SOME ASPECTS OF THE FARM INCOME
SITUATION IN NEW ZEALAND

E.A. Attwood

Views expressed in Agricultural Economics Research Unit Discussion papers are those of the authors and do not necessarily reflect the views of the Director, other members of the Staff, or members of the Policy or Advisory Committees.

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The Agricultural Economics Research Unit (AERU) was established in 1962 at Lincoln College, University of Canterbury. The aims of the Unit are to assist by way of economic research those groups involved in the many aspects of New Zealand primary production and product processing, distribution and marketing. Major sources of funding have been annual grants from the Department of Scientific and Industrial Research and the College. However, a substantial proportion of the Unit's budget is derived from specific project research under contract to government departments, producer boards, farmer organisations and to commercial and industrial groups.

The Unit is involved in a wide spectrum of agricultural economics and management research, with some concentration on production economics, natural resource economics, marketing, processing and transportation. The results of research projects are published as Research Reports or Discussion Papers. (For further information regarding the Unit's publications see the inside back cover.) The Unit also sponsors periodic conferences and seminars on topics of regional and national interest, often in conjunction with other organisations.

The Unit is guided in policy formation by an Advisory Committee first established in 1982. The AERU, the Department of Agricultural Economics and Marketing, and the Department of Farm Management and Rural Valuation maintain a close working relationship on research and associated matters. The heads of these two Departments are represented on the Advisory Committee, and together with the Director, constitute an AERU Policy Committee.

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The Agricultural Economics Research Unit has a continuing involvement in the production of farm income statistics through the continuing AERU annual surveys of town milk producers and of wheatgrowers. In addition, farm income statistics provided by the N.Z. Dairy Board, the Department of Statistics and the Meat and Wool Boards' Economic Service are used by the AERU in a wide range of research projects. Apart from the use of income statistics in research projects, farm income data are one of the major sources of information available to Government for evaluation of agricultural policy issues.

Dr E.A. Attwood, a visiting research fellow with the AERU, has undertaken a review of the available farm income statistics. This Discussion Paper presents the results of that review. It is hoped that this publication will raise the awareness of agricultural policy makers and the research community of some of the inadequacies of income statistics and may stimulate some effort towards an improvement in the way farm income statistics are presently collected and reported.

P.D. Chudleigh
Director
SECTION 1

INTRODUCTION

1.1 Need for Accurate Farm Income Data

The implementation of effective measures of economic management requires a substantial volume of statistical information as the basis of measurement of the needs and achievements of current policies. Two of the most important economic issues in New Zealand, as in other developed economies, are the growth in the level of incomes (particularly in real rather than just in nominal terms) and in the level of employment. These issues arise not only in relation to economic policy at national level but are also of importance down to sectoral and sub-sectoral levels where this is of concern to economic policy decision makers. A consideration of the trends and of the prevailing situation of average incomes and of the numbers employed in different sectors of the economy is a major aspect of policies which affect the pattern of income distribution within the community. The economic policies pursued by governments have both a direct and incidental effect on the incomes of the various sectors of society and this is as true in the case of agriculture as for other sectors.

The statistical data currently available in New Zealand provide a considerable volume of detail on average net incomes of the major farm types, but no direct information on average incomes of farmers collectively. However, for reasons set out later in this paper, the available statistics on net farm incomes from the various farm surveys are subject to many qualifications such as to make them of limited value. Nor do the data on the numbers employed in farming appear to be sufficiently accurate to make them of real value in any policy assessment.

1.2 Arguments Put Forward on Farm Income Data Needs

There is a point of view in New Zealand that a precise knowledge of the average incomes of farmers, particularly those of farmers as a whole, is not really necessary. This approach usually concentrates on the usefulness of time series data for incomes on particular farm types but gives little if any credit to the need for cross-sectional comparability between different groups of farmers. This argument does not stand up for two reasons. In the first place many of the major policy measures affecting farmers, such as exchange rate policy, taxation provisions, interest concessions etc. are of a general nature and not just related to one product or farm type. If these measures are to achieve their objectives they must have a beneficial effect on incomes, and the extent of that benefit is of major importance in determining the effectiveness of these measures. While these policies are generally aimed at generating additional farm output, they will be successful only if they also generate additional income. A knowledge of this income effect is an essential element in assessing the
appropriate level of exchequer resources required. It is clear that agricultural policy in New Zealand which, because of the importance of agriculture to the national economy involves a substantial volume of exchequer expenditure, must have regard to the farm income effect of the different policy measures.

The second reason for rejecting the argument denying the need for accurate farm income data is that within the agricultural sector there is a considerable mobility of resources as between different farm types - especially new investment, labour and, to a lesser extent, land itself. For the optimum growth of New Zealand agriculture to be achieved, it is essential that these resources, in so far as they are not already fixed, flow into those farm developments which generate the highest return to the resources involved. For this to happen there must be accurate information on the current situation so that those making the decisions - farmers, investors, sharemilkers, etc. can base their judgments on reliable data. There are a number of valuable studies, largely based on physical and price data, on the consequences of alternative investment or other development programmes in agriculture. However the most important measure of the returns to be earned in agriculture and its different sectors is the income which is generated. This is the outcome most immediately understood and acted upon by individual farmers.

In addition, in any development policy for agriculture followed by the government, an accurate assessment of the returns (incomes) currently earned in the different sectors of farming is of major significance to the decisions taken at national level. These decisions have a major effect on the future efficiency of agriculture in New Zealand. In this connection the Farm Monitoring Reports produced by the Advisory Services of the Ministry of Agriculture and Fisheries (March 1984), which provide a regular description and evaluation of the financial and physical situation facing each of the main farm sectors, should be read in the context of the trends in incomes in each of the sectors involved if they are to provide the fullest possible knowledge on which resource allocation decisions are made.

1.3 Macro-Economic Aspects of Resource Allocation

The issues concerning the allocation of resources to agriculture as a whole and to the individual sectors have been set out in a recent study on 'Macro Economic Data for Agriculture and Primary Products Processing' (Nickel 1983), which stated that "the role that agriculture has played in the growth of the New Zealand economy [requires] an understanding of the dynamic relationships between agriculture and the rest of the economy and in particular of the forces motivating the flow of resources between the two sectors", and further that "the basic premise is that the flow of resources is motivated by differential returns". The most immediate and important measure of these returns is the incomes which are realised in each of the two sectors and then, within agriculture itself, the incomes which are earned in the different sectors of agriculture both on a historical and projected basis. It is therefore evident that a knowledge of the relative income situation, both in agriculture and the rest of the economy and within the different sectors of agriculture, is essential to any understanding
of the factors motivating the flow of resources; this is of major importance both for agriculture as a whole and for the individual sectors within agriculture. This is not to say that the flow of resources is entirely determined by the relative income situation, for this can hardly be the case in the absence of precise knowledge of what these returns actually are. It is however necessary to have a much better knowledge than available at present of the income changes affecting farmers if the existing pattern of resource flows is to be understood and if a more efficient distribution is to be achieved in the future. Thus the argument that has been put forward that a direct comparison of incomes as between different sectors of agriculture or between agriculture and the rest of the economy is of little significance and that it is only the changes in income over time within each sector of agriculture that has real importance is clearly wrong when the major issues of agricultural policy, and particularly the question of resource flows, are under consideration.

Even the narrower question of the movements over time of the incomes of producers of particular products inevitably involves comparisons with other sectors, both within and outside agriculture. It is clear that both individuals and groups compare changes in their incomes with those around them and that these changes do have a major impact on decisions not only on resource allocation but also on social aspects of policies regarding income distribution. While this latter issue may have been of less importance in New Zealand than in other countries (for example currently in the European Community) it is nevertheless one which is likely to grow in significance over the coming years, as government is already taking a more active role in income developments in the different sectors of the economy.

1.4 Views of the Agricultural Review Committee

The question of the growing importance of economic management so far as it affects agriculture was reinforced by the Agricultural Review Committee which is charged with reporting to the Minister of Agriculture on the factors affecting farm profitability, investment and changes in output. In their most recent Report (1984) to the Minister of Agriculture, the Committee observed that "there has been a wider acceptance over the past year or two of the need for fundamental changes in the structure of the economy. A sharper appreciation has developed, of the relative importance of macro-economic policy, rather than sectoral policies, in shaping the fortunes of the agricultural sector, and thus assistance policies have come in for major review during the past year". However in spite of the terms of reference concerning farm profitability and the comments on the importance of "macro-economic policy, rather than sectoral policies, in shaping the fortunes of the agricultural sector" the Report does not give specific indication as to what has happened or is happening to farm profitability as a whole (as distinct from the profitability of the individual farming systems) in New Zealand, or to what is happening to the "fortunes of the agricultural sector".

Subsequently the Report of this Committee states that "it is important that the overall level of assistance to agricultural activities be maintained relative to that available to other broad
areas of economic activity. This is in order that agriculture can compete effectively for resources". This again clearly implies a need to have an accurate assessment of the return earned by the resources available to agriculture and while a full assessment is a complex matter, data on the net income position of farmers in nominal and real terms would be an essential component of that assessment.

1.5 Consequences of the Present Limited Knowledge

The present situation in New Zealand is that it is not possible to make reasonably accurate and up-to-date comparisons between the average income of farmers and those in other sectors or of the average income of farmers in each of the different types of farms within the agricultural sector. So far as the question of the comparison of incomes within and outside the agricultural sector is concerned, it has been argued that any such comparison would be invalid because a farmer's income is a reward for his labour, management and equity investment. Obviously any comparisons between the incomes of different groups in society have to take account of the particular circumstances of each group; few people would appear to subscribe to an absolute egalitarianism which would make no such distinctions in an income distribution policy. There is a general acceptance, for example, that professional people, with their longer period of training and greater human capital should receive larger incomes than those without such training and human capital, but that does not deter governments from making decisions on the changes in income that are deemed appropriate. Exactly the same principles apply in the case of farmers; suitable recognition can and should be given to the management and capital inputs by farmers in running what are demanding and complex businesses. No doubt there are differing views about just what is appropriate in terms of that recognition (as there is in any every other sector). However to conclude that comparisons between average farm incomes and those in other sectors is neither practicable nor meaningful, is to ignore the fact that such comparisons are made - so far as the data allows - in decisions on economic management and that this is a matter of very real public concern. Unfortunately the available data in New Zealand make such comparisons of only limited validity, and this means that major issues of economic policy cannot be as rigorously assessed as they would warrant because the data does not provide the tools with which such an assessment can be made. Certainly considerable strides have been made in this direction, particularly by the Economics Division of the Ministry of Agriculture and Fisheries, and this present paper is intended to complement the work which has been undertaken in recent years.
2.1 General Approach to Farm Income Data

Information on the average incomes of farmers and of the year to year changes are normally derived from two basic statistical sources. The first of these is the national agricultural accounts, which are usually a subset of the national accounts for the economy as a whole. The agricultural accounts give global figures for income; average incomes of farmers can then be derived providing the data is available on the number in the farm labour force to whom this income accrues. The data on both aggregate net farm income from the agricultural accounts and on the numbers in the labour force to whom this income accrues, give rise to problems in the compilation of the figures and their interpretation.

The second major source of farm income data is the set of farm incomes surveys based on the farm accounts of individual farmers. These surveys may be undertaken by one agency across all types of farm or, as in New Zealand, by a number of different agencies with interests in different farm commodities. Where farm income surveys are undertaken by one agency it is generally possible to make direct comparisons of incomes in different farm types and the results can be, and often are, aggregated into figures for all farms in the country.

2.2 National Accounts Approach in New Zealand

As in many other countries, the national agricultural accounts are the responsibility of the official Department of Statistics. The Agricultural Production Account covers all market oriented farms in New Zealand, and the data are available in two forms:

(a) the results for "Agriculture" in the published tables giving the components of Gross Domestic Product (Department of Statistics, February 1984). These are available in current prices for the years up to 1981-82, the most recently revised set of results being for the years from 1973-74. The data are also available in constant (1977-78) prices for the years from 1977-78 for the total GDP from Agriculture but not for the component items (Department of Statistics, March 1984).

(b) the results of the more detailed figures in the Agricultural Production Account, at current prices, for the years from 1973-74 to 1980-81.

These data have been supplemented by more up to date figures for aggregate net incomes from the Ministry of Agriculture and Fisheries. The figures for 1984-85 necessarily involve a considerable degree of estimation and forecasting and are therefore subject to revision. The
existence of these figures up to the current year is of considerable value in presenting an up to date assessment of farm income developments in New Zealand.

Clearly information on aggregate net income in farming, or in any other occupation, is of limited value if it is not related to the numbers of people to whom that income accrues. It is often assumed that the changes in the farm labour force are relatively small and of a uniform nature and, while this is generally true, it makes a great deal of difference if the trends are of an increasing or decreasing total number. In other countries, e.g. the European Community, the change in the agricultural labour force has been a major factor in the out-turn of changes in average farm incomes, as the decline in aggregate income in real terms has been largely offset by a comparable rate of decline in the numbers of people involved. In New Zealand the available information makes it difficult to determine trends in average incomes with any degree of confidence, for reasons set out later, and more emphasis has been put on income trends in each of the sectors of agriculture than for farming as a whole. The series on G.D.P. per head prepared by the Ministry of Agriculture and Fisheries (Johnson, 1983) gives a broad picture of the development of incomes in the agricultural sector, but it has to be recognised that G.D.P. per head in absolute terms is substantially higher than aggregate net incomes per head, and the year to year trends in these two variables do not move in an entirely parallel fashion. Furthermore the problems with the data on changes in the family labour force, as set out in the next section of this paper, are of equal relevance to this approach as to that using aggregate net income figures (as set out in Appendix 1).

2.3 Income Data from Farm Surveys

While there is no single agency in New Zealand responsible for undertaking farm surveys which provide detailed figures on net farm incomes, there is a considerable volume of published information available from a number of different sources. Farm income surveys are undertaken by four different organisations and they produce data for some eight farm types. The organisations involved are the Dairy Board, the Meat and Wool Boards' Economic Service, the Agricultural Economics Research Unit (AERU) of Lincoln College, and the Department of Statistics. The Dairy Board survey covers Factory Supply Dairy Farms, the Meat and Wool Boards' Economic Service Survey includes Sheep and Beef Farms, the AERU covers Town Milk Producers and Mixed Cropping Farms, while the Department of Statistics have surveyed Orchardists, Tobacco Growers and Commercial Gardeners. It is however not possible to compare data from these sources with that from the national accounts because farm survey data cannot be aggregated into results for New Zealand farmers as a whole. Furthermore the various farm surveys use methodologies that differ widely and conceptually they define farm income in ways which are quite different.

What is also clear is that although New Zealand is rich in the detail and variety of its farm income statistics, it is not possible to present reasonably precise data on trends in the average incomes of New Zealand farmers either in nominal or real terms. This has no doubt arisen from the absence of emphasis on trends in incomes in the farm
sector as a whole, and from the difficulties of utilising the available data to provide details on these trends. This is surprising in the light of very considerable efforts, involving a substantial volume of resources, to generate farm income figures for each of the main farm types and for some of the lesser types as well. Given the evident concern with providing these figures, it is clear that they should not only be accurate but that there should be a clear understanding of what the figures represent. As set out in detail later in this paper, there are strong reasons to question the validity of the published data and to doubt whether there is a clear understanding of the meaning of the farm income figures that are published by the variety of different bodies.

The Department of Statistics are however in the process of replacing their Farming Income surveys with a substantial series of Agriculture Economic surveys. It is the aim of that Department to cover the whole of the agricultural industry with these surveys, with the exception of three farming types already covered by other surveys which are recognised as official statistics. When this programme is fully in operation it will greatly enhance the present state of knowledge on the incomes and other economic characteristics of New Zealand farming. It is not clear however when the current discussions will be completed regarding the recognition of the Meat and Wool Boards' Economic Service Survey of Beef and Sheep Farms and the Dairy Board Factory Supply Dairy Farm Survey; these two surveys are, of course, a very large part of the total agricultural sector in New Zealand.

2.4 Sensitivity of Farm Income Data

In this connection it is necessary to recognise that net incomes in farming, as in any modern business, are the residual after deducting total expenditure from total receipts (defined in the appropriate manner). In modern developed agricultures, such as that of New Zealand, the residual item of net farm income is small in relation to the totals of expenditure and receipts. In these circumstances relatively small changes in the two main aggregates, for whatever reason, can have a very large effect on the net farm income figures. The figures for the value of total output and for total expenditure are highly dependent on the definitions used in the farm accounts, the methodology followed in finalising the accounts, the existence of any systematic bias in either of the receipts or expenditure totals (or both of them) and how the figures are collected. These issues are considered in Section 4 of this paper, but it is appropriate at this stage to draw attention to the sensitivity of the final net income figures to the procedures which are adopted in determining the two major elements of total receipts and total expenditures, and to the consequences of these factors for the figure of net farm income that finally emerges.

2.5 The Situation of Farm Income Data in Other Countries

This section has set out the alternative approaches to what is essentially the same question - what is the average income of New Zealand farmers. The problems to which these two approaches give rise are by no means unique to New Zealand; as the direct concern for farm
income developments has been much greater in other countries, the problem of accurate and meaningful data has been correspondingly in the forefront of discussions on agricultural policy. This has been especially the case in the European Community where considerable efforts are being made by the European Commission to provide improved data on the current farm income situation. In the U.K., the trends in farm incomes from the Departmental (i.e. national accounts) calculation and from farm surveys have been a matter of concern for many years. This is not to say that all the data problems have been solved, but there have been positive developments in presenting more accurate data, on a reasonably up to date basis, and the methodological problems are being tackled even though not entirely resolved.

For a number of reasons, the problem has not been seen as one of immediate concern in New Zealand. No doubt this reflects in part the general farm income situation over recent decades, but the growing economic problems currently facing farmers, and the rapid growth in government assistance to New Zealand agriculture is likely to make the issue of average farm incomes of much greater importance in the coming years. This will in turn highlight the difficulties of producing realistic data in view of the various issues which are set out in the following Sections of this paper.
SECTION 3

FARM INCOMES - THE NATIONAL ACCOUNTS APPROACH

3.1 The Computation of Average Farm Incomes

The derivation of average farm incomes from the aggregate national data involves the figures on aggregate farm income and on the number of people to whom this income accrues. Both of these elements involve some statistical difficulties but in practice it is the data concerned with the number of people which, in the New Zealand context, gives rise to difficulties which seem to be almost insurmountable. Unless some realistic solutions can be found, it will not be possible to obtain reliable data on average incomes in farming.

3.2 The Agricultural Accounts

The official figures in the Agricultural Production Account, and in the corresponding agricultural sector account of the National Accounts cover all establishments in the NZ Standard Industrial Classification major groups 111 (all types of farm, including horticulture) and 112 (agricultural services, including farm and land improvement services, topdressing, livestock and horticultural services). The Agricultural Production Account shows the operation of the farming industry (or more precisely the portion of it which is market oriented) in the form of a production account as specified by the New Zealand System of National Accounts. The Department of Statistics (Feb. 1982) recognised, however that "more than for other industries, the accounting and economic presentation of farming activities has its own specific problems (which) are related to the production process of the industry itself, its seasonal nature and its dependence on climate and other natural factors". Investment income such as dividends and interest, accruing to proprietors of farming establishments, is excluded from the agricultural production account.

The accounting concepts are different from those followed in the individual farm accounts prepared for taxation purposes, particularly in the distinction between current and capital expenditure. Individual farmers' accounts generally adhere to taxation rules which allow certain expenditures on durable assets to be treated as current expenditure, as there are incentives built into the tax system to encourage capital investment on farms. The Agricultural Production Accounts treat all capital development and construction costs as capital formation and exclude them from current expenses. There are also differences in the treatment of stock changes; in the system of national accounts, stock change is given as the value of the physical changes in stocks during a given period, measured in the appropriate prices on the market current at the time additions and withdrawals are made. Data in taxation accounts does not comply with this concept and in the Agricultural Production Account the closest feasible approximation has been made to the national accounts concepts.
3.3 Available Data from National Accounts

The most recent published series on the Agricultural Production Account for the years 1973-74 to 1980-81 does not identify a figure of net income as such but the figure for Proprietors Operating Surplus from farming activity has been regarded as representing the aggregate net income of farmers from their farming business (after an adjustment for producer board payments). In this context the Proprietors Operating Surplus is the sum available to meet personal expenditure, direct taxation, new capital investment and any savings.

For data on the agricultural sector in the more general national accounts format for the years up to 1981-82 (Department of Statistics February 1984), the figure of interest paid has not been separately identified in the Operating Surplus, so that a net income figure (in the form of Proprietors Operating Surplus) can no longer be derived directly from the data published by the Department of Statistics. However the Economics Division of the Ministry of Agriculture and Fisheries has published (MAF 1984) aggregate agricultural accounts for the period 1981-82 to 1984-85 (partly on an estimated or forecast basis) and these identify "aggregate net income" in agriculture. It is therefore possible to obtain a series of global farm income figures over the past decade, with forecasts for 1984-85. This is set out in Appendix 1, along with other data on farm incomes. However this information is only really of value, either for any one year or for any series of years when it is related to the number of people who enjoy this net farm income, and it is in this area that the greater statistical problems arise.

3.4 Changes in the Agricultural Labour Force

The assessment of changes in average farm incomes in New Zealand, particularly through the national accounts approach, involves an accurate knowledge of changes in the agricultural labour force. This in turn requires a detailed set of data on the three main categories within the agricultural labour force (farmers, relatives assisting and hired workers) on a consistent basis over the years under consideration.

The two main sources of information on the agricultural labour force are the Agricultural Statistics derived from the Annual Agricultural Census (which is carried out jointly by the Department of Statistics and the Ministry of Agriculture and Fisheries) and the New Zealand Census of Population (Department of Statistics). As the Census of Population is only carried out every five years, the Annual Agricultural Statistics are the only source of yearly data. The definition of persons working in farming in New Zealand is quite different in these two major official sources, due to the different questions on the Census form. It is therefore not possible to identify a set of figures for the farm labour force that is consistent as between the Agricultural and Population Census for 1981, even though they were taken within three months of each other. The total enumerated in the farm labour force in the Agricultural Census was some 23,000 higher than in the Population Census, and the distribution between the main categories within the farm labour force differs
sharply. The Population Census enumerated 75,000 farmers, of which nearly 73,000 were full-time and only just over 2,000 part-time; the Agricultural Census enumerated 91,000 "working owners, leaseholders and sharemilkers" of which under 66,000 were full-time (over 30 hours a week) and well over 25,000 part-time (less than 30 hours a week). While the definition of part-time in the Population Census was under 20 hours a week, this was not the main factor accounting for the number of part-time farmers in that Census being less than one tenth of those in the Agricultural Census. The explanation lies in the quite different questions on this issue asked in the questionnaire, and the fact that the respondent in the Agricultural Census is the farmer, whereas, each adult provides his or her own answer in the Population Census. The importance of this lies in the fact that it illustrates very vividly the alternative answers to what on the face of it would seem to be a very straightforward question - how many farmers and members of their families work on farms in New Zealand. There is no single answer to this question but the Agricultural Census results provide a greater volume of detail and are carried out annually, so that this would seem to be the better source.

3.5 The Situation With Regard to Employees

The problem of comparing the results of the Population Census with that for Agriculture is even more difficult in the case of hired workers. The number of "workers" enumerated in the 1981 Population Census was 61,000, whereas in the Agricultural Census only 37,000 "employees" were recorded. As this latter group included almost 9,000 casual employees and a further 7,000 "permanent part-time", it is not possible to relate this part of the labour force to the total number of part-time agricultural workers enumerated in the Population Census, which amounted to less than 6,000.

A major part of the differences in the two sets of Census data arises from the problem of recording "unpaid members of family assisting in farm work". In the Agricultural Statistics over 20,000 were recorded in this category in 1981; but only 2,300 were recorded as relatives assisting in the workers category in the occupational classification with a further 1,800 as relatives assisting in the farmer category in the Population Census results for 1981.

It is evident that the differences in the numbers of farmers and members of their family working on farms between the two sets of official figures cannot be reconciled by reference to the numbers in the farm workers or farm employees category. In view of the importance of employment as an issue in economic policy, it is clear that further consideration should be given to the question of providing meaningful data on the size and changes in the farm labour force in New Zealand.

3.6 Reasons for Differences in Census Data

The very considerable differences between the two sets of Census data, taken at such a short time interval, almost certainly reflect the precise wording of the questions in the Census forms, and the interpretation of that wording by the people filling in the forms (for
example the Agricultural Census instructions in relation to "working owners leaseholders and sharemilkers" are to "exclude wife/husband who does not have a financial interest in farm", but it is far from certain that "a financial interest" would be interpreted in the same way by all those filling in the form). The variations in the results no doubt also reflect the different sets of instructions accompanying the two forms.

3.7 Reservations on Labour Force Data

An equally serious problem arising with the data on the farm labour force is the irregular nature of the series over time in the Agricultural Census, which gives annual data going back over many years. The data on the farm labour force as published annually in the official Agricultural Statistics (Table 1) involve two related questions. Firstly, is the trend in the data for the total farm labour force validly represented, and secondly are the changes in the individual components real.

So far as the trend in the total labour force is concerned, this showed a reasonably steady fall from around 120,000 (in full-time equivalent labour units) down to 103,000 by the early seventies but a considerable growth since then to over 125,000. These changes should be seen in relation to those in the volume of farm production, which grew by 90 per cent from 1950 to 1972/73, but only by a further 10 per cent since then. The implication of this is that, on the basis of the published data, output per unit of labour improved by some 4 per cent per year from 1950 to 1972/73, but since then has declined by about 1 per cent per year to the present time. If this change was in fact a reality, then the massive investment in New Zealand agriculture, both at farm level and in the off-farm work on research, advice, education etc, would seem to have given a very poor return.

However the validity of the farm employment figures must be treated with considerable reservation. Apart from the implications for labour productivity, as set out above, an upward trend of the total farm labour force in New Zealand of some 2 per cent per year over the past decade would be against the trend in other developed economies of the world. In the European Community for example, the average decline in the farm labour force has been in excess of 2 per cent annually for the past decade, and this applies both to the more wealthy countries (such as Germany, France, Denmark, the Netherlands and the UK) and the less wealthy ones (Ireland and Greece which have a relatively large agricultural sector).

3.8 Possible Explanations of the Labour Force Changes

The most likely explanation of the New Zealand data on the farm labour force would seem to be that there is a strong bias in the figures for the past 10 years or so, and that this invalidates the comparability of the data over time. This would appear to be confirmed by the warning in the New Zealand Official Year Book that the figures on the Farm Employment Survey at 30 June 1981 are not comparable with previous years (though in the publication of Agricultural Statistics for 1980-81 and 1981-82, much of this data is given in the form of a
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Source: Agricultural Statistics, Department of Statistics, Wellington.
time series, so it is not clear what figures are not comparable). One possible explanation of this bias in the farm employment figures is that there are seen to be benefits under the taxation code for members of the farmers family to be declared as part of the labour force and that this has led to a change in the numbers recorded in the Agricultural Statistics.

The trends over the past decade may also be explained at least in part by the shortfall of farms on the Agriculture Register (i.e. the Register on which the Annual Agricultural Census is based). This is likely to have had an effect on the employment statistics reported in the Census returns, especially on the numbers of working owners. The Department of Statistics has been undertaking a major check of its Agricultural Register against the records of the Valuation Department on a County basis. The completion of the check on Franklin County for example brought into the Census 458 new farms with an area of over 5200 hectares. Approximately two thirds of these farms were over five hectares and in the main were actively used for farming purposes. It is to be expected that the completion of this check of the Agricultural Register on a national basis will bring a substantial number of farms into the Census, though it will not be possible to determine exactly when these farms should have been included in the annual results. It seems doubtful therefore whether it will be possible to make any adjustments to the published data for earlier years in the light of these additions to the Agricultural Register so that the time series data will include some unavoidable inconsistencies.

3.9 Trends in the Components of the Labour Force

This explanation of a persistent bias in the farm labour force data is reinforced by an examination of the trends in some of the individual components particularly, though not exclusively, those relating to the number of females. The number of female working owners, leaseholders and sharemilkers recorded in the official statistics has virtually trebled over the decade from 1972 to 1982, while the recorded number of female unpaid members of family assisting in farm work has almost doubled in this same period.

In the case of male working owners some remarkable changes also take place. In the Agricultural Statistics for 1981-82, the number of male owners working less than 30 hours increased by almost a quarter in 1982, having apparently been virtually unchanged in the previous five years.

These large upward trends in the numbers in the family labour force are in contrast to those in the numbers of employees. The number of permanent employees (both part-time and full-time) has declined by over 10 per cent over the decade to 1982, and the decline has been very steep over the past five years (as the numbers of employees actually grew in the first five years of this period).
3.10 Observations on the Farm Labour Force Statistics by Other Bodies

The statistics on Labour in Agriculture were studied in some detail in a Report on Rural Change: Farming and the Rural Community in the 1970's (New Zealand Planning Council and the Centre for Agricultural Policy Studies, Massey University 1982). Having examined the figures for the 1970's, this report concluded that a number of the trends "are hard to explain if the series are in fact consistent" and offer four "speculations" as the causes:

(a) the statistics may be wrong.

(b) there may be some long-term demographic influences at work, including older persons staying on farms as a second working owner.

(c) there may be a move towards more female working owners who include sharemilkers' wives due to taxation and other concessions.

(d) there may be some unknown effect from smallholdings.

The authors conclude that "one cannot prefer any particular piece of speculation, and that because of the uncertainty in interpretation most of the data on labour has been restricted to an Appendix in the Report".

A study on "Agricultural Labour 1950-1980" published by the Economics Division of the Ministry of Agriculture and Fisheries (Bushnell & Gibson, 1982) begins by saying that "considerable confusion exists over the trends in agricultural labour". In estimating the "total full-time equivalents for all labour" the authors exclude unpaid family labour from their final series "because of the difficulty in assessing their contribution to farm output from 1950-1980". This procedure, however, overcomes a considerable part of the problem by excluding it; clearly the unpaid labour force is a significant element in the total farm labour force. The problem is not really just one of assessing the contribution of the unpaid family labour force to farm output but one of an effective method of recording the numbers and farm work time of such family members. As already discussed, this problem is by no means confined to the unpaid labour force but arises with the other categories of family labour. The procedure adopted by Bushnell & Gibson might be the way of dealing with this question as it goes some way towards meeting the inherent difficulties, but it does not resolve them. For example in their discussion of the numbers of full-time working owners, leaseholders and sharemilkers, the authors refer to the "change in the response to the questionnaire as a result of the new question" on part-time owners in 1976, "even though the same question was requested on full-time owners as in earlier years". While this is most evident for the 1976 data, it seems unlikely that this problem arose only in that particular context; it has almost certainly arisen in other years and for other categories but not with quite the same immediate effects.
3.11 Implications of the Available Statistics

It would therefore appear that the changes in the agricultural labour force in recent years, as recorded in the official statistics, do not follow the same pattern as in other comparable economies or the trend in the decades preceding the most recent one. While there have been significant changes in the factors affecting the number of people working on the land, these would not appear to be of a character that would explain the very unusual changes that have taken place. There has been a growth in the number of intensively run horticultural holdings, but the total number of such holdings in the most recent Agricultural Census is not of sufficient magnitude to account for the changes recorded in agricultural employment. Furthermore it is evident that the official statisticians have warned that the data are not comparable from year to year and this clearly indicates the problems involved in using these data to determine changes in average farm incomes.

It would therefore appear that there are no sufficiently accurate figures of the size in any one year or the changes from year to year, in the farm labour force to provide the information needed to establish per capita farm incomes. There are evident difficulties in collecting meaningful figures when there is a strong bias in the data. How this can be overcome is not immediately evident. Until the problem is resolved however, the qualifications attached to the data have to be so large as to make it difficult to provide any realistic interpretation of the published figures, either on their own account or as one of the determinants of changes in average incomes of New Zealand farmers.
4.1 Inherent Difficulties of Farm Incomes Surveys

The lack of data on average farm incomes for all New Zealand farmers and their families is compensated for in part at least by the considerable amount of data available from farm income surveys. While these surveys vary widely in their approach to the issue, they are all concerned with net farm incomes in each of the sectors concerned. In practice, however, their outcome depends on widely differing interpretations of how the farm income figures should be derived from the basic available data.

These differing interpretations have given rise to strong misgivings as to the validity of the results of farm income surveys. These have been most explicitly and authoritatively expressed in the Report of the Review Committee on Agricultural Statistics (1979) which identified a number of problems with income surveys, ranging from basic definitions and sample design through to timeliness of publication. The report drew attention to specific problems

(a) "that staff engaged on surveys must have a sound knowledge of farm accounts and taxation and the ability to understand accounts in various formats", but "staff having these special abilities are not always available".

(b) "the Farmers Surveys are nearly all characterised by the use of dubious, arbitrary, convenience sampling methods with the only exception being the Tobacco Growers Incomes where a Census is taken",

(c) "from meeting the publication target date in 1971-72, the situation has deteriorated to the point where the publication target date has been missed by approximately nine months" (this criticism did not apply to the survey reports on Town Milk Producers and Factory Supply Dairy Farms, which were produced earlier by 4 months and 1 month respectively, than the target publication date),

(d) "as the surveys only cover individual farmers and exclude companies, partnerships, trusts, etc. (which make up a large proportion of farms today), they are not providing full information on the financial state of the activity",

(e) "the surveys do not consciously introduce new farmers into the sample" and are "only picking up the established farmer who will have a different cash profile to the farmer just starting out".
The lower limit for inclusion in many of the surveys now seems too low for the farm to be an economic unit.

The Report of the Review Committee then commented that "the above deficiencies have resulted in three published surveys being superseded, and duplicated to some extent by the producer board surveys, and some surveys remaining unpublished because of the dubious nature of the figures". Since this Report was published there have been considerable improvements in the income surveys but at the same time some major aspects still remain the cause of considerable doubts.

The main improvements have been in the measures taken to improve the statistical validity of the data, both in the revised sampling procedures which have been adopted, in the stratification of the results with the consequential weighting of the sample data to give more reliable results for the field of survey and in the publication of confidence levels and standard errors for the major variables. The revised sampling procedures have overcome the bias associated with "picking up established farmers" and new farmers are now very consciously introduced into the sample of farmers in the various surveys. In addition, efforts have clearly been made to publish results as soon as is practicable, and a substantial volume of current data based on fairly sophisticated estimating and forecasting techniques is now available for the major sectors of farming.

4.2 Lower Size Limit for Inclusion

The criticism of the inclusion in many of the surveys of farms below the limit of an economic unit should be seen in the light of the objectives of these surveys. If the objective is to assess incomes on farms of an economically viable size, then the inclusion of farms below that size is clearly inappropriate. On the other hand if the objective is to assess the incomes of all farmers in a particular farm sector, then the omission of the smaller farms would lead to invalid results. In these circumstances the outcome of any farm income survey would depend upon the precise definition of the group of farmers to be included, and if uneconomic farmers are to be excluded the outcome would depend upon just which farmers are deemed uneconomic. The wider definition of the appropriate population gives rise to the question of just who are "farmers" whose income is being measured. This is not an intrinsically difficult question to answer though it may create some difficulties in practice.

The problems of definition of the farm labour force, and of farmers in particular, have been discussed in an earlier section of the paper but in so far as "dairy farms" or "beef and sheep farms" etc. are taken to represent the total population of such farms, then the exclusion of certain categories of smaller farms from the survey would mean that the published results would represent only a section of the total population.
4.3 Representivity

The details included in the published data can also be somewhat unrepresentative. The fact that the results of the 1981-82 Economic Survey of Factory Supply Dairy Farms show Net Farming Income of farms with 30-34 cows increasing from $-4181 to $4492 from 1980-81 to 1981-82, while net incomes on farms supplying 3,000-6,999 kg milkfat fell from $4,387 to $591, must be seen in the light of the size of the sample of farms in each case; there were just 2 farms in the category 30-39 cows and 8 farms in the category 3,000-6,999 kg milkfat (and only 6 in the 1980-81 survey). The publication of results based on extremely small sample sizes can lead to a misunderstanding of what is actually happening; if it is intended to publish data relating to categories of farm of only a small total number, then it would be desirable to increase the sampling fraction in these groups to give a minimum size in the sample for each category for which data is published. Only in this way can reliable estimates be provided.

4.4 Remaining Unresolved Issues

The improvements in the Farm Survey data in recent years, and particularly in the statistical procedures that have been adopted still leave three major questions unresolved:-

(a) the problem of non-respondents
(b) the bias in the data itself
(c) the concept of net farm income as defined in the different surveys

So far as the question of non-respondents is concerned, the problem can be seen particularly clearly in the results of the Economic Survey of Factory Supply Dairy Farms. In the 1981-82 Survey, of the farmers approached and reminded when necessary, 41 per cent made their accounts available and 81 per cent of these accounts could be used in the survey. While some of the dairy farmers who did make their accounts available may have been subsequently omitted because they do not meet the criteria laid down for inclusion in the Survey, the position is that the overall effective response rate was less than one third of the sample actually chosen and the position in the previous year was virtually the same. Non-response rates in excess of two thirds of the sample must throw considerable doubt on the validity of the published results - doubts which are not resolved by the low standard errors in the results of the final participants. If the non-respondents had specific characteristics different from the respondents, it is possible that the standard errors of the group of participants could be smaller than the standard error in a sample which had a 100 per cent response rate; the statistical analysis of the results could in these circumstances give the appearance of greater validity than was justified. The Report of the Dairy Board Survey is commendable in that it gives details of the response rate; while this information is available in most other Farm Income Survey Reports, it is not always generally possible to form a full picture of this aspect of the statistical validity of the results. This information is required to form any view as to the reliability of the published data.
In this connection it should be noted that the Review Committee on Agricultural Statistics, in recommending the Town Milk Producers Survey be recognised as a source of official statistics, did so on the basis that the response rate should not be allowed to drop below its present level.

4.5 Problem of Systematic Bias

The question of bias in the data itself arises from the fact that, so far as can be ascertained, all the farm income surveys are based on accounts prepared for farm taxation purposes. This gives rise to two immediate problems.

(a) the definition of income for taxation purposes, particularly for incomes among various categories of business activities, is different from the definition of income in normal everyday use. In particular, the inclusion of Special and Initial Depreciation, over and above Ordinary Depreciation is purely a tax matter and deductions on this score would not normally be made were they not provided for in the taxation code. It is presumably this factor which gives rise to the comment in the report of the Meat and Wool Boards' Economic Service Surveys that the depreciation figure "may not represent the true diminution in the value of farm assets". Furthermore farm development expenses have generally been treated as of a current nature (because they are allowed for tax purposes) and interest payments have been charged even where these arise in part on the investment in the farm dwelling, whereas in other sectors interest payments on a house mortgage would be regarded as a payment to be met from net income, not one which is charged before the net income figure is determined.

(b) the use of income data for taxation purposes as the source of figures on net farm income must give rise to concern about the likelihood of a systematic bias in the results. While it must be recognised that the accounts have been prepared by qualified accountants, there is an evident reason for the farm income position in the individual farm being presented in such a way as to minimise the actual tax liability. This is largely related to the product values used in the opening and closing valuation. It is not possible to assess how serious this factor is in relation to the results as this is not a random bias but one which is bound to be of a downward nature. This has been recognised by the Department of Statistics, in their commentary on the results of the Agriculture Production Account that "there is a bias, in taxation accounts towards an understatement of the true profit or surplus of the farming industry" (Department of Statistics, February 1982).

2. In so far as development expenses are construed as Repairs and Maintenance and charged in as a current cost, the statement that "net income must meet all development costs" is not correct.
In the case of the Economic Survey of New Zealand Wheatgrowers', the data on farm expenditure is "as presented in the financial statement with the following adjustments if applicable" (Lough & McCartin, 1983).

(1) Appropriation of private car expenses

(2) Deletion of Managerial salaries

(3) Deletion of special depreciation allowance but replaced by depreciation based on an estimate of current market value.

(4) Deletion of itemised development expenses

At the same time, depreciation is calculated on the basis of current market values, rather than on historical cost as is more generally the case. This means that the treatment of the depreciation charge is different in this survey to that in the other farm income surveys. In terms of a procedure that would give a more meaningful definition of farm profit and one closer to that in the national accounts approach, this would appear to be fully justified. It means however that farm income surveys which do not make such adjustments are less meaningful to the ordinary user of the results and that these results are substantially different to the results of other farm surveys which use alternative methods.

4.6 Concept of Farm Income Adopted

The concept of net farm income used in these surveys is an important issue, as the figures that are published reflect clearly differing concepts. This makes it virtually impossible to compare data from the different surveys; it is doubtful if any but the most astute user of the data is fully aware of the pitfalls in making comparisons between the income figures for the different farm types in any year.

The major differences arise in the case of treatment of labour, particularly family labour. The Factory Supply Dairy Farm survey charges "wages actually paid to employees and family for work done on the farm. Ration allowance if claimed". However "in the case of farms operated by two full-time working partners (for example two brothers) the farm accounts were adjusted to an owner operator basis. One partner was regarded as the unpaid working owner. The other was treated as an employee at an assessed wage of $8,300". In the Town Milk Producers Survey, however, all family labour other than that of the farmer, is charged in as a cost, irrespective of whether it was actually paid or not. This survey again includes an adjustment of partnerships to a sole ownership basis, with an "imputed wage of $9,980 per annum for a second family member of a partnership". There are two major differences between the treatment of family labour in the two surveys, (i.e. in the imputing of wages to unpaid family labour and in the costs per unit where there is a measure of comparable treatment) and this difference in treatment accounts for a large part of the difference in labour costs in the 1981-2 results, i.e. $13,740 for Town Milk Suppliers but only $4,114 for Factory Supply Farms. As the average Net Farming Incomes were $24,191 and $20,930 respectively, the
differences in labour costs of about $10,000 is of major significance in these results. Had the Factory Farm Survey charged labour in the identical manner to that used in the Town Milk Suppliers Survey, then the average net incomes on the Factory Supply Farm would have been very substantially lower than those actually shown.

In the case of the Meat and Wool Boards' Economic Service Sheep and Beef Farm Survey, a different methodology again is adopted; "Wages" represent wages actually paid, with a separate item for Managerial Salaries, again for "actual cash paid for farm management". No notional charges are imputed for any family labour and the results, including that for Net Farm Income, are presented on a per farm basis. The per farm basis is used because "it depicts the structure of sheep farming in New Zealand where around 36 per cent of farms have individual ownership and the remainder are held by trusts, companies, estates or some combination of these farms of ownership"; the Reports of this survey emphasise that "the data presented does not refer to individual owners but to individual farm properties". A figure of net income for "single owner" farms is however given from the 35 per cent subset of the total sample which is in this form of ownership, but these farms are substantially smaller (321 hectares) than those in the total sample (508 hectares) and the size of the farm business is correspondingly smaller. In practice the difference in net incomes between the "all farm average" ($21,698) and the single owner farms ($13,171) reflects overwhelmingly the difference in the size of the farm business, and not any difference in the treatment of items in the accounts, or whether the figures are "per farm" rather than "per farmer". There is therefore no basis on which the net income figures from the survey of Dairy Supply Farm, Town Milk Producers and the Beef and Sheep Farms can be compared because of the difference in methodologies which are adopted in relation to the treatment of the labour factor in the accounts, apart from other aspects of the methodology. Such major differences have a very large effect on the figure of Net Farm Income as it is actually shown, and this cannot in any way be ascribed to inherent differences that would justify a different concept of Net Farm Incomes in these three different types of farm.

4.7 Other Conceptual Difficulties

These differences in methodology do not, however, occur only in the case of the labour factor. The treatment of interest payments in the farm income survey is also the subject of major differences. In most of the surveys, payments of interest actually made are charged in as a cost before arriving at the figure of net income. In the case of net orchard incomes, as set out in the tables of Orchard Income and Expenditure, published by the Ministry of Agriculture and Fisheries in New Zealand Agricultural Statistics (1984), the definition of net orchard income is before charging interest. These are often very substantial in the case of orchards; for example on mature orchards of kiwifruit, the net orchard income is reported as $50,250 for 1983-84 but this has to cover debt servicing costs including interest. The financial charges on these farms amount to $35,336, so that the net orchard income, after paying interest, was under $15,000 in 1983-84 — a considerably smaller sum than the figure for net orchard income of over
$50,000. Even with the qualification that net orchard income has to cover interest charges, the figure of net orchard income has an unusual definition (though it is one followed in the data on other types of orchard in the official publication 'New Zealand Agricultural Statistics', but not followed in the farm income surveys of other farm types).

4.8 Use of Farm Income Data for Determining Trends Within Farm Sectors

The differences in the treatment of the individual cost items, and the consequential differences in the concept of Net Farm Income, are of course of less significance where the results of the surveys are used solely for year to year changes within any farm sector rather than for comparisons between different farm types or between farming and incomes in other occupations. While individual surveys may be concerned solely with internal time series comparisons the fact remains that published data are used for making income comparisons with other groups. It is not however entirely true that as long as the purpose of the surveys is time series data for particular farm types, then the concept of Net Farm Income is of little importance as the concept itself is unchanged from one year to the next. Definitions of Net Farm Income which tend to include every possible item of cost and thus to lead to relatively low estimates of income will tend of their very nature to show much greater year to year changes on a percentage or index basis than those definitions which tend to keep costs to a more restricted level and therefore show larger net incomes.

Moreover it is not even evident that the concept of farm income itself remains unchanged even for any one survey. The fact that accounts for tax purposes are the basis of the income figures has meant that the changes in tax allowances for depreciation etc are reflected in the farm income figures — but clearly these changes do not reflect real changes in income, although the published figures would imply that there has been a change.

4.9 Non-Comparability of Existing Survey Results

The inherent differences between the various farm income surveys have two major consequences. In the first place the results cannot be compared, as the concept of income and the treatment of a number of individual items in the farm accounts give rise to such substantive differences that the figures of income have quite different meanings in the different surveys. While some of those involved have argued that there is no intention of compiling income data for comparative purposes, the fact remains that the level of income of any one group in society, when related to that of other groups, acts as one of the most powerful stimuli in modern society.

The second consequence is that the inherent methodological and conceptual differences bring about different answers to the question of the level of incomes in different sectors of agriculture which have no basis in the reality of the income position. The concept and definition of farm income should not vary as between dairy farms and
sheep farms or between tillage farms and orchards; there is no justification whatsoever for having different definitions etc. in different farm systems. Whatever the average farm income is in a particular farm system should in no way be a function of the particular methodology; there is no basis for the variety of different answers currently generated in New Zealand to the same question — what are average farm incomes in the different farm types. This is not just a matter of marginal importance: the differences in the definitions and methodologies, the problems of systematic bias, and the unresolved statistical problems are of such a magnitude that it is not possible to draw any but the broadest and most general conclusions from the considerable volume of information currently available. Given the importance of the subject, particularly in the decisions of policy makers, and the level of resources being invested into farm income surveys, the present position is in need of substantial revision.
SECTION 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Need for Farm Income Statistics

The effective operation of agricultural policy in New Zealand, as in other countries, requires an accurate knowledge of the current levels of average farm incomes, the trends in those incomes and the population to whom that income accrues. This information should be available not only for farming as a whole but also for each of the main farm types, on a basis that makes for valid comparison between them. Income data, particularly if it is of a current as well as historical character, is an essential element in any analysis that would assess and understand the forces motivating the flow of resources into agriculture and between the various sectors within agriculture. This information can be derived from both national accounts sources and from farm surveys.

5.2 Problems of the National Accounts Approach

At the present time, in spite of the considerable efforts that are being made to collect data concerning the farm income situation in New Zealand, either through the global national accounts approach or through the Farm Income Survey approach, the present state of knowledge on per capita incomes is not satisfactory. So far as the global approach is concerned, the publication by the Ministry of Agriculture and Fisheries of an aggregate net income figure, including a forecast for the current year, provides the basic information on global farm incomes. An understanding of that figure however requires a knowledge of the number of people amongst whom it is distributed. Obviously it makes a great deal of difference if the total income is spread among a large and increasing number of people or between a smaller and declining number. Unfortunately the data on the size of the agricultural labour force, and particularly on the farm family labour force is extremely difficult to interpret given the trends which have been reported in the published statistics. There is no evident way in which this problem can be resolved without further study of the data currently available on the numbers of people in the farm labour force.

It is evident that in recent years women have become far more widely recognised as working owners on farms, and that this has given rise to a rapid increase in the numbers in this category recorded in the Annual Agricultural Statistics. This trend has been due to a combination of two separate factors. The first is the increased awareness of the work that women have traditionally undertaken on farms but which has largely gone unrecorded in the past; the second factor is the growth in the actual volume of farm work of women over recent years. It is not possible to determine the relative importance of these factors; what is clear is that this combination has brought about a very large growth in the numbers of female working owners recorded in
the official statistics.

5.3 Recommendation on Farm Labour Force Statistics

It is recommended therefore that a study of the ways in which meaningful data could be collected on the numbers in the farm labour force should be undertaken as a matter of urgency. Such a study can only be made with the full involvement of the Department of Statistics. It is suggested that the Department should initiate such a study, either from within its own staff resources or through commissioning a study by an appropriate independent research agency. However, it should be stressed that a study by an outside agency is likely to be effective only if it has the active support and involvement of the Department of Statistics. Unless such a study can resolve the basic issues relating to the enumeration of the farm labour force, it is difficult to see the justification for continuing to ask farmers to complete the section of the Annual Agriculture Census form dealing with employment. This has been the case in Australia, where the Bureau of Statistics has dropped the employment question on their census questionnaire due to the problems they had experienced. However, given that the level of employment is one of the key issues in economic policy, the absence of up-to-date data on agriculture employment would be most undesirable.

5.4 Current Position on Data on Aggregate Farm Income

So far as the data on aggregate net income is concerned, the publication of current data (including forecasts for the forthcoming year) by the Economics Division of the Ministry of Agriculture and Fisheries is to be particularly welcomed. While this does not purport to represent the total net income of farmers from all sources, it gives a figure of income from the farming activity and as such is of more value than figures which included income from non-farm sources. Some further discussion of the methodology of these aggregate income statistics and of the forecasts of the current year out-turn would be welcome but this should be concerned with improvements in the data presently available rather than any substantial revision of the present procedures.

5.5 Recommendation on Farm Income Surveys

Most of the farm income statistics in New Zealand are derived from special Farm Income Surveys undertaken by a number of different organisations. The net income figures which are published at present involve basic statistical inadequacies, widely differing methodologies and are based on farm accounts data which would appear to have a clear bias. It is doubtful if the published results can be regarded as giving a reasonable representation of the situation. In these circumstances there is an evident need for a re-examination of the surveys by a competent authority and a detailed appraisal of measures which might be taken to provide more accurate data on the income situation of farmers. Given the volume of scarce resources spent on the present set of surveys, there is a strong case for such a
re-examination to be undertaken as a matter of urgency. The most appropriate body for this exercise is the Department of Statistics, perhaps through a re-convening of the Review Committee on Agricultural Statistics which reported its previous examination in March 1979. This Committee should exercise sufficient powers of persuasion to require non-government agencies to adopt a uniform approach to methodology for all Farm Income Surveys, so that results are published which do have sufficient reliability to be of value in agricultural policy decisions.

5.6 Alternative Measures of Farm Prosperity

Consideration should be given to producing alternative measures of the economic health of farming, and of the different sectors within farming. Clearly it would be undesirable to generate a proliferation of indices of one sort or another. At the same time total reliance on data on the level of net farm income, even when this is on a national and uniform basis, may be an inadequate expression of the true economic situation. One measure that has already become of considerable importance at the individual farm level is the cash flow situation, and this could usefully be extended to groups of farms or to farming as a whole. Such a measure would not be generated overnight, but it already is used in some surveys and could be gradually extended to give the same coverage as is already available for net farm income statistics.

5.7 Conclusions

There is every reason to believe that the two key questions with which this paper is concerned - the level of farm income and the number of people whose work creates that income - will be of growing concern in the coming years. The statistical problems involved are by no means easily resolved and are likely to require some measure of approximation. These problems could be overcome, with the help and advice of those most competent to help in these matters and a considerable measure of uniformity in the technical aspects of the work. The information is essential if agriculture in New Zealand is to achieve its optimum development in a very uncertain world.
REFERENCES


This appendix is concerned with the figures of average farm incomes, both for agriculture as a whole and for the farm types for which data are available. No attempt has been made to standardise the data and the various qualifications about the validity of the figures set out earlier apply in full. It could be argued, with justification, that these qualifications are of such weight as to make the setting down of the various farm income data of little merit. However in order to complete this paper, the figures have been extracted or derived from published sources, but no conclusions should be drawn from these figures, either on a cross-sectional basis or on a time series basis.

### Al Average Farm Incomes All Farmers (National Accounts Approach)

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<tbody>
<tr>
<td>Aggregate Net Farm Income ($'000)</td>
<td>616</td>
<td>939</td>
<td>1,288</td>
<td>1,088</td>
<td>1,204</td>
</tr>
<tr>
<td>Total No. of Farmers and Family (Full-time equivalents)</td>
<td>87,793</td>
<td>88,604</td>
<td>94,168</td>
<td>97,786</td>
<td>100,461</td>
</tr>
<tr>
<td>Average Income per Head ($)</td>
<td>7,006</td>
<td>10,598</td>
<td>13,678</td>
<td>11,126</td>
<td>11,962</td>
</tr>
<tr>
<td>Average Income - Real Terms (1977-78 = 1,000)</td>
<td>1,000</td>
<td>932</td>
<td>1,028</td>
<td>724</td>
<td>701</td>
</tr>
</tbody>
</table>

Source of Data: Aggregate Net Farm Income. Ministry of Agriculture and Fisheries Agricultural Statistics. Number of Farmers and Family. Agricultural Statistics for the relevant years. Includes unpaid members of family, as recorded. Persons working over 30 hours included as one full-time equivalent; those working less than 30 hours as one half full-time equivalent.
### A2 Incomes on Sheep and Beef Farms
(Source: New Zealand Meat and Wool Boards' Economic Service)

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<tbody>
<tr>
<td>&quot;All Farms&quot; ($)</td>
<td>13,888</td>
<td>19,494</td>
<td>24,772</td>
<td>21,698</td>
<td>21,401</td>
</tr>
<tr>
<td>&quot;Single Owner Farms&quot; ($)</td>
<td>8,731</td>
<td>13,160</td>
<td>16,634</td>
<td>13,171</td>
<td>13,965</td>
</tr>
</tbody>
</table>

Sample: Random, stratified by region and flock size of farms which winter at least 750 sheep or their equivalent sheep plus cattle stock units, with 80 per cent of farm revenue derived from sheep or sheep plus beef cattle, and run as an ordinary sheep farm (i.e. not as a stud or dealer type farm). Variable sampling fractions used for different strata. No details given on response rate, or on the statistical validity of the published results.

Source of Farm Data: Farm accounts, supplemented by direct visits by District Officers who collect additional data not included in farm accounts, particularly data on the physical aspects of the farm.

### A3 Incomes on Factory Supply Dairy Farms
(Source: New Zealand Dairy Board)

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<tbody>
<tr>
<td>10,155</td>
<td>13,341</td>
<td>13,742</td>
<td>15,188</td>
<td>18,190</td>
<td></td>
</tr>
</tbody>
</table>

Sample: Random, stratified by region and milkfat output of farms milking 30 or more cows
- supplying a dairy factory
- deriving at least 75 per cent gross income from dairying
- not employing a sharemilker
- not supplying town milk
- with suitable double entry accounts covering a 12 month period

Response Rate: Of the farmers approached for the 1981-82 survey and reminded when necessary, 41 per cent made their accounts available and 81 per cent of these accounts could be used (i.e. 33 per cent of farmers approached were actually included in survey).

Statistical Validity: 95 per cent Confidence Levels given for the 1981-82 all farms averages for milkfat output, Gross Farm Income, Cash
Expenses, Net Farm Income, Total Assets, Liabilities, Equity. However the low response rate makes the validity of these results a matter of considerable doubt.

A4 Incomes of Town Milk Producers
(Source: Agricultural Economics Research Unit, Lincoln College)

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</thead>
<tbody>
<tr>
<td>Net Farm Income ($/farm)</td>
<td>15,195</td>
<td>18,500</td>
<td>16,709</td>
<td>19,668</td>
<td>24,191</td>
</tr>
</tbody>
</table>

Sample: Random 75 per cent of the farms that participated on the 1980-81 survey were retained for the 1981-82. The other 25 per cent were excluded and replaced by a new random selection of farms. All town milk farms were eligible provided:

(a) farm supplied a producer association with a nominated quantity of more than 7,500 litres daily
(b) farm itself had a daily quota of more than 200 litres
(c) farm received at least 75 per cent of gross revenue from milk
(d) farm employed no sharemilker
(e) farm produced milk over the 12 months of the survey period

Response Rate: Of the 230 farmers approached in the 1981-82 survey 41 were ineligible and 37 declined to provide data.

Statistical Validity: Relative standard error (i.e. the standard error divided by the mean) given for all the main variables.

Source of Farm Data: Farm accounts supplemented by direct questions.

A5 Incomes of Wheatgrowers
(Source: Agricultural Economics Research Unit, Lincoln College)

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<tbody>
<tr>
<td>Net Farm Profit ($)</td>
<td>13,642</td>
<td>12,200</td>
<td>18,456</td>
<td>18,456</td>
<td>11,515</td>
</tr>
</tbody>
</table>
Sample: Sample of all farms which delivered wheat to the Wheat Board over the most recent five year period for which records were available. Approximately 75 per cent of those who participated in the 1981-82 survey (Survey No. 6) were retained for the 1982-83 survey. The sample was stratified by region.

Statistical Validity: Relative standard error given for the most important cost and revenue items.

Response Rate: Of the 180 farms in the 1981-82 survey, 58 per cent provided financial statements suitable for analysis, 8 per cent were unsuitable and 34 per cent were unable or refused to provide financial statements.

Source of Data: Information relating to the farm, its management, crop and livestock enterprises, wheatgrowing costs and returns were obtained from farmers by personal interview conducted in a farm visit. Accounts results sent by farmers or accountants directly to the Agricultural Economics Research Unit.

A6 Incomes of Pig Producers
(Source: Department of Statistics)

<table>
<thead>
<tr>
<th></th>
<th>1980-81</th>
<th>1981-82</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Farming Income ($ per farm)</td>
<td>14,280</td>
<td>20,813</td>
</tr>
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</table>

Sample (1980-81): A statistically representative sample of 279 pig farm units selected from the 629 farms classified as pig farms in the 1979-80 Agriculture Census. Of those selected in the sample, 56 had either changed their farming activity or ceased to exist since the 1979-80 Agriculture Census and were subsequently excluded from the survey. The remaining 223 farms surveyed are estimated to correspond to 502 units classified as pig farms in the 1979-80 census and still in existence as such at the time of this survey. No allowance was made for a unit which came into pig farming in the survey year.

Response Rate: No data given, but it is understood that around 85 per cent of those remaining in pig farming in the year of the survey and asked to participate actually did so.

Statistical Validity: No data given.
## A7 Incomes of Tobacco Growers
(Source: Department of Statistics)

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</thead>
<tbody>
<tr>
<td>Persons</td>
<td>9,529</td>
<td>9,139</td>
<td>8,931</td>
<td>10,540</td>
<td>10,169</td>
</tr>
<tr>
<td>Partnerships</td>
<td>12,060</td>
<td>11,970</td>
<td>10,888</td>
<td>13,271</td>
<td>15,944</td>
</tr>
<tr>
<td>Companies</td>
<td>4,393</td>
<td>4,393</td>
<td>3,227</td>
<td>3,524</td>
<td>2,491</td>
</tr>
<tr>
<td>(+ Shareholders remuneration)</td>
<td>(10,039)</td>
<td>(11,909)</td>
<td>(13,364)</td>
<td>(13,620)</td>
<td>(13,484)</td>
</tr>
</tbody>
</table>

Sample: Tobacco growers, including partnerships and companies, who utilise a minimum of 1.6 hectares of land for tobacco growing and derive 75 per cent or more of gross farming income from tobacco growing. This definition meant that the small part-time grower was substantially excluded from the survey. In 1979-80 the survey covered 101 persons, 33 partnerships and 30 companies.

Response Rate: No details given.

Statistical Validity: No details given.

Source of Farm Data: The annual return for income tax purposes and "it should be noted that the accounting concepts and the definition of net income itself are governed by the Income Tax Act 1976 and such of its amendments as may affect that type of farming".