. The emphasis is on extension work through the use of data obtained from the analysis of account books. One of the contributions of the accounting services has been the development of standards of performance related to the accomplishments of farmers operating under different systems of farming. A list of these measures of success is included in Appendix I.

Although the associations have been established primarily to serve the cooperating farmers, the records have been useful sources of research data in studies of farm organization and operation, land appraisal, soil conservation practices, farm credit, and numerous other subjects.⁴ Mosher, discussing the contribution of farm records to farm organization and operation said:

Farm account records have been the means of measuring the economic value of many farm organization and operation practices. The annual farm management analysis prepared for each farm account keeper shows, first, how profitably he has operated his farm as compared with others farming under similar conditions; second, it shows those crops and

⁴M. L. Mosher, "Thirty Years of Farm Financial and Production Records," Journal of Farm Economics, XXVII (January, 1945), p. 30.

livestock enterprises in which he excels and which he may build a more profitable business; and third, it shows those places where the so-called 'leaks' occur and gives him an opportunity to 'stop the leaks'.⁵

Farm records have been used by research workers as the basis for comparing the effectiveness of different systems of farming and farm practices in general. Farm records also provided information for extension and teaching. Farmers have more confidence in results obtained from analyses of records kept by other farmers and themselves. In teaching, the records serve as a source of information in demonstrating the application of research findings and help in illustrating the inter-relationships between different farm enterprises.

A criticism of the above mentioned uses of farm records has been that they are not representative of the entire farm population, because the participating farmers are above average as regards to performance.

Production Function Studies

Production function studies go back as far as the 1920's when Spillman studied the relationship of crop yields to fertilizer applications. During and after the World War II detailed input-output analyses were carried out to establish production functions for many farm products. In general, the data conformed to the law of diminishing returns. Economic interpretation of the physical relationships required consideration of the relative prices of inputs and outputs, and

⁵Ibid.

the differences in prices in different regions. By combining the physical and economic data it was possible to determine the optimum level of production. Earl Heady, a leader in the application and empirical verification of the production economic theory, used the isoquant technique--first presented by Edgeworth and Pareto and later resurrected by Hicks-- to interpret farm production problems. He also used this technique to analyze the effects of changing proportions of factors of production on output and to indicate the conditions of equilibrium of the farm firm.⁶

Production functions have been useful at several levels in farm management research. In the phase of agricultural policy that effects agricultural production, functions can be used to summarize the relationships among aggregate factors. This knowledge is helpful in determining the impact of policies and the adjustments that might occur on the farm. In farm management extension the production functions can be of greatest help. They provide the physical data of production which when combined with prices can give the optimum combination of resources that will achieve given ends: efficient resource allocation and profit maximization. The input-output relationships provide a wide range of coefficients and can be estimated for a single technical unit. The unit can be a single acre or animal, a farm, a region, or any other unit.

⁶Case and Williams, op. cit., pp. 320-323.

They can be derived on a physical or a value basis.

The use of production functions is not without drawbacks. As Fellows points out "adequate physical production functions are not available now nor will they be in the reasonably near future unless there occurs a marked change in agricultural research."⁷ He describes the present situation of agricultural research and the necessary changes as follows:

Research on farm problems has been done at scattered points throughout the country. Scientists working within this framework have normally worked on these problems of greatest interest to themselves and to the farmers in the area in which they are located. As a result, spotty coverage has been given farming problems. Moreover, because of our propensity to classify and order, institutional segmentation has been established. Problems have been viewed in segments much as the blind man 'viewed' the elephant. Agricultural engineers have been primarily concerned with the structural design of a barn, a silo, or a piece of haying equipment. Dairy husbandrymen have considered hay or silage from a feeds or feeding standpoint. Agronomists have attempted to develop more useful forages. These approaches are necessary and desirable but what is lacking is an integrated research plan. Lost somewhere along the way is the problem that transcends all others--the use of farm resources to achieve maximum profit.⁸

The problem of income instability due to weather and price uncertainty increased the interest in uncertainty as a factor influencing decision making. Research workers tried to measure the effects of farm size, feed and cash reserves, debt status and degree of diversification on income fluctuations and resource allocation.

⁷Harold Halcrow (ed.) Contemporary Readings in Agricultural Economics (New York: Prentice-Hall, Inc., 1956), p. 78.

⁸Ibid.

Beady pointed out the effects of uncertainty in the market on the need for flexibility in the organization of the farm. He tried to determine the optimum combinations of enterprises under conditions of price uncertainty. Using iso-cost curves he showed that under these conditions the farmer may try to achieve flexibility in production by retaining the ability to adopt one of several short-run production plans. A farmer may be prepared to sacrifice efficiency within a narrow range of production in order to achieve more efficient production over a wider range.⁹

Post War Developments in Farm Management Research

Methodologies employed in the past continued to be used to a limited extent after the war. In addition many new methodologies were developed. The emphasis on newer methodologies does not mean that the older methodologies were entirely replaced by the new ones.

There has been a gradually widening recognition of the role of economics as a guide in the analysis of farm problems. The incorporation of economics into farm management has centered on two phases. In the first phase emphasis was merely on the usefulness of economic analysis as a guide for collecting and analyzing data. In the second phase emphasis has centered on methods of research and the logical basis of

⁹Case and Williams, op. cit., pp. 329-330.

using abstract theory to formulate hypotheses to serve as guides in research related to practical problems. Emphasis on the importance of methodology increased the importance attached to purposefulness in research analysis of the characteristics of the individual farmer, as opposed to merely descriptive studies.

Salter's critical review of research in land economics reflects the turn of the tide.¹⁰ Commenting on methodology in the rural social sciences he pointed out that prior to 1930 the emphasis of social science research was on gathering and classifying masses of data. After the early 1930's the main theme was that research should be geared toward problem solving. The reorganization of the Bureau of Agriculture Economics in 1938-1939 was done to: (1) Direct research toward immediate planning and operating problems; (2) develop plans for agriculture programs; and (3) to develop an integrated and continuing national program.¹¹ Salter stresses the importance of a flexible hypothesis in scientific inquiry: "without some hypothesis the inquiry will be at least inefficient; without a flexible and tentative hypothesis it may be dangerous."¹²

The hypothesis guides the collection of facts from the universe of study. Salter summarizes his suggestions, as to

¹⁰ Leonard A. Salter, A Critical Review of Research in Land Economics (Minneapolis: The University of Minnesota Press, 1948).

¹¹ Ibid., p. 51.

¹² Ibid., p. 65.

what research should be, by presenting an outline of a full research inquiry. In an inquiry any of the five phases of the following outline may be in action at any time:

1. Problematic situation. This arises when there is doubt as to the relation of action and outcome.
2. Formation of the problem. This is a tentative designation of actions that are possible strategic to the consequence in the situation.
3. Hypothesis. A tentative proposed statement of what actions result in the postulated consequences.
4. Processing evidence.
5. Terminal test. Its function is to solve the problem by the application of intelligence to direct experience.

The hypothesis formulation, proposed by Dewey and developed in rural sciences by Salter, was to become a central theme in all farm management research.

Emphasis on the role of models as symbolic statements of hypotheses was maintained by Heady in his article on "Implications of Particular Economics in Agricultural Economics Methodology".¹³ In discussing the contribution of theory to empirical study he pointed out the five fundamental steps in empirical economic research and the part that the analytical models or theory play in each of the steps:

¹³Earl O. Heady, "Implications of Particular Economics to Agricultural Economic Research," Journal of Farm Economics, XXI (November, 1949).

1. Formulating a problem. This can be defined in terms of doubt, confusion, and uncertainty that faces individuals or society. Also in terms of departure from ideal or optimum conditions, which involves the normative approach and creation of a theoretical ideal or equilibrium conditions which serve directly in identifying and outlining the problem.

2. Formulating hypotheses or theoretical solutions. Here the basic laws function as models and hence provide hypotheses which guide the research. Without a theoretical solution the probability is small that one will be found in reality.

Models also suggest conditions which must hold for maximization of a given end and thus indicate the kind of data necessary for its solution. Heady states that the "use and adoption of theoretical models is one of the most neglected steps in empirical research."¹⁴

3. Designing empirical procedures. This includes specification of the evidence needed, the statistical techniques, the design of sample or experimental method, and tests of significance, or bases by which the hypotheses will be accepted or rejected. These are given automatically when the analytical model is specified in the second step.

4. Assembling and processing data, which is largely a routine procedure. Too much research is initiated with the fourth step. Data collection is substituted for thinking.¹⁵

¹⁴Ibid., p. 839.

¹⁵Ibid., p. 840.

5. Interpreting findings with the use of statistical and economic analysis.

Heady concluded:

The important role of analytical models in applied research is now apparent. They provide imagination at every turn and function to systematize problems, express hypotheses, and outline empirical procedures.¹⁶

Economic theory also provides a common logic by which we can achieve economic objectivity, and the validity of empirical analysis can be guaranteed even in the absence of empirical analysis.¹⁷

A more detailed analysis of some of the analytical models considered appropriate in farm management research was presented in Heady's paper on "Elementary Models in Farm Production Economic Research."¹⁸ The role of production economics is to provide both simple and complex models in farm management economics, which serve as the fundamental hypothesis of research and furnish the schematic framework for establishing appropriate empirical analyses in solving specific problems related to the farm.¹⁹

The following tabulation is based on Heady's presentation of the problems which confront the farm economist (whose

¹⁶Ibid., p. 841.

¹⁷Ibid.

¹⁸Earl O. Heady, "Elementary Models in Farm Production Economics Research," Journal of Farm Economics, XXXI (November, 1949).

¹⁹Ibid., p. 202.

role has expanded beyond the goal of securing maximum profits to consider welfare in general) in terms of economic principles which provide the hypothesis as to the nature and kind of data and design of the sample appropriate to the solution of the problem:

Economic Problem Faced by the Individual Farm Firm.

Economic Concepts of Use in Analysis of the Problem.

1. Level of output to be obtained from fixed or specialized resources.

Diminishing returns; equating of marginal cost and revenue.

2. Combination of resources to produce a given output of production.

Marginal rates of factor substitution. Product contours; equating of productivities and costs of resources.

3. Combination of enterprises within a given period.

Marginal rates of transformation; equating of marginal returns in various alternatives, or proportionality of prices and marginal rates of product substitution.

4. The timing of production (sales) given certainty (near) as to price variations--the problem of seasonal price variations.

As in 3; with output of commodity in two different time periods assuming same relationship as output of two different commodities at same point of time.

5. Level of resource conservation.

As in 1; with different time spans, and with consideration of time preference and interest rates.

6. The optimum scale of operations.

Returns to scale; equating of marginal costs and returns; capital rationing; return discounting; risk aversion.

7. Methods of securing control of resources.

Equity ratios; principles of increasing risk; resource productivities and market prices for factors; price and production uncertainties. Discounting of future returns.

Economic Problem Faced by
the Individual Farm Firm.

8. Adjusting to change and uncertainty, including growth of the business over time.

Economic Concepts of Use in
Analysis of the Problem.

Probability distributions; discounting returns; flexibility of the enterprise; timing of production; dispersion and convergence of expected prices.²⁰

Studies of the Managerial Element

During the prewar years very little research was done in order to determine the characteristics of successful farmers, even though the importance of managerial ability was recognized. The difficulty of determining what portion of the farm income was the return to management remained. After the war more attention was given to the study and analysis of the management factor. Many research projects were started in order to find the attributes which would make it possible to identify the good and poor managers and to find means of measuring differences in the input of management on farms.

Experience has shown that the practical application of the findings of agricultural scientists is limited by the human element as well as by the social and economic environment in which the farmer operates. The managerial ability of farmers varies and farm economists felt the need to define the nature and effects of these managerial differences and the influences which determine them. These variations influence decision making and the adoption of changes in techniques

²⁰Case and Williams, op. cit., pp. 341-342.

suggested by research findings.

This emphasis on the managerial element developed in part from cooperation with psychologists and in part from the progress of dynamic economics and the incidence of risk and uncertainty in agriculture. In turn the emphasis on management led to the emergence of a new and specialized aspect of farm management which studies the decision-making process in agricultural production.

Linear Programming in Farm Management Research

With more emphasis on economic dynamics and decision-making new emphasis was given to statistical procedures. Linear programming was an outcome of the renewed emphasis on statistical procedures. Linear programming studies together with studies of decision-making have constituted a dominant contribution of the post war period and have assumed added importance in recent years.

Linear programming can be defined as the mathematical method of formulating and solving the problem of planning a number of interrelated activities so to give maximum advantage under stated restrictions and under certain simplified assumptions. This technique was developed by George B. Dantzig in 1947 for the planning of diversified activities of the United States Air Force. George Dantzig and J. Laderman used it to solve Stigler's famous "adequate minimum cost diet" problem. This was the first time an economic problem was solved by the

explicit use of linear programming.²¹

Linear programming gives a mathematically precise--and some times ridiculous--answer. Linear programming is an extension of the budgeting technique. It makes possible the consideration of a larger number of farm plans out of which the optimum plan can be chosen. Methods for solving linear programming problems have been improved and with the use of fast computing machines even the most complicated problems can be solved in a few minutes. One should not, however, get the impression that linear programming is the answer to all farm management problems. Computation may take only a few minutes but before this can be done, data have to be collected, production coefficients have to be calculated, and proper formulation of the problem has to take place.

In addition to these practical limitations, linear programming has some theoretical shortcomings. The biggest theoretical limitations are the reliance on linear assumptions, and the failure to consider economies and diseconomies of size. As a result of the latter recommendations to farmers often include more enterprises than make good sense.

Attempts to make linear programming a more realistic tool in practical farm management problems have led to the development of linear programming models which incorporate

²¹F. Dorfman, P. Samuelson, and P. Silow, Linear Programming and Economic Analysis (New York: McGraw-Hill Co., Inc., 1958), pp. 3, 9.

specific economies or diseconomies of scale.²² Models dealing with diseconomies of size are less refined than those incorporating economies of size.

Use of Computers

As mentioned many times before, the scope of farm management research has expanded. This expansion made necessary the use of more accurate and faster computing equipment to make the solution of the more complicated, and thus more realistic, models less laborious and more accurate. Electronic computers already play a significant role in farm management research. In order that this role does not terminate in one which is only a symbol of scientific status, the research worker is challenged to examine: (1) whether certain computer applications impair his productivity; (2) which problems can be analyzed only if computers are used; (3) which organizational changes are needed because of the possibility of economic computer applications; and (4) what skills are needed for effective use of computers in research.²³

A danger arising when using a computer is that research may become computer oriented instead of being problem oriented. Another danger is that research programs may become oriented

²²Harald Glaever, and James Seagraves, "Linear Programming and Economies of Size," Journal of Farm Economics, XXXII (January, 1960).

²³Darrell H. Flaunt, "Use of High Speed Computers for Farm Record Keeping and Data Collection," Journal of Farm Economics, XXXV (November, 1963).

towards certain empirical techniques, certain traditional economic theories, etc. Computers should not become substitutes for human thinking. The genius of research is not in computing but in asking the right questions and collecting the appropriate information. The latter lie beyond the capabilities of the present day computers. They can only provide fast and reliable analyses from a given set of data.

CHAPTER VII

THE PAST AND THE FUTURE

The Past

Looking back over the last sixty years we see that during this period farm management has evolved into an applied science. Its future looks equally or even more promising.

The diversity and change of research attitudes reflects its dynamic nature. One may ask what are the causes of this multitude of research attitudes? To this we now turn our attention. In doing so we can present, in a summary form, the forces responsible for the growth and status of farm management.

The differences in research attitudes of farm economists arise because of differences in the purpose, geographic location, and background training of the workers, each of which may be responsible for establishing traditions at different research centers.

Farm research has many purposes, all of which are related. The original inspiration for the development of farm management came from a group of men who desired to be of service to farm people and make extension more effective. This philosophy continued until today and research workers employ

refined research methods to provide extension personnel with a continual flow of information useful for their work.

A second group seeks relationships, with scientific preciseness, guided by the theories of economics as the means of interpreting the problem and of formulating hypotheses to be tested by empirical analysis. This type of methodology has already been discussed in detail. The goal is to establish exact relationships capable of scientific proof. These relationships then are of universal application in situations where the assumptions on which they depend are valid.

A third group of researchers have widened their horizon beyond the original goal of providing data for the extension service designed to aid individual farmers in their decision-making, to include regional or even national aspects of farm production problems. This interest arose from the experiences in the adjustment problems since the 1920's. This is a legitimate field for farm management research in view of the effect which factors exogeneous to the farm firm play on production decision-making.

Attitudes in farm management research are also the reflection of the different environment in which research is conducted. Importance of economic motives and nature of problems vary among regions. These differences necessitate the use of different research methodologies.

Various regions or states have taken up farm management research with varying degrees of vigor. In some states the problems analyzed are more specific and less descriptive.

In other states work is limited to maintaining a description of the changes in farm costs and methods.

The development of farm management research is full of instances of the influence of economic doctrines held by research workers. For example, prior to 1920, Taylor drew attention to economic principles which influence competition between enterprises, interpretations of cost analyses, and intensity of operations. In the twenties, Black gave emphasis on methodology, input-output analysis and the importance of comparative advantage. Marshallian price analysis was the theoretical foundation for supply response and for the effects of the fixity of farm resources studies. Schultz drew attention to the importance of uncertainty on resource allocation.

These differences in attitude can be characterized in terms of the extent to which economic theory is used as a basis for hypotheses used to guide the collection and interpretation of facts. At the one extreme the deductive method may be used in which economic principles are used to provide hypotheses to be tested. Recent economic theories are used as guides to the interpretation of farm problems. This approach is especially adapted to studies of production economics relating to the farm in which multiple input-output relationships of many variables are analyzed. The law of variable proportions and the critical points are the center of study. At the other extreme, the inductive approach may be used to analyze data so as to reveal relationships. It is seldom that either method is used exclusively. Most research involves both approaches,

although individual researchers may emphasize one or the other.

The Future

What can be said about the future direction of the discipline of farm management? We have seen that problems on which farm management economists have worked reflected closely the economic environment within which they operated. Accordingly we may expect that its future direction will depend on the economic and social matrix in which it will be practiced. What are some of the economic forces which are at work in the United States today and which new ones are likely to emerge in the near future?

The impact of technology on agriculture will continue and technological change will be the main determinant of the complexion of agriculture and the rest of the economy. Technology will influence the supply of agricultural commodities, the organization and characteristics of the farm firm, the relative economic position of agriculture with respect to other industries, and lastly the general composition of society.

The organization and structure of agriculture will change under the impact of technology. The trend toward larger farm units will continue and the number of farm operators will decline. The future market structure will depend to a considerable degree upon the extent to which technology favors large farms. It is likely that agriculture will continue to operate within highly competitive market structures. As a result of the increase in size of the operating unit, ownership,

management, and labor functions will be performed by different persons to a greater degree than in the past, agricultural labor mobility will increase, and those remaining as farm laborers will increasingly be benefited by minimum wage laws, social security and unemployment compensation.

In agricultural economics the process of agricultural adjustment will receive prominent attention because of the character of demand for agricultural products and unique market structures. This will require the blending of the efforts of researchers in farm management, marketing and prices, and the utilization of all the tools available to economists. A part of the inquiry into the process of adjustment will involve analysis of alternative agricultural policies to predict their implications for farms of different sizes, the production of different products, and the location of production. Studies of the relationships of agriculture to other industries will be needed in order to determine the competitive position of agriculture.

Complexity of farming will increase at an increasing rate and, as a result, the problems faced by farmers in the future will become more complex. More powerful analytical tools will be needed for their solution. Construction of improved farm management research procedures will require a greater degree of cooperation between farm management researchers and researchers in other social sciences as well as closer cooperation with researchers in the physical and biological sciences.

SELECTED BIBLIOGRAPHY

BOOKS

- Case, Harold, and Williams, D. B. Fifty Years of Farm Management. Urbana: University of Illinois Press, 1957.
- Halcrow, Harold. Contemporary Readings in Agricultural Economics. New York: Prentice-Hall Inc., 1956.
- Koopmans, Tjalling. Three Essays on the State of Economic Science. New York: McGraw-Hill Book Co. Inc., 1957.
- Robbins, Lionel. An Essay on the Nature and Significance of Economic Science. London: MacMillan Co., 1937.
- Taylor, Henry. A Story of Agricultural Economics in the United States of America 1840-1932. Ames: The Iowa State College Press, 1953.

ARTICLES AND PERIODICALS

- Boss, Andrew. "Forty Years of Farm Cost Accounting Records," Journal of Farm Economics, XXVII (February, 1945), 1-17.
- Forster, Garner. "Contribution of Farm Management Research to Attainment of Production Goals," Journal of Farm Economics, XXV (February, 1943), 110-119.
- Heady, Earl. "Implications of Particular Economics to Agricultural Economic Methodology," Journal of Farm Economics, XXI (November, 1949), 837-850.
- Morshar, M. L. "Thirty Years of Farm Financial and Production Records," Journal of Farm Economics, XXVII (February, 1945), 24-37.
- Northrop, Filmer. "The Impossibility of a Theoretical Science of Economic Dynamics," Quarterly Journal of Economics, LXI (November, 1941), 1-17.

- Schultz, Theodore. "Theory of the Firm and Farm Management Research," Journal of Farm Economics, XXI (November, 1939), 570-586.
- Souter, R. W. "The Nature and Significance of Economic Science," Quarterly Journal of Economic Science, XXXVII (May, 1933), 377-413.
- Tapp, Jesse. "Research Problems in Providing Continuous Economic Information to Farmers," Journal of Farm Economics, XI (January, 1929), 95-107.
- Taylor, Henry. "The New Farm Economics," Journal of Farm Economics, XI (July, 1929), 587-589.
- Wilcox, W., Johnson, S. E., and Warren, S. W. Farm Management Research 1940-1941. Report by the Subcommittee on Farm Management, Social Research Council Bulletin, No. 52, 1943.

APPENDIX I

Measures of Farm Success

The following is a list of measures of success of farm business used in 1948 by the North-Central Farm Management Extension Committee.

I. Measures of net returns from the business

- A. Labor income or labor earnings
- B. Rate earned on investment
- C. Management returns
- D. Other measures:
 - Net income
 - Net cash income
 - Net income per acre
 - Farm receipts per tillable acre
 - Management returns per acre
 - Net cash income as a percentage of total cash income
 - Total returns per dollar of total inputs

II. Measures of size of business

- A. In terms of inputs
 - 1. Acres: crop acres, tillable acres, rotated acres, and total acres in the farm
 - 2. Capital managed
 - 3. Labor: work units
months of labor or man equivalent
 - 4. Total inputs, total farm expenses, total cash expenses
- B. In terms of output
 - 1. Gross farm income
 - 2. Gross cash receipts
 - 3. Total farm returns

III. Measures of intensity of business

- A. Gross profit or gross earnings per acre
- B. Farm receipts per tillable acre
- C.
 - 1. Total expenses per acre
 - 2. Total inputs per acre
- D. Day's work per tillable acre
- E. Capital invested
 - 1. Per crop acre
 - 2. Per livestock unit
 - 3. Per man equivalent

IV. Measures of organization of cropping system

- A. Acres of specified crops
- B.
 - 1. Crop selection index
 - 2. Percentage in high-return crops
- C.
 - 1. Percentage of cropland in legumes
 - 2. Percentage of tillable land in hay and pasture
- D. Percentage of farm in cultivation
- E. Percentage of land tillable

V. Measures of crop production efficiency

- A. Per acre yields of specified crops (all reports)
- B. Crop yield index
- C.
 - 1. Gross value of crops per crop acre
 - 2. Value of crops per tillable acre
 - 3. Crop returns per tillable acre

VI. Measures of livestock organization

- A. Production units--dairy cows, beef animals, ewes, litters of pigs, hens (all reports include one or more such measures)
- B. Animal units
 - 1. Total
 - 2. Per 100 acres
- C. Value of feed fed
 - 1. To all productive livestock
 - 2. To each kind of livestock
 - 3. Per acre
 - 4. Per tillable acre
- D. Percentage of work on livestock
- E.
 - 1. Percentage of gross income from livestock
 - 2. Percentage of cash income from milk
- F. Livestock income per tillable acre

VII. Measures of livestock efficiency

- A. Returns per \$100 or \$1 feed fed
 - 1. To all livestock
 - 2. To each kind of livestock
- B. Livestock efficiency index
- C. Returns, income, or sales per production unit--cow, ewe, litter of pigs, hen
- D. Production--per cow or hen
- E. Pigs weaned per litter
- F. Pounds feed per unit of production

VIII. Measures of labor efficiency

- A. Work units per worker
- B. Labor cost per crop acre
- C. Crop acres per man
- D. Gross profit or income per man
- E. Livestock increases per man
- F. Number of cows per man

IX. Measures of power and machinery efficiency

- A. Power and equipment cost per crop acre
- B. Machinery investment per crop acre

X. Miscellaneous measures of operating efficiency

- A. Expenses per \$100 gross income
- B. Operating expenses per tillable acre
- C. Power, machinery, equipment, and buildings expense per work unit
- D. Labor and equipment expenses per \$100 gross income
- E. Labor and equipment expense per acre
- F. Buildings cost per acre.¹

This list of measures indicates the progress in the refinement of standards and efficiency measures of the years 1925-1948.

¹Case and Williams, op. cit., pp. 313-314.

THE EVOLUTION OF FARM MANAGEMENT RESEARCH
IN THE UNITED STATES

by

PETROS MICHAEL YIASSEMIDES

M. R. A. C., Royal Agricultural College, 1962
N. D. A., Royal Agricultural Society, 1962
B. Sc., Kansas State University, 1964

AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Agricultural Economics
Department of Economics

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1965

The purpose of this report is to present a historical review of the development of farm management research in the United States during the last seventy years.

The report is divided into five chronological periods: (1) years before 1910; (2) 1910 until the end of World War I; (3) years of 1920-1930; (4) the depression years of 1930-1940; and (5) World War II and post war years. These periods mark changes in trends or indicate interruptions which caused changes in emphasis.

Major developments of each period are examined and an evaluation of their contribution to farm management research is made. Factors affecting these developments are also considered.

The need for farm management research arose when farming became commercialized. Research facts and economic principles were needed to strengthen experience in managing the farm.

Pioneer farm management researchers used three approaches: (1) farm cost analysis; (2) model farm approach; and (3) farm survey approach. A major aim of the cost studies was to encourage efficient production. Model farm studies tried to discover interrelationships between different farm enterprises by describing farm practices. Farm management surveys were able to point out extreme differences between farms.

The establishment of the American Farm Management Association in 1910 was the first step towards the recognition

of farm management as an applied science. The following decade was one of consolidation and broadening of the field. Surveys expanded and replaced the emphasis on model farms. Cost studies continued with emphasis on physical costs. Accurate cost data were difficult to obtain and failed to serve the purposes originally assigned to them.

The reorganization of the American Farm Management Association into the American Farm Economic Association in 1919 widened the scope and interests of farm management research. During the next decade the material content and methodology improved. Farm management research included studies on demand for agricultural products, prices and price trends, welfare and income of farmers, marketing, outlook reports, supply response to price change, cost of production, and factors affecting the choice of enterprises.

Important concepts in relation to farm management originated in this decade: budgeting, risk and uncertainty, historical and geographical approaches, and correlation analysis. Cost studies reached their zenith. Better understanding of the problems associated with cost calculation and use was obtained.

By 1930 the main framework of the science of farm management was constructed. The value and limitations of different research procedures were recognized. During the following ten years farm management researchers were preoccupied with the urgent problems of adjustment. This did

not prevent the continuation of more fundamental studies. Research was influenced by current developments in economics--such as the theory of monopolistic competition, and economic dynamics--mathematics and logic. Previous studies continued under the influence of new methodologies.

World War II changed farm production objectives from restricted to all-out production. Farm management research provided the information needed for adjustment. During the war studies on human element, farm work simplification, and interregional competition were carried out in an effort to increase efficiency. Rapid growth of Farm Management Associations helped establish farm management on a firm basis. Farm records proved a useful source of research data. Production function studies provided a basis for determining optimum production on a farm and nation wide basis.

During the post war years farm management research incorporated economic analysis as a guide for collecting and analyzing data and abstract theory was used for formulating hypotheses to serve as guides in research related to practical problems. This increased the importance of purposefulness in analyzing the characteristics of the individual farmer, as opposed to merely descriptive studies. Analytical models for farm management research were constructed.

Linear programming and decision-making studies constituted two major lines of research in post war years. Widening of the scope and responsibility of farm management made

it necessary for farm management researchers to cooperate with researchers in other sciences. Cooperation is expected to continue.