

FARM SURVEYS AND FARM MANAGEMENT RESEARCH

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The scientific study of farm management and of the pattern of rural activities is destined to play an increasingly important role in the future development of Australian agriculture.

Scope for expansion in primary production lies in two directions. First, in the improvement of farming techniques within the present boundaries of major agricultural development. This applies particularly to the main crop and livestock areas which experience comparatively high rainfalls. Second, in the development of new areas beyond the present margins of agriculture, by means of new techniques designed to improve natural conditions, such as irrigation works, the application of deficient minerals to soils, and other measures. It is evident that development along each of these lines can be most rational only if adequate account is taken of the many complex factors which influence farm management. Farm management and farm survey research seek to do this.

The information gained by such research serves two main purposes, in that it assists both extension work and policy formation.¹ From the viewpoint of extension, the most important use of farm management and farm survey research is to provide detailed information on which to base accurate advice on the economic aspects of various farm practices and methods of farm organization. Secondly, if agricultural policy, in respect of price levels, credit facilities, tenure, etc., is to be realistic, it must be based on adequate information as to farmers' problems and attitudes and the many factors affecting farm management and the level of output.

¹ The term "extension" is used to cover all means of educating the farmer in improving his farming. The most common media for providing the farmer with information and advice are—radio, the press, films, group extension through field days, and individual extension through the work of agricultural field officers in visiting individual farms.

In this article it is proposed to describe the main types of farm management research and associated studies that have developed in Australia and abroad, and to discuss the contribution such research can make to agricultural extension and policy.

1. DEFINITION OF TERMS.

To avoid confusion it is proposed to employ the term "farm management research" in the strict sense given to it by recognized overseas' authorities.

Both *farm management research* and *farm survey research* have a common subject matter—the scientific study of the technical, economic and social factors which affect the character of activities on farms. However, farm management research in the strict sense studies these factors from the viewpoint of understanding and improving the organization and operation of *the individual property*. It is a *co-ordinating* type of research, bringing together the results of research and knowledge in the technical, economic and social fields. Having investigated the major factors which influence the level of earnings on the farm, the study aims at designing a plan (or alternative plans) to modify management, with the aim of increasing net income.²

On the other hand, most farm survey research is focused, not on individual properties, but on farms in general. Research of this nature is primarily concerned with trends, aggregates and averages in the rural situation as a whole, rather than in means of improving management on individual farms. Studies of this type will be referred to as "farm survey research."

Such research does not come within the scope of farm management proper, although it is concerned with investigating similar factors, and provides background information which is essential to farm management research. It is of a fact-finding nature, investigating the nature and reasons for current conditions in agriculture, often to provide general data for agricultural policy.

Since farm management research aims at studying the farm as a whole, it must pay close attention to the many relationships within each property, as between various enterprises and between the operator's resources: land, labour and capital.

As an illustration of this point, the farmer who is contemplating the sowing of improved pasture would need to consider how this development would affect and be affected by other aspects of his farming. He might have to consider, for example, the seasonal variation of feed and stock numbers, the cost of sowing, renovating and topdressing pastures after allowing for the possibility of a fuller utilization of machinery and labour, watering facilities as they are related to increased carrying capacity, erosion control, the return from increasing carrying capacity and earlier-maturing stock for market (lambs, vealers), the length and nature of the pasture-crop rotation desired, and many other factors. Because farm management problems are so complex, involving the consideration of so many related factors, farm management research must necessarily be comprehensive and detailed in scope.

² For a summary of the scope and method of farm management research see "Research in Farm Management", Social Science Research Council Bulletin No. 13, New York, June, 1932.

On the other hand, farm survey research as it concerns the individual farm is more restricted in scope and is often of a single-aspect nature. A farm survey might aim to assess the trend towards increased sowings of improved pasture in a region and the resultant increases in carrying capacity. Such a survey would not necessarily have to investigate the many other related factors of the type mentioned in the preceding paragraph.

Up to the present time very few farm management studies have been conducted in this country, probably because of the considerable costs involved. Most of the work in this field has been farm survey research. An extension of farm management research in the strict sense should form the next stage of development in Australian agricultural research.

2. FARM SURVEY RESEARCH.

This type of research aims to investigate the nature of and reasons for past and present developments in primary production. It seeks to gain basic information on (a) the organization and management of farms of various types, (b) the scope for increased production and the adoption of new methods of farming, (c) the problems of adjustment faced by farmers and (d) farmers' attitudes towards changes in the prices for their products, the adoption of improved management practices and allied subjects.

The uses to which this information can be put will be considered under two headings—extension and policy.

Farm Survey Research and Extension.

Effective agricultural extension involves several distinct procedures. First, the accumulation of knowledge on current farming practices in particular areas; second, the designing of regional recommendations to improve farm management, based on the experience of farmers in those areas and the results of scientific research; and third, the task of reducing the gap between recommended practices and the methods in actual use, through the work of field officers and through the radio, press and films. Farm survey research can assist extension in all three aspects of its task.

In the first place, farm survey research can provide the chief means of gaining a necessary detailed understanding of how farms are managed and the problems farmers face in their day-to-day activities. An example of this assistance was a land-use study recently conducted by the Division of Marketing and Agricultural Economics of the New South Wales Department of Agriculture on a sample of wheat farms in the Riverina.³ The area surveyed was heavily infested with skeleton weed, and the survey, *inter alia*, sought to obtain information on the effect of this problem on farm management, particularly on crop rotations, sowings of improved pasture, cultural practices, crop yields and carrying capacity.

Second, such studies help to isolate type-of-farming areas—*i.e.*, areas which display peculiar agricultural problems and in which farm management practices are fairly uniform but characteristically different from other areas.

³ See Ross Parish, "Recent Trends in Land Use in South-Western Wheat Farms", *Review of Marketing and Agricultural Economics*, Vol. 20, No. 1 (March, 1952).

Type-of-farming area studies have a particular value for extension work, in that they provide the information necessary to modify regional recommendations on both technical and economic grounds, so as to make them most suited to local conditions. Modifying recommendations by type-of-farming areas is a logical pre-requisite to the designing of recommendations for individual farms.

Australia can be readily divided into broad land-use zones conforming to the major types of farming such as wool, wheat or dairying. However, comparatively little information is available on the different types of farm practices used within each of these areas and the associated differences in geographical conditions. An example of a broad type-of-farming area classification is provided by the map of Fat Lamb Production Regions published recently in connection with a survey of the fat lamb industry conducted by the Bureau of Agricultural Economics.⁴ In this map the fat lamb zone of south-eastern Australia is subdivided into three major sections—"marginal, intermediate and intensive". This subdivision is based on two criteria—the use of improved pastures and the type of ewe used in the breeding flock.

Type-of-farming areas are largely based on particular combinations of geographical factors, including soil-type, rainfall, topography and pastures. Other factors, of course, will affect the type of farming in an area, such as location relative to transport and markets, prices, availability of water for irrigation, etc.

Therefore to arrive at a more satisfactory classification of areas it will be necessary to make more use of Census material, soil and climatic maps and farm surveys in certain critical areas. The methods used to delineate type-of-farming areas in the United States have been described in considerable detail, and while the approach necessary in Australia may be somewhat different, many of the methods used there are probably adaptable to local conditions.⁵

Third, besides measuring the gap between recommendations and practice, farm survey research can assist in reducing that gap by investigating the reasons why better farm practices are not followed, and the related problem of overcoming the barriers disclosed. Surveys have indicated already that the potential increase in production which can be achieved in Australia by the adoption of improved practices is very considerable. Therefore, research into reasons for the non-adoption of improved practices on a large number of farms is a pressing need. An **important** aspect of such research must be a study of the attitudes of farmers towards better farm practices, and their attitudes towards the use of credit, risk in farming, and other factors affecting the adoption of new farming methods. Some *attitude studies* in this field have already been attempted, usually as part of more comprehensive land-use surveys.⁶

⁴ "The Fat Lamb Industry", by H. G. McConnell and E. K. Simmons, *Quarterly Review of Agricultural Economics*, Vol. V, No. 1 (Jan., 1952), p. 26.

⁵ See for example "Types of Farming in the United States", by F. F. Elliott, Washington, U.S. Bureau of the Census. I. G. Davis, "Types of Farming and Type-of-Farming Areas in Connecticut", Storrs: Connecticut Agricultural Experiment Station Bulletin 213, p. 122-137.

⁶ J. Rutherford, "Some Aspects of Land Utilisation on Dairy Farms on the Lower North Coast," *Review of Marketing and Agricultural Economics*, Vol. 19, No. 4. (December, 1951).

G. C. McFarlane, "Soil-Management Practices on North-Western Wheat Farms", *Review of Marketing and Agricultural Economics*, Vol. 20, No. 3. (September, 1952).

Farm Survey Research and Policy.

Farm survey research provides information to assist the making of policy decisions which have a general application to the agricultural industries. Examples of the problems which arise in the determination of policy are:—

“Should a price be guaranteed for a particular product and at what level?”

“What type of farm machinery is most needed by farmers?”

“What are the critical factors limiting agricultural expansion?”

“What type of credit facilities and extension services do farmers want?”

The solution of such problems requires the type of information that can only be revealed by farm survey research.

The necessity for such information was realized by the Royal Commission on the Wheat, Flour and Bread Industries in 1934, when the Commission was faced with some extremely complicated policy decisions of an economic character, without having sufficient economic data on which to base those decisions.

In this regard the Commission made the following comment:—

At the outset, the Commission was faced with the fact that the Commonwealth had not available staff capable of making an economic survey of farming operations. The warp and woof of the agricultural fabric of Australia are by no means as simple as is generally imagined. A study of the economics of agricultural production requires specially trained individuals. The Commission, therefore suggests that the Commonwealth should take steps to ensure that it has available a nucleus of men trained in Economics, having detailed knowledge of agricultural organization and practice. Investigations such as the present one would then be practicable without great delay, and in many cases would be unnecessary as the information would be available. Future conditions will require a supply of accurate information rapidly.

The recognition of the need for such a staff, and for rural economic surveys generally, is not new. In 1927, Professor A. J. Perkins, Director of Agriculture in South Australia, drew attention to the position in an address which was published as Bulletin No. 212 of the Department of Agriculture of South Australia. Little or nothing was done in the matter and the Commission recommends that the Commonwealth Government should request the Council of Agriculture to consider what steps can best be taken to further Agricultural Economics research in Australia . . .⁷

One of the major problems faced by the Royal Commission was the question of a home-consumption price for the Australian wheat industry. Such problems of price policy frequently occur, and farm survey research can play an important role in this field.

In recent years there has been considerable speculation as to the probable effect of price increases on the supply of various commodities. It has been argued, for some primary industries at least, that farmers are content with a certain level of income. According to this view, price increases would cause farmers to reduce production, enabling them to earn the same income with less effort. No conclusive evidence has been advanced to support or refute this argument. Such a problem

⁷ Royal Commission on the Wheat, Flour and Bread Industries, Second Report, p. 200 (1934-35).

is one for farm survey research, involving investigation of farmers' attitudes towards price changes and income levels, regional production potentialities and costs, and other related factors.

To what extent are farmers' incomes goals fixed and to what extent are they adjusted to higher standards of living? Do producers change their farm operations if they expect a price change, and what influences their price expectations? In what areas of the wheat belt is there considerable scope for expanded acreages, and what areas are already cropped close to capacity? What price rise would be necessary to adequately cover the costs of new wheat farms in marginal areas, or to make wheat more attractive than other enterprises for a considerable number of producers in established areas? All of these questions can be answered on the basis of factual data collected from farms by the survey method, and used to estimate the production response likely to be achieved by an increase in price for a commodity in particular circumstances.

It is not only in the field of price policy that governments can influence the regional use of land and other farm resources. They can directly influence what farm products are to be produced, and in what quantities, through Closer Settlement and Irrigation policy. For instance, the settlement of a newly-established irrigation area involves government decisions on the problem of what type and size of farm will ensure best possible use of the water and other resources of the area, having regard for available markets. Intensive land use potentiality surveys can be of considerable assistance in investigating the most profitable use of this land.

An example of an investigation aiming to develop a method of analysis to guide future development in agriculture is reported by R. L. Mighell and J. D. Black in "Interregional Competition in Agriculture."⁸ The project was undertaken in the belief that national agricultural policy depends on an adequate understanding of competition between farm products between one region and another. Given certain price situations, the study aimed at showing how the optimum use of regional resources, as between, say, dairying and horticulture, could be planned.

Farm survey research can also assist in formulating other aspects of Government policy, such as rural credit, and farm tenure. In recent years credit facilities available to farmers have been widened considerably, but it is known that comparatively few farmers have availed themselves of this credit. At the same time it has been widely claimed that there must be a considerable increase in capital investment in agriculture if any significant expansion of production is to be achieved. There is a necessity, therefore, for a comprehensive survey of farmers' attitudes to credit to determine why farmers have made such little use of borrowed capital and what types of credit facilities are most needed.

Profitable research could also be carried out into the effectiveness of existing land legislation from the point of view of the efficiency of existing forms of tenure in encouraging an effective use of the land. In addition such research could investigate the degree to which the farming community is aware of the rights and obligations of land-holders and land-users under existing legislation.

⁸ Harvard University Press, Massachusetts, 1951.

3. FARM MANAGEMENT RESEARCH.

Need for Farm Management Research.

Farm management research is needed to provide an advisory service to the individual farmer which is more detailed and comprehensive than that available at the present time.

Referring to the need for farm management studies in Australia, A. W. S. Moodie said as early as 1941 that "technical advice is readily available, but there is no organization to analyse his (*sic* the farmer's) business in detail, and provide the economic guidance necessary. Many of the usual technical recommendations involve expenditure and the farmer should be given detailed information as to how the outlay involved will influence his costs and returns."⁹

As an example, various demonstrations are conducted on individual farms in this State which seek to show farmers in the district the *technical* efficiency of certain practices. In addition to this information, however, an accurate measure of the *economic* efficiency of these practices under specified conditions is required, in terms of the resultant net return on capital invested. Estimates of economic efficiency are often more difficult than would appear on the surface, particularly when such calculations have to be made for farms differing significantly from the demonstration farms.

In addition to the point made by Moodie, the individual farmer is often in need of informed assistance in solving such questions as: What single enterprise or combination of enterprises would it be most profitable for me to adopt? Should I employ bulk handling methods on my wheat farm? Is my holding sufficiently large to allow me to make the most efficient use of my labour and machinery? Should I change from raising fat lambs to running wethers? Should I concentrate more on winter milk production?

Before the farmer can be assisted in solving economic problems such as these, there must be fact-finding research to provide essential economic data to be used by the extension worker in advising individual farmers.

The need for farm management research and extension is a growing one. In the days of the largely self-sufficient or subsistence type of farm, most of the problems encountered by the farmer were purely technical. Since then farming has become a highly specialized and complicated business venture requiring for maximum success considerable capital investment and business acumen. The problems which confront the farm manager to-day are very often as complex and difficult of solution as those faced by managers in other industries.

⁹ A. W. S. Moodie, "Agricultural Efficiency and Its Relationship to Production Costs", *Journal of the Australian Institute of Agriculture Science*, Vol. 7, No. 2 (June, 1941), p. 54. The late Mr. Moodie was formerly Chief, Division of Plant Industry, N.S.W. Department of Agriculture.

Methods of Farm Management Research.

(i) *Farm Record Studies.* A basic method of obtaining data for farm management research is to arrange with a large number of farmers to keep continuous and comprehensive records of the physical and financial details of the operation of their farms. The information can then be analysed to reveal the relationships between the management practices and the results obtained on those farms. Farm records may sometimes be used to estimate the costs and profitability of certain practices under specific conditions. Such estimates can only be made with accuracy by a detailed analysis of each farm which isolates the part played by each aspect of management. For instance, an analysis of the costs and profitability of improved pasture grown on a property can be made only if improved pasture represents the sole change in management over a period, or if the effects of other concurrent changes can be separated.

An incidental advantage of farm records is that they provide information on receipts, costs, and physical details for prospective farmers or farmers considering the adoption of new sidelines.¹⁰

An example of a very comprehensive farm records study carried out in the United States is reported by M. L. Mosher and H. C. M. Case, in "Farm Practices and Their Effects on Farm Earnings".

In this report the authors point out, "differences of as much as a thousand to three thousand dollars a year in the net incomes of comparable farms in the same community in Illinois are not unusual. One farmer is successful, while another, having a farm the same size with the same type of soil, has a difficult time to make ends meet. Obviously such differences are due largely to differences in the organization of the farms and in the practices used in their operation. It was for the purpose of discovering the relative importance of the different methods and practices which farmers are following that this study, involving approximately 1,000 farms in north-central Illinois, was made".¹¹

All of the farm operators involved in the project were members of the Illinois Farm Bureau Farm Management Service—a co-operative undertaking conducted by the Illinois Agricultural Experiment Station. That organization had two purposes—first, to assist participating farmers in improving the business organization of their farms; second, to collect data which would be of value to farmers throughout the State. Services provided to each farmer included:

- (a) assistance in keeping accurate records;
- (b) assembling, analysing and interpreting the records in such a manner as to enable each farmer to compare his accomplishments with similar farms in the same district, and in the light of this information, to improve his own organization and practices.

¹⁰ The Department of Agriculture has frequent requests for information of this nature, particularly as to the relative profitability of competing enterprises, but unfortunately little material is available on this subject in answer to individual inquiries.

¹¹ University of Illinois Experiment Station Bulletin No. 444, 1938. *Ibid.* p. 475.

To achieve these objectives field officers were employed, each responsible for two hundred farms which were visited at least four times a year.

A significant point is that the co-operating farmers found these services sufficiently valuable to justify considerable financial outlay. About sixty per cent. of the cost of the service was met by the farmers themselves.

Since one of the main uses of farm records is to provide accurate data for comparing farms in similar type-of-farming areas, so as to discover the management factors largely responsible for variations in income, such a comparative analysis will be valid only if the farms studied are fairly homogeneous in respect of factors other than those being analysed, particularly as regards natural conditions.¹² Otherwise statistical analysis will disclose differences in earnings which are not wholly attributable to differences in the management practices being investigated, but which are partially due to differences in other factors. The factors which are responsible for variations in incomes on farms are numerous and so inter-related that it is difficult to isolate statistically the specific effects of individual practices on farm incomes.

For example, an analysis of records of 100 dairy farms on a particular area might reveal that the greater the quantity of supplementary fodder fed per cow, the greater the butter-fat yield per cow. However, analysis might also reveal a strong relationship between butter-fat yields and several other management practices. In these circumstances it would be very difficult to determine accurately the extent to which each of the practices affected butter-fat yields.

It might also be found that the better farms practised more supplementary feeding in particular. Conversely, on poorer farms, the beneficial effects of supplementary feeding might be offset—by inefficiency in other aspects of management, so that the relationship between better feeding and yields would be understated by comparative statistical analysis. In such cases as the above, these difficulties can be largely overcome by careful sampling and analysis.¹³

A further illustration of the difficulties of statistical analysis in this field can be quoted. A study of a group of dairy farms, carried out by this Division, showed little relationship between the degree of mechanization and production per cow when all farms were analysed together.¹⁴ However, closer analysis indicated that this result was unduly influenced by a minority group of the sample farms, all located in one area where high production was achieved by means other than mechanization (more favourable natural conditions and better feeding practices). A separate analysis of the other farms indicated that high levels of mechanization were associated with high production.

¹² Type-of farming area studies previously described can ensure that comparative studies of farms will be confined to a homogeneous area.

¹³ Careful cross-classification of the related factors would make some allowance for the presence of inter-correlation of the independent variables. This implies a very much larger sample than would otherwise be necessary.

¹⁴ J. Rutherford, "Further Aspects of Dairying on the Lower North Coast", *Review of Marketing and Agricultural Economics*, Vol. 20, No. 1 (March, 1952), pp. 78-9.

To be of value to the producer, farm management research should provide specific information on the economic aspects of particular practices rather than quote aggregate results of better management generally. Yet it is often difficult to give specific and detailed advice to farmers on how to increase net income by means of the types of statistical studies mentioned above unless an analysis is made of a very large number of farms.

To overcome this disadvantage of what has been called "the comparative method," such studies can be supplemented by the budget approach which enables the influence on production of specific practices to be more easily isolated.

(ii) *Farm Budget Studies.* For the individual producer, a farm budget is a plan for the future use of his farm and its resources. Its function for the farmer is to test plans for the use of his farm on paper, rather than in actual operation, so as to avoid unnecessary losses. More specifically, its uses are (i) to plan a new farm business; (ii) to compare two or more alternative plans of organization for a farm in operation; (iii) to compare two or more competing enterprises; and (iv) to compare alternative methods of production or returns from alternative investments.

The budget drawn up by the farmer is based on information about costs, yields and prices he can derive from his own farm records, from extension workers in agronomy and livestock husbandry, from the experience of other farmers, and from the published results of farm management research on other farms.

As a tool for farm management research, *representative farm budget studies* consist essentially of constructing budgets for farms typical of a certain area.¹⁵ Various representative budgets can be drawn up using different assumptions as to how the farm is organized and operated. With sufficient data available it is possible to forecast the results of each modification of the budget. These representative budgets include costs, returns and other financial and physical data which can be expected to prevail on certain well-defined types of farms (*e.g.*, a 75-acre family-operated dairy farm on one of the river flats in northern New South Wales might be taken as one type).

The use of the comparative method as in farm record studies can show only broadly whether management practices already employed by some farmers are profitable. On the other hand, representative budget analysis makes it possible to examine for a "typical" farm the effect on financial returns of a new practice previously only tested on an experimental scale.

Furthermore, it has been claimed that the use of such budgets enables the merits of alternative practices to be demonstrated to farmers in practical terms. Farmers are more familiar with such a method of arriving at decisions than they would be with statistical techniques, which may be distrusted.

¹⁵ The budget can be drawn up either for one or more farms actually in existence, which are found to be representative of a group of farms; or alternatively, the budget can be drawn up for a composite "hypothetical" farm constructed to be typical of an area.

It should be noted that information of the type available from farm record studies provides essential background material for the construction of representative budgets. In fact, a budget study for a group of farms is usually an extension of a farm records project covering those farms.

Before a representative budget can be constructed, it is necessary to select from the many farms on which data is available groups of farms which can be treated as similar. The farms might be classified in terms of size, topography, soil-types, enterprise-combinations, etc., so that when a budget representative of all farms in the group is constructed and analysed the conclusions derived can be applied to every farm within the group.

Apart from the data derived from farm records, representative budget studies also rely on physical and financial information obtained from sample surveys especially conducted as part of the budget study, as well as physical data obtained from experiments in agronomy and animal husbandry. The detailed budgets are of course drawn up in physical as well as financial terms, so that allowance can be made for price changes which occur after the representative budget is constructed.

Virtually no work of this nature has been done in Australia up to the present time, although budget analysis of an elementary type has been used occasionally in this country in determining "home maintenance areas" for closer settlement schemes. In the United States, however, where agricultural economic research is very well advanced, a great deal of attention has been paid to this approach.

An example of a budget study for a group of farms in the United States is reported in "Methods and Principles of Farm Development" by E. J. Nesius.¹⁶ The study was made on the assumption that "farmers who contemplate changes of importance in their farming need factual information on which to base their decisions." To provide such guidance, the project aimed at evaluating the actual farming systems used on eight typical farms in the Western Pennyroyal Plains area of Kentucky, and suggesting improved systems and farm practice for these farms.

For each of the eight properties studied, the farm layout, the crop and livestock system, and the normal income returns were analysed and by means of a budget were compared with a suggested farm layout and crop and livestock system using improved practices. These comparisons demonstrated the effect of an improved farm organization, increased production through improved farming practices, and more complete use of labour and of capital items such as buildings and machinery.

So as to ensure that the farms selected were most typical of the survey area the region studied was divided into two topographical land areas on the basis of undulating and flat lands. Land-use data was secured for 175 farms in the area by random sample. A farm-records project carried on in the area continuously from 1931 to 1941 provided a cross-section of important production situations found on 12,000 farms in the area. This data was used to evaluate the enterprise combinations being used on farms and those suggested.¹⁷

¹⁶ Kentucky Agricultural Experiment Station Bulletin 531 (1949).

¹⁷ The most common enterprise combinations were "crop-dairying", "crop-specialty" and "crop-dairy-beef."

All of the farms in the region were grouped in terms of size and enterprise combinations, and for each group one farm which most nearly corresponded to the average was selected as typical. Twenty such farms were selected and of those eight were chosen which formed the best combination of farm size and type to represent the area. These eight farms were subject to close analysis along the lines outlined above. Chemical soil tests were made for each of the eight farms and technical assistance in planning the crop and livestock set-up for these farms, as well as data on probable physical responses from the new production methods, was obtained from agronomy and animal husbandry specialists.

The recommended farm plans were set up as *objectives* towards which other farmers in the survey area could work, with the aid of agricultural experts available to assist in the problems of transition.

The Contribution to Extension.

Farm management research, to an even greater extent than farm survey research, can assist in putting regional recommendations on a sound and detailed basis and, by providing a persuasive forecast of the likely results, can assist in converting farmers to the improved management practices recommended.

Farm budget studies, and to a lesser extent farm records studies, perform the necessary function of providing a measure of the economic efficiency of regional recommendations. Naturally, the costs and economic effects of particular recommendations will vary between different areas and different types of farms, and only budget studies and farm record projects carried out in particular areas and on particular types of farms can provide accurate data on the effects of the practices studied.

An extension worker who visits a farm to which the result of a representative budget study or farm records analysis can be applied is in a better position to diagnose short-comings in management and suggest more efficient production methods. The farmer and the extension worker can compare each particular aspect of management on a property (*e.g.*, feed costs and returns) with other farms, and set up *standards of performance* for that farm. By using the experience gained from farm management research on similar properties, the farmer can be provided with essential information on which to base his economic decisions, and he is therefore in a better position to draw up the budget which will ensure the most economic working of his farm.