ECONOMIC ASPECTS OF AGRICULTURAL EDUCATION AND TRAINING IN NEW ZEALAND

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Discussion Paper No. 95

July 1985

Agricultural Economics Research Unit
Lincoln College
Canterbury
New Zealand

ISSN 0110-7720

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PREFACE

It has long been recognised in New Zealand that various forms of education are major ingredients in an efficient farm sector - for the individuals and families and the nation as a whole. Farm organisations and other institutions have played major roles in this area. Dr Attwood, in this report focuses on the vocational training aspect of education and farming. In his work he not only provides a comprehensive overview of the system but makes a preliminary quantitative assessment of the value of vocational training to one group of farmers. This is a partial view and the data is not extensive but Dr Attwood has demonstrated how such empirical evaluations can be made using a concrete New Zealand example.

R G Lattimore
Director

ACKNOWLEDGEMENTS

The Agricultural Economics Research Unit gratefully acknowledges the encouragement and support for this study given by the Department of Lands and Survey. In particular, the co-operation and assistance willingly provided by the officers of that Department in Auckland, Dunedin, Invercargill and Hamilton has been most helpful.

SUMMARY

Policy Objectives in Agricultural Education and Training

- The three basic questions to be considered in any examination of the policy for agricultural education and training relate to the objectives of the policy, the level of funding that is appropriate and the distribution of those funds.

- At present in New Zealand there are no agreed objectives of agricultural education and training policy or any published explanation of the level of funding or its distribution.

- The measurement of both the input of funds and the output resulting from that input is complex, particularly where the output is regarded as a part of the general development of farming.

- Objectives of agricultural education policy should be derived from the objectives of agricultural policy; these should be concerned with increasing agriculture's contribution to the Gross National Product and with increasing the level of employment in agriculture.

- The measurement of the contribution of individual expenditure programmes to the Gross Agricultural Product will become more precise as additional studies of these programmes are undertaken.

- The need to increase employment derives not only from the economic gains that should result from additional jobs but also from the social benefits of reduced unemployment.

- The level of future funding of agricultural education and training is likely to be decided in the framework of government strategy aimed at ensuring that all expenditure programmes are fully justified.

Agricultural Education and Training Arrangements in New Zealand

- The present pattern of agricultural education and training involves a diversity of institutions and qualifications, with limited formal structure.

- The pattern has evolved from a variety of initiatives, many at local level; it involves four government departments, the University Grants Committee, the Agricultural Training Council and the Cadet Training Scheme run by Federated Farmers.

- The present arrangements for agricultural educational qualifications involve both individual institutions, e.g. Lincoln College, Waikato Technical Institute, and national examinations from the Trades Certification Board involving a variety of institutions.

- The farm training institutes run one year courses and a number of short courses, including those for applicants for Land Settlement farms and those working for the Trade Certificate in Farm Management.

- The Diplomas in Agriculture given by Massey University and Lincoln College are essentially of a vocational character, designed for those who intend to become farmers, while the content of the degree courses

covers issues required in a wide range of agricultural related employment.

- Other institutions teaching vocational agriculture include Community College, Technical Colleges, Polytechnics, and the Technical Correspondence Institute; some award their own certificates while others direct their teaching programmes to the Trade Certificates.

- The only comprehensive assessment of total expenditure on vocational education and training in agriculture relates to 1983, when the estimated total amounts to $33m; however, part of this expenditure might be categorised as of an advisory rather than educational character.

- It has been estimated that nearly 100 000 people are "touched by agricultural training", but this may involve some double counting.

- On a national basis the rapid growth in farmers and farm workers with tertiary education is shown in the Population Census returns and in farmer surveys.

Economic Performance in Relation to Agricultural Education and Training

- The Land Settlement Scheme is aimed at the settlement of landless New Zealand farmers with limited finance; the basic qualifications for applicants include three types of agricultural educational training, but exemption from these requirements has been available for certain categories of applicants.

- In addition to the educational training requirements, applicants must have five years practical farming experience, they may have to satisfy local committees as to their ability to farm successfully, must show they can finance the deposit on the farm from their own resources, and that seasonal finance is available for an approved source.

- While settlers are on a current account mortgage, they are subject to detailed budgetary control, operated by the Department of Lands and Survey; it is these budgets which provided the basic data on farm performance for the present study.

- Settlers have to meet substantial rent and interest charges, which can amount to around $40,000 a year; these payments however, are part of the gross value added in the agricultural sector.

- Before settlement a detailed budget is prepared by the professional staff of the Department of Lands and Survey; this has been used as the basic standard against which actual economic performance in the first three years after settlement has been measured in the study.

- The study covers farms settled in the years 1978 to 1982 inclusive.

- The three dependent variables in the study were total farm output, net farm income and gross value added per farm; the total sample consisted of 168 farms.

Results of the Study

- Of the settlers in the sample, 38 per cent had been exempt from the educational training requirements, 25 per cent had university degrees or

diplomas in agriculture, 24 per cent had completed the Land Settlement course at the farm training institutes, while 13 per cent held the Trade Certificate in Farm Management.

- The majority of those exempt from the educational training requirements were over 40 years of age, while only a small proportion of those under this age obtained exemption.

- The proportion of the settlers meeting the educational training requirements has increased steadily since they were first imposed in 1978, and by 1982 less than 20 per cent of settlers did not meet them.

- As only a few of the settlers were unmarried, our analysis of economic performance by marital status was not justified.

- Although the projection of average gross output was just over $60,000 the out-turn in the first year after settlement was $80,000, with the growth in the subsequent two years faster on the North Island farms.

- Average gross value added on the farms in the study accounted for just over half the total output, which is a better performance than on New Zealand farms as a whole.

- Most of the value added was absorbed by interest and rent payments, but the net farm income was by no means as low as had been projected in the pre-settlement budgets.

- The average level of net farm income in the first year after settlement was $15,000, but it grew only slowly in subsequent years.

- The levels of output, value added and income in the first three years after settlement show that these units are in a fully productive state when first settled; the growth in output, value added and incomes in current prices in the second and third year after settlement reflected the increase in prices rather than growth in volume.

- In spite of higher levels of gross output per farm in North Island sheep farms than those in the South Island, the much higher level of costs (both non-factor and factor) meant that average net farm incomes were 20 per cent higher on the South Island farms.

- The average results, both for the sample as a whole and for the different farming systems showed a wide variation within each of the groups.

- When analysed according to category of educational attainment there was no consistent pattern in the levels of performance, or any large variations between the average results for each group.

- In general the group of settlers exempt from the educational training requirements obtained average results (in terms of output, value added and farm income), better than that for the sample as a whole, though the margin was small.

- An analysis of the results, based on least squares regression, showed a low level of statistical significance in the results, but the general indication was that those settlers with the Trade Certificate in Farm Management achieved the best results, while those who were exempt achieved results which were almost as good.

- It is evident that factors other than formal education and training play the major role in the level of economic performance of the farms in the sample.

- The development of agricultural education and training in recent years has not led to any growth in farm efficiency over the past decade, as it is argued that there has been "a dramatic fall (a quartering) in efficiency growth" in New Zealand agriculture since 1970.

- An analysis of the relationships between gross output value added and net farm income showed that in the pre-settlement projections, total output was negatively correlated with farm incomes (i.e. in general higher farm output was associated with lower farm incomes) and in the actual results the relationship between them was very slight.

- The relationships between gross value added and output and between gross value added and farm income was positive and much stronger than between output and income.

- In general there was a wide variation in the results from year to year, reflecting the instability of output and incomes on many farms.

- A much more detailed study is necessary to establish the causes of different levels of economic performance at farm level, which would encompass a wider range of issues than those in the present study.

Conclusions

- There has been little discussion on the optimum level of funding of agricultural education and training in New Zealand, of the most effective distribution of those funds, or the returns which are generated from the present level of funding.

- It would be useful to consider the funding of expenditure on related activities such as agricultural education and training on a programme basis, which would cover all the funds from the public sector irrespective of the particular official departments involved.

- The basic conclusion of the present study is that the economic performance at farm level of those who have been exempt from the educational training requirements of the Land Settlement Scheme has been as good as those who met these requirements.

- The educational training requirements are only part of the total requirements that applicants have to meet; these total requirements tend to make those settled under the Land Settelement Scheme of a higher calibre than New Zealand farmers generally.

- In these circumstances the provision for exemption from the agricultural training requirements for applicants with a particularly wide range of experience has been justified and, provided applicants of comparable standard continue to apply, the present policy should be continued.

- There is a strong case for further research into the causes of economic achievement at farm level, both for those settled under the Land Settlement Scheme and for New Zealand farmers generally.

- At the same time, those responsible for organising and delivering agricultural education and training should carefully appraise their objectives and then specify them in more detailed terms than at present.

- The extent to which these redefined objectives are being achieved should be continuously monitored and the teaching programmes modified where necessary to achieve those objectives more effectively.

SECTION 1

POLICY OBJECTIVES IN AGRICULTURAL EDUCATION AND TRAINING

1.1 Basic Issues

"In view of the rapid growth of agricultural education and training and the amount of Government funding involved, it is questioned whether the system inherited from the past is equipped to serve the best interests of the industry in the future" (Elworthy 1983). This issue was raised in relation to the way "the industry has got by in the past with light handed and informal procedures for co-ordination", but whether the present system of agricultural education serves the "best interests of the industry" raises more fundamental issues than that of co-ordination (even though that issue is no doubt of considerable importance). There are in fact three basic questions which need to be considered in any comprehensive examination of the policy for agricultural education and training:

(a) what precisely does agricultural education and training contribute towards "the best interests of the industry" and just what is meant by that phrase?

(b) what level of total funding of agricultural education and training is appropriate, in the light of the present situation of the economy as a whole and the part played by the agricultural sector in that situation?

(c) what is the most cost-efficient distribution of the total funding, determined after consideration of (b) above, between the various agricultural education and training programmes and the different institutions involved?

These are complex questions which go to the heart of a rational policy on agricultural education and training. They are, however, not just theoretical ones; decisions are made on the level of funding and on the allocation between different programmes and institutions (or rather, what appears to happen at present is that decisions are made on amounts to be paid to the different institutions and organisations, and these together add up to the total funding that is provided by the Government).

1.2 Evaluation of Expenditure

The decisions on the level of funding of agricultural education and training have to be taken in the context of the large number of such decisions in the whole range of expenditure programmes of the government. The systematic evaluation of such programmes is becoming of greater importance, both in New Zealand and in many other countries, as the levels of public expenditure increase in relation to Gross National Product. This is part of the stronger efforts being made to contain this expenditure. Much of the evaluation which is being undertaken at present is of a limited and straightforward character, involving primarily a consideration of the inputs (not just in terms of finance, but increasingly of personnel and other categories of input). This approach really only begins to take on a worthwhile degree of rationality when the evaluation includes data on the output which is generated by the expenditure involved. Initially the estimates of output tend to be in physical terms, but the analysis becomes more meaningful when expressed in appropriate financial terms, which give a

measure of the returns achieved from the original input of resources. This then raises the next, and even more illuminating issue of the consequences of changes in the level of expenditure (either upwards or downwards) on the level of output.

In the case of expenditure on agricultural education and training, the measurement of both the level of expenditure and that of output gives rise to difficulty in the New Zealand public accounts. The level of expenditure is considered later in this paper, but it should be recognised that this is not a question on which there is as yet precise and meaningful data.

The measurement of the output of agricultural education and training programmes gives rise to even more complex questions. It is usually measured in terms of the hours of instruction, the number of persons achieving certain specific standards (i.e. certificates of farming or farm management, university diplomas or degrees in agriculture), the total number of persons in receipt of agricultural education, etc. These are, however, only intermediate measures of output; a more comprehensive measurement would be directly related to "the best interests of the industry". This in turn should be reflected in the basic objectives of the agricultural education and training policy.

1.3 Objectives of Agricultural Education and Training

Vocational education and training is undertaken in order to enable the participants to make a greater contribution to the sector of the economy concerned. The benefits of this greater contribution will accrue not only to the people directly involved but also to other groups in that sector or related sectors. In the case of agriculture, the benefits of vocational education and training are seen as being "crucial to the future growth and development of the agricultural industries" (Elworthy 1983). This view is representative of the general belief that investment in education and training in the agricultural sector is essential to its future prosperity.

The objectives of the policy on agricultural education and training, however, need to be identified in more specific terms than the "growth and development" of the agricultural sector, if the achievements of these policies are to be fully evaluated. This means that the objectives of agricultural policy itself have to be identified in reasonably precise terms.

In the case of New Zealand, however, this is where the difficulties grow more acute. The conclusion of the Hon. D F Quigley in his "key address" to the convention on "The Formulation of, Implementation of and Response to Agricultural Policy" (New Zealand Institute of Agricultural Science 1983) was that "the objectives of New Zealand agricultural policy were as elusive as the proverbial 'Scarlet Pimpernel' and as diverse as the various disguises he wore ..... indeed it seemed pointless to even attempt to pinpoint objectives, because they could be as wide ranging and subjective as 'Maximising the earnings or savings of foreign exchange'; 'Stabilising product prices'; 'Improving access to foreign markets'; 'Maximising the return to the producer' etc. etc. etc.". A concensus on the objectives of agricultural policy in the New Zealand context is necessary if the various aspects of that policy and the expenditures involved are to be subject to rational analysis. While a detailed consideration of the policy objectives for New Zealand agriculture would go beyond the purposes of this paper, it is necessary to summarise the issues involved in order to derive the appropriate policies for the agricultural

education and training programmes. Unlike the situation in other countries, there are no specific social issues within the agricultural sector with which agricultural policy should be directly concerned (of course general social policies should and do have an impact on people in the agricultural sector, but this is entirely different to agricultural policy itself being directed towards resolving social issues); nor is there any justification for measures directed towards self sufficiency in food on the grounds of food security, given the large surplus of food that exists over and above domestic requirements. Environmental considerations have become major constraints, but they are not of themselves objectives of agricultural policy.

1.4 Economic Objectives of Agricultural Policy

This leaves basic economic objectives as the appropriate ones for the agricultural sector. These are essentially part of the wider economic objectives for the economy as a whole, which are primarily concerned with the growth of the economy and employment. The growth in the economy is conventionally measured in terms of the increase in the Gross National (or Domestic) Product; in the farming sector the equivalent measure is the Gross Agricultural Product (i.e. the value-added within the farming sector), which represents the contribution from farming to the Gross National Product. Just as the Government's economic policy is concerned with the growth of the GNP, the equivalent objective in the agricultural sector is the growth of the Gross Agricultural Product. As with GNP, the growth in the Gross Agricultural Product should be measured in real, not just money terms; statistical information is published on the real changes each year so that the data on the actual changes in the Gross Agricultural Product are readily available.

Rational policies for economic sectors, such as agriculture, in a well structured economy should not involve income transfers to or from other sectors (except in so far as these are part of national policies on taxation to raise funds for social welfare, defence, educational or similar purposes). This means that farmers should not be required, through government sectoral policies, to contribute towards the incomes of persons working in other sectors, nor conversely should their incomes be increased through policies involving financial transfers from other sectors. This does not imply that there should be no support measures for agriculture funded through taxation or other government actions, but that these support measures should be financed out of the benefits which they generate in the agricultural sector (and of course similarly for other sectors) through the additional taxes which would be paid by farmers from the higher incomes generated by the policy measures. The time-lag between investment in, for example, agricultural education and training and the resultant benefits in terms of a larger Gross Agricultural Product can be readily allowed for in the estimates of those benefits and the procedures involved in making such estimates are widely known and give rise to no special difficulties.

The adoption of objectives of agricultural policy in terms of the contribution to Gross National Product provides specific criteria against which performance can be measured. This applies both to the whole spectrum of policy measures in the agricultural sector and to its individual elements. There are, however, problems of measurement both of the costs of the individual policy measures and of their resultant output, as the tools currently available for measurement of both inputs and outputs are not precise. However, problems of the detailed methodology of policy analysis can be resolved as more resources are directed into this work; the present

body of work on cost benefit analysis of specific projects provides a valuable basis for more general policy evaluation studies. Information on value added generated by particular policy measures is not always readily available but, in much of the project analysis work, data on value added can be extracted.

The objective of increasing employment (usually specified in terms of measures to reduce the level of unemployment) is also an important element in the promotion of vocational education and training programmes. There is a widely held view that employment opportunities can be increased directly through the availability of a trained and educated workforce and also through the growth in the economy (i.e. in the Gross National Product) which trained and educated people can help to generate. The need to maintain existing jobs and to create new ones, not only through the development of manufacturing industry but in other sectors of the economy as well, has become a major plank in economic policy in many countries, including New Zealand.

Employment policy today involves much more than just the efficient utilisation of labour; it has a substantial social content in which the provision of jobs for their own sake, as well as for any economic advantage they confer, is an important facet. In this context the recorded growth in the total numbers working on farms in New Zealand has been an important part of the growth in the total employed labour force; for example, in the most recent three year period for which the data is available, agriculture accounted for 40 per cent of the growth of total numbers employed in the economy (Attwood 1984). While this gives rise to questions about the consequences of the growth in the trends in labour productivity, the social benefits of extra jobs in farming are now of considerable importance.

Thus an analytical framework for expenditure on education and training, with the policy objective of increasing the value added (or Gross Product) of agriculture and the level of employment can be readily developed. An increase in employment can be expected to generate a higher Gross Agricultural Product, so that the two primary objectives are not in conflict - though individual policy measures would not normally have an equal effect on each of them.

1.5 Purpose of the Present Study

At present the substantial level of expenditure involved is justified by the belief that "we can accept without apology or argument the case for agricultural education and training. Indeed there are compelling reasons, having regard to the inter-dependence of employment opportunity with training and education, for believing that there has been no more urgent time, with such high levels of unemployment for maximising and making best use of the resources available ..... the success of our farming community in doubling production is proof of the success of past training" (Elworthy 1983). In the face of the difficulties in achieving a better balance in the Government's accounts, it will be necessary to establish whether the evidence supports this belief.

Raising questions on the benefits from expenditure on agricultural education and training does not imply any pre-conceived views about the answers. In the light of the decisions announced in the 1984 Budget, for example, that interest rates on Government funded rural lending will be progressively brought into line with market interest rates, it is evident that changes in agricultural policy will have a substantial effect on the

development of the agricultural sector. In these circumstances the expenditure on agricultural education and training is unlikely to be exempted from critical examination. It may well be that a detailed analysis would support the need for increasing expenditure, not just in current, but in real terms. Those who believe that this is the direction that expenditure on agricultural education and training must take should give support to more detailed studies of all the factors which need to be considered in decisions on substantive changes in the level of such expenditure.

It is the purpose of this paper to explore just one of the key issues which arise in an agricultural education and training policy - are the recipients of this education able to achieve better economic and financial results than those who have not so benefited and is the relationship an incremental one (i.e. does the level of economic and financial performance improve as the level of educational attainment increases)? This is only one of the steps that would be necessary in a full analysis of agricultural education expenditure which will, no doubt, be part of "the process of reshaping the Government's operations as part of a medium term strategy aimed at ensuring that all Government expenditures are fully justified and that the tax burden is therefore minimised ..... in the longer time available for the 1985 Budget, the process will be continued with more detailed attention to expenditure programmes and their costs" (Douglas 1984).

SECTION 2

AGRICULTURAL EDUCATION AND TRAINING ARRANGEMENTS IN NEW ZEALAND

2.1 Current Agricultural Education and Training Situation

The provision of agricultural education and training in New Zealand involves a greater degree of diversity than that generally found in other developed economies (the situation in some of the main agricultural countries in Europe is summarised in Appendix 1). There is no nationally determined pattern of institutions teaching agriculture, set up on a planned basis and organised by central government, as is commonly found elsewhere. Nor is there a policy of requiring new entrants into agriculture to have completed a course of instruction and achieved a specific degree of competence (through passing one or more nationally recognised examinations). Rather, a looser system of agricultural education and training has evolved from a variety of initiatives with little formal control being imposed upon them. In general the impact of the system would appear to vary regionally. It has, for example, been reported that "Canterbury needed between 200 and 300 newly trained farmers to replace those retiring .... Agricultural degrees, diplomas and certificates gained by Canterbury people each year made up a mere 20 per cent of this replacement number. Therefore the gap between training needs and people with recognised qualifications was very large" (Moore 1985). In other areas of the country a higher proportion of the new entrants appear to have recognised qualifications - even though Canterbury has had a major agricultural teaching institution since 1878. However, as set out later, the national position has been changing in recent years, and this may well have had a differential impact over the country.

While agricultural education in New Zealand has been a subject for inclusion in primary and secondary schools as well as at vocational level for over a century (in 1983 there were 5,900 students in agriculture and horticulture in Forms 3 to 6 at secondary schools); in the following description of the current situation, classes in agriculture and horticulture by students at secondary schools is regarded as part of the general second level educational process, rather than as part of vocational agricultural education and training. The scope of agricultural education and training, for present purposes, encompasses post secondary school programmes of a formal nature; it does not include short term vocational programmes designed to assist a prospective trainee to identify a particular career opportunity, nor does it deal with short term pre-employment training programmes. It is concerned with the educational and training activities, both part-time and full time, that are of a substantive character designed specifically for people entering or already in the farming industry, rather than agricultural aspects of courses such as those under the Young People's Training Programme, which are essentially concerned with work preparation and vocational training programmes for the young unemployed.

The present pattern of agricultural education involves four government departments (the Ministry of Agriculture and Fisheries and the Departments of Education, Labour and Maori Affairs) together with the University Grants Committee. In addition the National Cadet Training Scheme run by Federated Farmers and the Agricultural Training Council, which include a wide

spectrum of agricultural interests, both provide a major input into the current agricultural education and training system. The view of the Agricultural Training Council on the present situation is that "while the diversity of government agencies delivering agricultural training can be seen as a strength, it is also a structural weakness in New Zealand, with Government investment in agricultural training reaching the industry through at least four quite separate policy strands. The system does not provide for consultation across the agencies involved in initialising new policy. Moreover, the voices of the agricultural industry organisations are not programmed into the system in any systematic way." (Agricultural Training Council 1983).

2.2 Teaching and Examinations

The diversity in the agencies involved is reflected in a somewhat complex system of teaching and training on the one hand, and the arrangements for assessment on the other. In some cases there is total integration, for example the Massey University and Lincoln College Diplomas or Degrees in Agriculture or in related subjects are awarded only to those students who have met the requirements of attendance at the courses of instruction at the University or College and passed the relevant examinations. At some other tertiary institutions teaching and certificates of passing their own examinations are provided by the particular institutions concerned (e.g. the Taranaki Polytechnic, the Waikato Technical Institute) but these qualifications do not carry the same national standing as those from Lincoln College or Massey University.

At the other end of the spectrum are the qualifications through the New Zealand Trades Certification Board, i.e. the Trade Certificate in Farm Management. These are national qualifications through assessments and examinations of the Trades Certification Board for which the necessary training can be completed at a wide range of institutions of different types. In the case of the Trade Certificate in Farming, the candidates are required to pass Assessment Tasks marked by authorised staff from approved institutions which include "polytechnics, technical institutes, community colleges, senior technical divisions and farm training institutes where farming courses are conducted" (New Zealand Trades Certification Board 1979). In the case of the practical farm management study for the Trade Certificate in Farm Management there is reference to "evidence from an approved school or institute" in the requirements for the certificate. The Trades Certification Board provides a wide range of examinations for apprentices and others who are actively engaged in trades of various descriptions and the certificates in farming and farm management are part of this wide range.

Under the training requirements of the Land Settlement Scheme, only the full Trade Certificate in Farm Management is acceptable; neither the Trades Certification Board's Certificate in Farming nor the various certificates from the different farm training organisations are regarded as meeting the level of training required.

2.3 Farm Training Institutes

The farm training institutes provide one year full time courses designed for young people aged 16 to 19 (but predominantly 17 to 18) to gain a wide range of farming skills. They are essentially directed towards those who will actually farm and who plan to become managers and owners of farms, not those who will be employed in jobs related to agriculture (e.g.

in commercial organisations such as stock and station agents). The two institutions give their own certificates to successful candidates (in Vocational Agriculture at Flock House and in Agriculture at Telford) but, at the same time, encourage their students on the one year course to study and complete learning exercises on topics in the Trades Certification Boards Certificate in Farming and, through passing the mastery tests, to demonstrate that the knowledge has been acquired. These training institutes are among those approved by the Agricultural Training Council which has the responsibility for notifying the Trades Certification Board that the candidates for the Trade Certificate in Farming have satisfactorily completed the Qualifying Assessment Tasks and the Trade Certificate Assessment Tasks.

The farm training institutes also provide a wide range of short courses designed to meet the needs of particular groups. In recent years they have run 18 to 20 Land Settlement Courses annually for 300 to 400 participants (Table 1). These courses, of two weeks duration, cover basic husbandry and farm management and are specifically oriented to the requirements of applicants for the Land Settlement Scheme. In addition separate courses are provided for those working, on a part-time basis, towards the Trade Certificate in Farming and Farm Management (although at Flock House the course for the Trade Certificate in Farm Management is combined with the Land Settlement course). These courses, together with those designed to meet the initial training needs of farm cadets, are the main short term courses for younger people entering farming; in recent years they have been attended by a total of around 250 annually.

TABLE 1

Farm Training Institute Courses
(Flock House and Telford)

Course	No. of Courses			No. of Participants		
	1981	1982	1983	1981	1982	1983
1 year Agriculture	2	2	2	106	113	109
1 year Horticulture	1	1	1	8	9	8
Land Settlement TCB Farming) TCB Farm Management)	19	18	18	421	344	325
	8	9	8	198	105	144
1st Steps to Farm Management	0	1	1	0	13	6
Short-Farmer	54	58	64	926	972	1154
Workshops	13	11	11	436	334	331
In Service Training	46	51	91	854	1054	1440
Foreign Affairs	8	5	14	8	5	14
Initial Training (Farm Cadets)	3	5	4	118	143	119

Note: The TCB course in Farm Management at Flock House has been combined with the Land Settlement Courses.

Source: D. D. Cameron, Ministry of Agriculture and Fisheries (pers. comm.).

2.4 University Diplomas and Degrees

The Diplomas in Agriculture issued by Massey University and Lincoln College are essentially of a vocational character. In the case of the Massey Diploma the objective is "to prepare students with the appropriate knowledge, skill and attitude for the management of farms in a changing social, economic and technological environment", while that at Lincoln is "designed to give an introduction to later advanced Diploma Courses or to give a broad introduction to agriculture for those intending to become primary producers" (Fenwick 1984). Both institutions require prospectiive students to have spent a period in practical farm work before entering the Diploma course (18 months at Massey, 22 months at Lincoln) and to have met certain educational standards in their school careers.

The Diplomas involve full time one year courses, covering 700 teaching hours plus some extra-mural work. At Lincoln a more advanced Diploma Course in Farm Management gives more formal training to those who wish to become farm managers.

Both Lincoln and Massey offer a number of degrees in Agriculture, Commerce (Agriculture), Commerce (Valuation and Property Management) and post graduate diplomas in Agricultural Science, Valuation and Property Management, etc. One of the educational training options for applicants for the Land Settlement Scheme is that of "an appropriate degree or diploma from Massey University or Lincoln College", and while there is no published list of the degrees or diplomas which would be regarded as appropriate, there appears to have been little, if any, difficulty arising from this.

The degrees in agriculture are not specifically designed to meet the objective of improved ability to manage a farm successfully, though this is one aspect of the degree programme. It would be unrealistic to judge expenditure on University degrees in agriculture purely by the performance at farm level of the holders of those qualifications; the teaching content of a degree in agriculture covers a range of issues which go beyond the needs of efficient farm management and the graduates work in a wide range of jobs. At the same time, given that the degrees in agriculture do have considerable direct vocational content, it would be reasonable to expect those with the benefit of this training to achieve better results in farming than those without formal agricultural education and training. Whether such better results would justify the investment in education and training involved is a far more complex issue and one that is not pursued in the context of the present study.

2.5 Other Agricultural Training Facilities

In addition to the agricultural education and training arrangements set out above, there are a number of other institutions which also provide training. Some direct their teaching programmes towards the Trade Certificates in Farming or in Farm Management (i.e. the Community Colleges in Northland, Southland, Waiariki, Taranaki, Tairawhiti, Polytechnics in Christchurch and Taranaki, the Technical College in Waikato, the Technical Correspondence Institute, the Taranaki Agricultural Training Centre etc.). In other cases the institution concerned directs its programme towards its own certificate (e.g. the Waikato Technical Institutes Certicate of Agriculture, the Taranaki Polytechnic's Certificate in Dairy Farming, Farm Certificates at Taratahi and Smedley Station). These diverse arrangements provide considerable scope for local initiatives, but it is evident that the nature of the training programme for those studying at these

institutions depends on the content of the courses provided by the institutions concerned rather than on a set of nationally defined criteria.

To complete the list of agricultural training arrangements, mention should be made of the Cadet Training Scheme for new entrants into agriculture. This has evolved over the past half century from the Auckland Youths' Farm Settlement Scheme in the mid thirties into a countrywide scheme 30 years later. It now involves nearly 3,000 young people. The scheme is run by Federated Farmers through the Agricultural Cadet Management Committee, representative of the principal industry organisations, which determines general policy on matters of finance, administration, employment and training. Three sub-committees on farming, horticultural and equine training provide a forum for policies on training, financial and administrative matters in their respective areas of responsibility and there are regional committees which are responsible for the detailed implementation of the Scheme, including selection and placement of cadet applicants, general supervision and evaluation of the scheme in their particular regions.

The scheme is funded through a government grant towards the costs of administration with a Farmer Trainee Incentive Grant paid to employers of first year cadets for seven weeks training, of which at least two weeks must be off-farm, and four weeks training in the second and third years (of which one week, i.e. 5 working days, must be off-farm). The off-farm training can include induction, day release and block courses and correspondence and skills courses related to national qualifications, principally the Trade Certificate in Farming. In addition, part of the costs incurred by cadets themselves, arising from attendance at basic skills training courses and block courses at agricultural training centres, are reimbursed.

The Department of Lands and Survey does not recognise those training schemes, which are designed primarily for post school entrants into farming, as meeting the standards they require of participants in the Land Settlement Scheme. Their focus of attention is essentially on university degree and diploma students; the standard of the Trade Certificate in Farm Management would appear to equate at least to that of the University Diplomas, while the Land Settlement Courses at Flock House and Telford are also regarded as of a comparable standard (Cameron 1985). The vocational training for those leaving school can be a useful step in the achievement of the higher standards required by the Department of Lands and Survey, even though they are not, in themselves, regarded as being of a sufficiently adequate standard of training for settlers under the Land Settlement Scheme.

2.6 Expenditure on Agricultural Education and Training

A consequence of the diversity of funding for agricultural education and training is that there is no official account of the total level of such funding. The only comprehensive assessment is that provided by Elworthy (1983) and while there may be some differences in the items included in the total and of the methods of calculation, the total does give a most useful measure of the expenditure in a form not available elsewhere. As can be seen from Table 2, the total of $23,068 m in 1982-83 includes $7.881 m spent on the Ministry of Agriculture and Fisheries Advisory Services Division and $1.725 m on the Dairy Officer Consulting Board Services which might be categorised as of an advisory, rather than of an education and training character.

The total of just over $34 m in 1982-83 has probably grown to some $40 m in the current financial year. There has been considerable discussion of the financial circumstances of some of the institutions involved - for example those of the Telford Farm Training Institute and it would appear that constraints on the Ministry of Agriculture and Fisheries has made it difficult for it to respond to proposals for new developments that have been raised from time to time.

TABLE 2

Summary of the Annual Investment by Government and Industry in Training and Education in Agriculture

Training	Public Expenditure	Industry Expenditure
1. ATC	568,000	72,000
2. Agricultural Cadets Scheme	1,110,000	
3. Technical Institute & Community Colleges and Senior Technical Division (training days)	5,785,000	
4. Farming training	2,404,536	
5. MAF - Advisory Services Division	7,881,423	
6. Wool Board shearing instruction		300,000
7. Dairy Board Consulting Officer Service	1,428,000	297,000
8. University Agriculture & Horticulture Diplomas	3,191,400	
9. Maori Affairs Department	200,000	
10. Department of Labour Employment training for skills	500,000	
Total	$23,068,359	$669,000
Education		
University: 2,388 agricultural students at $4,728	$11,300,000	

Note: The average of $4,278 per student is calculated by dividing the 54,149 total university enrolments (Department of Education's Annual Report to March 1983) into total university expenditure to March 1983 of $258,000,000.

Source: Elworthy (1983)

An estimate of those "touched by agricultural training" in 1982 gave a "rough and ready" total of nearly 100,000 with a further 8,277 in agricultural education (Elworthy 1983). As in the case of expenditure, there are problems in defining those who should be included and how those on a part time basis should be counted. It seems quite likely that a considerable element of double counting has occurred, as for example, farm

cadets could also be participants in the Technical Correspondence Institute or the Education Department's programme of continuing education all counted separately in the estimates by Elworthy. Again, these estimates should be seen as a particularly useful beginning for the provision of more detailed information on the present policy for agricultural education and training and as an incentive towards the provision of more precise data.

2.7 National Agricultural Education Situation

There are no comprehensive data available on the levels of agricultural education and training for those engaged in farming. Changes in the general education levels of people working in agriculture are recorded in the Census of Population reports (Department of Statistics 1973, 1983). While the changes have to be interpreted with some caution (as the classifications of educational attainment have been changed slightly from one Census to the next) there would appear to be reasonable consistency in the categories (Table 3). The main results from the comparison of trends are:

(a) the decline in the number of farmers with primary education only, and the rapid increase in the number with university or other tertiary education. It is clear that the majority of those with primary education in 1981 were also in the farm labour force a decade earlier, and that the increase in those with university or other tertiary education has come from new entrants into farming;

(b) the decline in the number of farm workers with only primary and secondary education and the increase in those with university or tertiary education. In general agricultural and animal husbandry workers have educational standards virtually as high as those of farmers;

(c) the fall in the number of farm managers and supervisors with only primary or secondary education has been particularly sharp. This may in part reflect the high rate of turnover in this category, as many farm managers aim to achieve farmer status; and

(d) the growth in the number with tertiary, non university education; this has occurred in only a very short period and may in part reflect some changes in the Census classifications, but even so there would appear to be a substantial increase in this category.

The general picture of the total farm labour force in 1981 was one in which, out of just over 102,000 males, 70,000 reached secondary level, 8,000 university level, 12,000 other third level education and a further 12,000 only primary level. In the case of females, out of the total of 30,000, almost 20,000 reached secondary level, 1,000 had attended university, 7,000 other tertiary institutions and 2,000 only primary level (it would appear from the Population Census reports that a proportion of those with tertiary education had attended teachers' training colleges and nursing schools, so that 'tertiary' education should not be interpreted as being of an entirely agricultural character).

The situation in 1981 was one in which just over 20 per cent of the 73,000 farmers had attended university or other tertiary institutions, while the great majority had completed their formal education on leaving secondary school. However, the rate of change over the 1971-1981 decade, and even more so in the period 1976-1981, implies that of those entering

TABLE 3

Educational Levels Attained by the Farm Labour Force

Category	Year	Education Level									
		Primary School		Secondary School		University		Other Tertiary (Polytechnic, Tech. Inst. etc)		Total[a]	
		M	F	M	F	M	F	M	F	M	F
Farmers	1971	12183	940	44189	5329	2457	187	-	-	58829	6456
	1976	13857	1627	37637	7213	3359	375	2355	741	57204	9957
	1981	8358	1086	39636	8658	4821	426	6363	3510	59175	13680
Farm Managers and Supervisors	1971	834	13	4546	53	418	4	-	-	5798	70
	1976	849	27	3720	137	476	4	380	12	5425	179
	1981	405	9	2379	78	372	6	489	33	3648	129
Agricultural and Animal Husbandry Workers	1971	5969	1381	31980	9051	1109	196	-	-	39058	10628
	1976	4924	1444	26222	9035	1816	446	1776	786	35765	11711
	1981	4179	1050	27774	11160	2079	531	5214	3084	39267	15822

[a] Numbers do not always add to totals because of rounding of data in the Population Census Reports.

Source: Dept to Statistics, Census of Population for relevant years.

the industry a much higher proportion have third level education. In addition those who studied through the Technical Correspondence Institute and through part time courses at various farm training institutions may have been classified as having completed their formal education at secondary level, even though they may subsequently have made substantial efforts, through a formal learning process, to improve their knowledge of agriculture and achieved a high standard of academic achievement (for example those who studied for the Trade Certificate in Farm Management are generally regarded as having achieved a standard at least as high as that of the Diploma in Agriculture at Lincoln or Massey).

The numbers attending third level agricultural education courses were recorded in surveys of farmers' intentions and opinions, carried out during the 1978-1983 period (Pryde 1978-1983). The pattern of change since 1978 (Table 4) shows a steady increase in the proportion of farmers in these surveys attending some form of tertiary education. In some cases the rate of increase would appear to be exceptionally rapid, for example of those attending Flock House or Telford, the increase was from two per cent to eight per cent over a five year period. This would seem to be an outstanding growth rate. At the same time the figure of almost a quarter of all the farmers in the survey who have attended either Massey or Lincoln is also a remarkable testimony to the educational attainments of New Zealand farmers, but there is some possibility that the response rates to the postal surveys were biased toward the better educated farmers. Even so, according to both the Census and Survey data there would appear to have been a substantial increase in the number of farmers who have attended tertiary education centres, and this has occurred over a short period of time.

TABLE 4

Attendance of Farmers at Tertiary Education Institutes
(Percentage of Farmers in Sample Attending)

Year	Lincoln or Massey	Technical Course	Trade Certificate Course	Flock House or Telford	Other Tertiary Institutions
	%	%	%	%	%
1978	17.0	4.0	2.0	2.0	7.0
1979	17.0	4.0	n.a.	3.0	n.a.
1981	14.9	4.5	2.9	4.5	5.8
1982	18.6	6.6	3.3	5.9	7.5
1983	22.9	10.4	4.6	8.0	8.2

Source: Pryde, 1979-1982
Pryde & McCartin, 1983-84

SECTION 3

ECONOMIC PERFORMANCE IN RELATION TO AGRICULTURAL EDUCATION AND TRAINING - A STUDY OF SETTLERS UNDER THE CIVILIAN SETTLEMENT PROGRAMME OF THE DEPARTMENT OF LANDS AND SURVEY

3.1 The Land Settlement Scheme of the Department of Lands and Survey[1]

The central authority for the administration of Crown land is the Land Settlement Board (consisting of the Minister of Lands, seven government officials and not more than four other persons appointed by the Minister). The Board is responsible for both the administration of land policy and for the development and settlement of Crown land through the Department of Lands and Survey. The Civilian Settlement Scheme, introduced in 1961 provides for the Settlement, with the aid of funds made available through the Land Settlement Board, of landless New Zealand farmers with limited finance[2]. The scheme covers two types of farm:

(a) sheep and cattle units and

(b) dairy units .

However, because of the kind of land being developed most of the farms are sheep and cattle units. The number of farms settled is determined by the amount of finance available, although it has been Government policy "to maintain a constant and accelerated rate of settlement" (Department of Lands and Survey 1984).

The basic qualifications for applicants are that they must be New Zealand citizens, 25 years or over, with five years full-time farming experience, and must have completed one of the following educational training requirements:

1. two 2 week courses in each of two years in basic husbandries and farm management to a satisfactory standard; or

2. the Trade Certificate in Farm Management; or

3. an appropriate degree or diploma from Massey University or Lincoln College.

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1 The description of the present Land Settlement Scheme summarises the booklet on the Scheme published by the Department of Lands and Survey (1984).

2 This scheme developed from one designed to cater for ex servicemen, but there are only a few such persons now applying for land settlement, and this study deals exclusively with the Civilian Scheme.

The only exception will be for those applicants born before 1946, who can if they wish sit an assessment course at Flock House or Telford Farm Training Institute to establish the extent of their knowledge; this will be followed by the training necessary to bring them up to the required standard. While no exemptions from the educational training requirements will be available, exemptions already granted remain valid. In addition, the policy of qualifying farm managers or sub block managers employed by the Department of Lands and Survey as eligible for participation in the settlement programme has led to a number of them being settled under the scheme. To be eligible under this policy, the manager or sub block manager must have at least 10 years continuous service with the Department of Lands and Survey, be classified by the Land Settlement Board as a first class manager or sub block manager who has given outstanding service and has ahead of him a reasonable number of years of active farming life.

In addition to the above qualifications applicants must satisfy the Land Settlement Committee (appointed for each area by the Land Settlement Board, and consisting of two private farmer members and the Commissioner of Crown Lands for the land district as Chairman) that they have the necessary relevant and up-to-date experience and ability to successfully farm the areas applied for. Applicants may, therefore, be called for an interview in the districts where they applied for farms, although this is not always the case. At the interviews, applicants must be prepared for an in-depth discussion on their plans for farming the units for which they have applied. They are expected to prepare a budget of estimated payments and receipts for an average year, and to be able to answer questions by the Land Settlement Committee on that budget.

3.2 Financial Requirements

Applicants are required to show that they have the finance for the deposit, which has to be paid in cash except where the Land Settlement Committee accepts, as part of the deposit, assets which form an essential part of the stock or plant required for farming the property. The leasehold deposit is based on 10 per cent of the value of improvements plus 25 per cent of the value of stock and plant (and normally works out at between 12 and 15 per cent of the total value of improvements plus stock and plant). Successful applicants are expected to contribute the whole of their available resources towards their settlement; in the case of a husband and wife, the combined resources of both may be required to be contributed.

The Land Settlement Board requires any seasonal surpluses arising from the operation of the farms to be applied to reducing the debt, until the amount owing has fallen to an acceptable level when the current account mortgage (i.e. incurring interest only on the outstanding capital sum) may be converted to an instalment mortgage (incurring repayments of principal as well as interest).

In addition to the deposit and the long term finance for capital purposes from the Land Settlement Board, applicants are required to satisfy the local Land Settlement Committee that:

(a) for sheep farms, seasonal finance is available from a stock firm, bank or other approved source. Seasonal finance is controlled under a budget prepared in conjunction with the Department of Lands and Survey and the seasonal financier;

(b) for dairy farms, sufficient finance is available to meet living and working expenses until the dairy returns start to come in. A 100 per cent dairy order is taken and operated on a graded basis to cover charges and topdressing. Again a budget is prepared jointly.

While settlers remain on a current account mortgage, they are subject to detailed budgetary controls, operated by the Land Settlement Board through the Department of Lands and Survey. It is a condition of allotment to an applicant that arrangements for seasonal finance made with an appropriate financier are controlled by the lending agency, in conjunction with the Department of Lands and Survey. In this connection the seasonal financier must indicate readiness to:

- provide finance without requiring registered security, and

- assist in administering full budgetary control requirements.

All farms are fully stocked by the Department of Lands and Survey and have sufficient plant for the initial requirements at settlement. Stock and plant provided in this manner must be bought by the settler at the current prices ruling on the settlement date, with the cost being added to the outstanding capital sum owed by the settler, rather than paid directly in cash.

The effect of the combination of the value of improvements and the value of stock and plant is that the capital sum owed by the settler to the Land Settlement Board in recent years is very substantial. In the example given in the Department of Lands and Survey explanatory booklet (Department of Lands & Survey 1984), this capital sum amounts to $435,000; of this $60,000 is met by the deposit, leaving $375,000 carrying an interest charge of 7.5 per cent. In addition a rent is charged on the unimproved value of the land at a rate of four per cent nett which in the example quoted above amounts to $8,000 annually. Thus the rent and interest payments or charges to the Department of Lands and Survey in this example amounts to over $36,000 a year. If the seasonal requirements are substantial, the total interest and rent bill for those settled in recent years can amount to $40,000 or more annually; sums of this magnitude do occur in the budgets of some of these settlers. Debt service costs of this size represent a considerable charge on the financial earnings of the farm and are often regarded as a strong incentive by the settlers to achieve high levels of performance. These paymments for capital (which are all interest charges as no direct capital repayments are involved while the farmer is on a current account mortgage) are part of the value added of the farm, so that they are a gain in terms of the Gross Agricultural Product; they are nevertheless normally the biggest item in the expenditure of the settler and therefore of major significance in the residual figure of net farm income.

3.3 Data Available for the Present Study

The Settlement Scheme of the Department of Lands and Survey represents a major investment in the provision of farming opportunities for potential farmers. The farm units are allocated by ballot among the applicants who meet the requirements set out above. All the farmers participating in the scheme have to operate within detailed budgets worked out by the professional officers of the Deparment of Lands and Survey. These budgets, together with an initial "charge-fixing budget" which is drawn up before the choice of settler has been made, are kept on the files for each settler at the area offices of the Deparment of Lands and Survey. They, therefore, provide a detailed account of the assessment by the officers of the Department as to the likely levels of performance by a typical settler, together with details of the actual performance by the settler operating the farm in question. Data is also available on the educational and other qualifications of the settler, including the amount of deposit paid towards the capital cost of the farm.

This body of detailed information is available for one of the most uniform samples of farms in New Zealand (indeed it would be difficult to find an equivalent sample in other market oriented economies). The farms within each of the dairying or sheep and beef categories are of a comparable size in terms of their carrying capacities; they are stocked (both with livestock and plant) to a uniform level; the farmers all take over at around the same date each year and, while no two farms are identical, the settlement units of the Department of Lands and Survey are characterised by much less physical and economic variation than farms generally.

The availability of a substantial body of detailed information on a sample of farms of greater physical and economic uniformity than could be found elsewhere has made it possible to assess the economic consequences of different levels of attainment in agricultural education. This assessment has been made in relation to three criteria:

(a) the increase in total farm output;

(b) the increase in valued added; and

(c) the increase in net farm income.

In each case the increase has been determined by comparing the average of the first three years actual performance by the settler with the original "charging" budget as assessed by the officers of the Department of Lands and Survey - prior to settlement.

The choice of these three different criteria makes it possible for the outcome of alternative objectives of policy to be considered. For reasons set out in the Introduction, in any assessment of the economic benefits from policy measures in the agricultural sector, the increase in Gross Value Added is the most important of the alternative criteria which might be considered, although increase in total output or in net incomes have their adherants in terms of objectives. The increases have been assessed in current rather than constant terms, as in the circumstances of the present study there is no particular advantage to be gained from transforming the results for each year into constant price terms given that the focus of the study is on the relative rates of increase according to educational levels, not the change in any absolute sense (although some of the implications of the growth rates in real terms are considered).

3.4 Collection of the Data

The data was collected for the settlements which occurred during the five years 1977-78 to 1981-82 inclusive. The choice of 1977-78 as the earliest year was determined by the fact that this was the first year in which the agricultural educational training requirements were laid down for applicants. Those applicants who had previously been accepted but not successful in any of the ballots and who reapplied were allowed to qualify irrespective of their agricultural educational training qualifications; others who had particularly lengthy practical experience were also exempted from these requirements. The choice of settlement in 1981-82 as the latest year to be used in the study followed from the decision to measure the efficiency of individual farmers by comparing the professionally assessed budget, drawn up for the farm unit before settlement, with the average of the three budgets of the settler in the years immediately following settlement. As 1982 was the latest year of settlement for which there were three years' budgets in the file which related to the performance of the settler concerned, this was the latest year of settlement that could be used for the present study.

3.5 Definitions of the Main Variables

In terms of the data in the budgets, the following definitions were adopted for the main output variables:

(a) Total Farm Output: Total receipts from sales of farm products, including rebates and miscellaneous payments relating to the current farming activity; income from non-farm sources and receipts reimbursing capital expenditure have been excluded.

(b) Net Farm Income: Cash surplus (or deficit) arising from farming operations, plus personal living expenditures from farm sources (i.e. household expenditure, life insurance, school fees, income tax) and capital expenditure funded from within the farm receipts as set out in (a) above

(c) Value Added: Net farm income as defined in (b), plus rent charge, interest payments to stock firm or bank, interest on outstanding current account with the Department of Lands and Survey, and wages paid, including shearers wages.

The data for these variables were extracted from the records for:

(a) the 12 month "charging" budget prepared by the professional staff of the Department of Lands and Survey in the year prior to the farm being settled; and

(b) each of the first three years of settlement (the first "year" is in fact a 15 to 16 month period for sheep farms and a 13 month period for dairy farms).

In addition to the above data, information was also collected on:

(a) Deposit: the sum paid towards the cost of the farm unit; in most cases the amount paid is the minimum specified by the Department of Lands and Survey (based on 10 per cent of value of improvements and 25 per cent of value of stock and plant). As applicants are expected to contribute the whole of their

available resources towards their settlement cost the actual deposit can exceed the minimum required, in some cases by a substantial amount.

(b) Age of Settler - as shown on the application form submitted to the Department of Lands and Survey.

(c) Number of dependent children.

(d) Marital status.

(e) Agricultural education and training qualifications, according to the categories laid down for eligibility for participation in the scheme by the Department of Lands and Survey, i.e.

(1) two 2 week courses in each of two years in basic husbandries and farm management to a satisfactory standard; these courses are in practice available only at Flock House and Telford Farm Training Institutes.

(2) the Trade Certificate in Farm Management.

(3) an appropriate degree or diploma from Massey University or Lincoln College.

(4) exemption from the agricultural education and training requirements, for reasons set out above.

(5) the type of farm (dairying or sheep and cattle).

3.6 Numbers in Final Farm Sample

The data was extracted from the districts (two in the North Island and two in the South) where the largest number of settlements had been made over the years concerned. The numbers of units settled in these districts and the numbers actually used in the study are set out in Table 5. The difference between the number of units settled and the number actually used in the study has arisen mainly from the rapid transfer from the "current account" system of repayment (which involved a detailed budgetary control system) to the "instalment mortgage" basis in which circumstances the settler was released from budgetary control. Other factors, including the absence in some cases of detailed budgets from the settlers files for one or more of the years for which the data was required, and the unavailability of a small number of files at the time of collection of the data accounted for the remainder. The difference between the actual and potential numbers was more evident in the North Island districts; as can be seen from Table 5 in all but one of the 69 settlements in the South Island the required data was available, whereas in the North Island one third of the settlement files could not be used, for reasons set out above. The total number of 168 farms in the study represents just over 75 per cent of all the units that were potentially available for inclusion.

TABLE 5

Sample of Farms Used

District		Year 1977-78	1978-79	1979-80	1980-81	1981-82	Total
North Auckland	A	4	8	6	10	11	39
	B	2	5	1	9	8	25
South Auckland	A	19	15	20	25	36	115
	B	9	5	9	19	33	75
Otago	A	7	3	5	4	3	22
	B	7	3	5	4	3	22
Southland	A	10	6	8	10	13	47
	B	10	5	8	10	13	46
Total	A	40	32	39	49	63	223
	B	28	18	23	42	57	168

(A) = Number of units settled
(B) = Number actually used in the study; 75 per cent of total actually used.

SECTION 4

CIVILIAN SETTLEMENT SCHEME - THE RESULTS

4.1 Basic Characteristics of the Sample

This study of participants in the Civilian Settlement Scheme of the Department of Lands and Survey is primarily concerned with the consequences of different educational and training levels on the economic results of the individual settlers. The distribution of the sample between the four education and training categories in the four areas studied is set out in Table 6. The substantial number who were exempted from the educational qualifications has arisen from the right of applicants to exemptions where they had been applicants under the Scheme before the educational requirements were introduced, and also from the right of older applicants to sit an assessment course to establish the extent of their knowledge; long term high calibre managers and sub managers working on the development of the land being settled are also given special consideration with regard to the educational requirements. As will be seen in Table 6 the proportion of participants in the South Island, especially those in Otago, exempted from these requirements is much higher than in the North Island; it is not clear why this has been the case.

The second highest category in Table 6 is that of settlers with an appropriate degree or diploma from Massey University or Lincoln College. The proportion of settlers in Southland with university training is particularly high; as the reverse is the case in Otago, the position in the South Island in this regard is only slightly different from that in the North Island. The Land Settlement courses at the Farm Training Institutes account for almost the same number of settlers in the sample as the University courses, though the courses are of a much shorter time span. Settlers with this qualification are more evenly spread between the four areas than those with the other types of educational qualification.

The Trade Certificate in Farm Management accounts for a smaller proportion of the sample than the other categories; it is mainly confined to the South Auckland area. Only two settlers in the South Island sample held this certificate.

The attainment of the educational training requirements is related to age (Table 7). In the case of the 48 settlers in the sample over 40 years of age, only 8 met any of the training criteria. Conversely, of the 120 settlers aged 20-39, only 24 had been exempted from the educational training requirements. Nearly two thirds of the settlers in this age group had either university education or had attended the Settlement course at Flock House or Telford (although all those with the Trade Certificate in Farm Management also came from this age group).

The proportion of the sample meeting the educational training requirements has increased over the years since the requirements were first imposed (Table 8). Of the 28 settlers in 1978 (in the study) only eight met the requirements, the remaining 20 being exempt. The proportion of settlers being allowed an exemption has, however, fallen sharply from over 70 per cent in 1978 to under 20 per cent in 1982. It seems likely that the number meeting the educational training requirements will continue to grow; by 1984 of the 237 eligible applicants in the South Auckland area, there were only 31 (13 per cent) who were granted exemption from the requirements.

TABLE 6

Educational Training Levels of Settlers by Location

	Flock House or Telford Land Settlement Course	Trade Certificate in Farm Management	Degree or Diploma from Massey or Lincoln	Exemption from Educational Requirements	Total
North Auckland	8	2	6	9	25
South Auckland	20	17	17	21	75
Otago	7	0	1	14	22
Southland	6	2	18	20	46
Total	41	21	42	64	168

TABLE 7

Educational Training Levels and Age of Settlers

Age	Location	Educational Levels: Flock House or Telford Land Settlement Course	Trade Certificate in Farm Management	Degree or Diploma from Massey or Lincoln	Exemption from Education Requirements	Total
20-29	N.I.	6	7	7	1	21
	S.I.	5	0	7	4	16
30-39	N.I.	19	12	13	9	53
	S.I.	7	2	11	10	30
40-49	N.I.	3	0	2	18	23
	S.I.	1	0	1	17	19
50+	N.I.	0	0	1	2	3
	S.I.	0	0	0	3	3
Total	N.I.	28	19	23	30	100
	S.I.	13	2	19	34	68
Total	N.Z.	41	21	42	64	168

TABLE 8

Educational Levels and Year of Settlement

Year of Settlement	Location	Educational Levels: Flock House or Telford Land Settlement Course	Trade Certificate in Farm Management	Degree or Diploma from Massey or Lincoln	Exemption from Education Requirements	Total
1978	N.I.	3	0	1	7	11
	S.I.	1	0	3	13	17
1979	N.I.	5	0	2	1	8
	S.I.	1	0	1	6	8
1980	N.I.	2	0	3	7	12
	S.I.	3	1	4	5	13
1981	N.I.	4	9	8	7	28
	S.I.	2	1	4	7	14
1982	N.I.	14	10	9	8	41
	S.I.	6	0	7	3	16
Total	N.I.	28	19	23	30	100
	S.I.	13	2	19	34	68
Total	N.Z.	41	21	42	64	168

The numbers in the sample are not large enough to justify any firm conclusions on the trends on the relative importance of the three main categories of educational training requirements for the settlers included in the sample. The general picture is one in which the decline since 1978 in the number of settlers with exemption has been accompanied by a steady increase in those with university diplomas or degrees, and a sharp increase in 1982 in the number who have attended the Flock House or Telford Land Settlement course. At the same time virtually all those with the Trade Certficate in Farm Management in the sample were settlers in 1981 and 1982; in these years the numbers with this qualification represented just over 20 per cent of the total.

Nearly all the settlers in the sample were married, with only 13 (8 per cent) single persons. The number of single people was not sufficient to justify an analysis of the data on the basis of the marital status of the settler. In the case of the married settlers an increasing proportion are joint applicants with, in a number of instances, both husband and wife meeting the educational training requirements.

The farms settled are all either sheep and cattle units or dairy units. All the farms in the South Island sample are sheep and cattle units, together with 70 per cent of those in the North Island. These farms are predominantly stocked with sheep, normally in the ratio of around two stock units of sheep to one stock unit of cattle and are generally stocked with a total of just over 3,000 stock units at settlement. As it was not the objective of this study to make a substantive analysis of all the factors involved in the success of individual farms, but just the effects of different educational training qualifications, the details of the changes in physical factors have not been examined but, as is discussed later these changes may be of greater importance in the levels of success actually achieved, than the level of educational training attainments.

4.2 Levels of Output and Income

The average gross output per farm projected in the pre-settlement budgets was just over $60,000 being slightly higher in the South Island (Table 9). In the first year after settlement the average gross output outturn was $80,000, with the North Island's results being slightly greater. The differential between the North and South Islands increased in the years subsequent to settlement, such that in the third year after settlement, the average output per farm in the North Island was almost $6,000 greater than that in the South Island (though the pre settlement projections were for gross output on the South Island farms to be on average over $3,000 greater than that in the North Island).

The receipts from farm output are spent on three categories of expenditure:

(a) non-factor costs (i.e. fertilisers, machinery expenses, animal health etc.);

(b) factor costs (i.e. the returns to borrowed capital and hired labour, in the form of rent and interest charges, shearing costs, casual labour etc.); and

(c) net farm incomes (i.e. the returns to management, including that for the labour of the farmer and family and for any capital invested by the settler).

TABLE 9

Average Gross Output per Farm ($)
(at current prices)

No. of Farms	North Island (100)	South Island (68)	New Zealand (168)
Projected Pre Settlement	60 367	63 616	61 682
1st Year after Settlement	80 845	79 918	80 470
2nd Year after Settlement	88 014	84 519	86 599
3rd Year after Settlement	95 128	89 413	92 815

The deduction of the non-factor costs from the receipts from gross output gives the level of gross value added per farm which, as set out earlier, is of major importance in the contribution of agriculture to the national economy. The figures for gross value added on the farms in the survey (Table 10) show that it accounted for just over half of the total farm output. This is a somewhat better performance than for New Zealand farming as a whole where, in recent years, the non-factor costs (or intermediate consumption, as they are classified in the New Zealand system of National accounts) have grown from over 52 per cent of gross output in 1980-81 to nearly 60 per cent by 1983-84.

The level of gross value added in the pre-settlement budgets was projected to be slightly higher in the South Island than in the North Island, and while this turned out to be the case in the first year after settlement, the position was reversed by the third year. However, the difference between the level of value added on the farms in the two locations was small.

TABLE 10

Average Gross Value Added ($)
(at current prices)

No. of farms	North Island (100)	South Island (68)	New Zealand (168)
Projected Pre Settlement	29 387	31 061	30 065
1st Year after Settlement	38 606	41 131	39 628
2nd Year after Settlement	42 427	43 814	42 988
3rd Year after Settlement	45 200	44 849	45 058

Most of the value added on these farms was absorbed by the high level of debt interest payment and rents that have to be met. The net farm income after the payment of interest, rent and hired labour charges was, however, by no means as low as had been projected in the pre-Settlement budgets (Table 11). In practice, the average level of net farm income in the first year was just under $15,000 per farm, but this grew only slowly in the years after settlement. This pattern occurred in both Islands, although the growth in incomes during the three years after Settlement in the South Island was slower than in the North Island.

TABLE 11

Average Net Farm Income ($)
(at current prices)

No. of farms	North Island (100)	South Island (68)	New Zealand (168)
Projected Pre Settlement	1 566	4 074	2 581
1st Year after Settlement	13 043	16 757	14 546
2nd Year after Settlement	14 183	16 709	15 205
3rd Year after Settlement	15 634	17 912	16 556

The pattern of change in the levels of output, value added and income from the first to the third year after Settlement illustrates the fact that the farms are in a fully productive state in the year in which they are settled, both as far as the farm itself and the levels of stocking are concerned. As the average rate of increase in prices for sheep and cattle over the period 1977-78 to 1981-82 was in excess of 18 per cent per annum (Ministry of Agriculture and Fisheries 1985), the growth in the value of output on sheep and cattle units in the first three years of settlement was a reflection of price increases rather than of any growth in the volume of output.

Similarly the growth in the value of the gross value added over these years reflected the average increase of over 8 per cent per annum in the price index of value added in agriculture so that the average growth in value added in current prices on the units in the survey of only 14 per cent over the two years after settlement meant that growth in real terms was negative (it was virtually unchanged in real terms in the North Island farms but fell in the South Island). This again points to the fact that the level of value added generated in the first year of settlement did not increase in real terms in the following two years. This cannot be ascribed to any evident climatic factor; the first year was spread over a "five year span", which should reduce the effects of external factors, such as climate, to a minimum.

In the case of net farm income the growth in current prices during the second and third year after settlement was very similar to that of value

added. The average rate of increase in the Consumers Price Index, of just under 15 per cent per annum, was larger than the increase in net farm income in current dollar terms over the second and third years after settlement so that by the third year settlers' incomes in real terms were lower than in their first year.

It should however, be noted that while these figures deal with the average results for the sample as a whole (which in turn represents over 75 per cent of all those who were settled in the five years 1977-78 to 1981-82), there is a wide range of outcomes at individual farm level. The extent of the range of individual results is shown in the very large standard deviations for each of the variables (see Table 12) especially for those relating to net farm income.

TABLE 12

Mean and Standard Deviation of
Main Dependent Variable

Number of Observations: 168	Mean	Standard Deviation
TOUTS	61682.17	18691.17
NINCS	2580.73	6282.76
GVAS	30064.81	8353.24
TOUT1	80470.11	25142.81
NINC1	14546.09	11895.51
GVA1	39627.85	15112.54
TOUT2	86599.32	21662.32
NINC2	15205.29	12077.69
GVA2	42988.33	13901.99
TOUT3	92814.82	21757.54
NINC3	16556.03	11792.57
GVA3	45057.76	12704.26

where
TOUT = Total Farm Output
NINC = Net Farm Income
GVA = Gross Value Added

and S, 1, 2, 3 are the pre-settlement, first, second and third year after settlement respectively.

4.3 Effects of System of Farming

When the data is disaggregated into that relating to the three main farming situations (sheep farming - North Island, dairy farming - North Island and sheep farming - South Island) the basic issues concerning the rates of growth in real terms in the two years following the year of settlement remain. In terms of gross output, the sheep farms in the North Island are the largest units, both in the projected levels prior to settlement and in the outturn after settlement (Table 13). By the third year after settlement this output is 15 per cent higher than on South

Island sheep farms in the survey. However, these farms have substantially higher non-factor costs than the sheep farms in the South Island; in the third year after settlement the difference in the levels of these costs was almost $10,000. This had been anticipated in the projected budgets; the higher costs would appear to have been primarily animal health and fertiliser costs, but other costs may also have been higher. The higher production costs account for most, but not all of the higher output, so that while gross value added was also larger in the North Island sheep farms than those in the South Island, the difference was considerably smaller than in the case of total output and non-factor costs.

TABLE 13

Average Output, Value Added and Income by Type of Farm ($)

	Type of Farm				
Year	N.I. Sheep	S.I. Sheep	All Sheep	Dairying	All Farms
No. of Farms	(70)	(68)	(138)	(30)	(168)
(a) Gross Output per Farm					
Projected Pre Settlement	68283	63615	65983	41897	61682
First Year	93973	79918	87048	50212	80470
Second Year	97838	84519	91275	65090	86599
Third Year	102902	89413	96256	76986	92815
(b) Net Farm Income per Farm					
Projected Pre Settlement	-541	4074	1733	6842	2581
First Year	13002	16757	14852	13139	14546
Second Year	13726	16709	15916	15248	15205
Third Year	14682	17912	16274	17855	16556
(c) Gross Value Added per Farm					
Projected Pre Settlement	32237	31061	31657	22736	30065
First Year	44855	41131	43020	24024	39628
Second Year	47323	43814	45594	31002	42988
Third Year	48675	44849	46789	37091	45058

Not only were the non-factor costs higher in North Island sheep farms, but so were the factor costs themselves. By the third year after settlement these costs, at $34,000 per annum, were $7,000 higher than those of South Island sheep farms. The effect of this was that the net incomes of South Island farmers were over 20 per cent higher than those in the North Island in the third year. Thus, in spite of their considerably higher level of output, the North Island sheep farmers were appreciably worse off in net income terms than their South Island counterparts. This, again, had been anticipated in the pre-settlement budgets, which showed negative incomes for the North Island sheep farmers as a whole.

The smaller group of dairy farmers, all in the North Island, had lower output (projected and actual) than sheep farmers, but also a lower level of costs, both factor and non-factor. This meant that their net farm incomes as a proportion of the value of gross output, were considerably better than those of sheep farmers. These dairy farmers had net farm incomes in absolute terms virtually the same as those of South Island sheep farmers, but 20 per cent higher than those in the North Island.

The dairy farms in the sample showed a much stronger growth in the value of gross output than the sheep farms after the first year of settlement (though not such a difference over the projected output levels as occurred with the sheep farms). In the case of dairy farms, however, the growth in the value of output after settlement was not solely a reflection of price increases; there was also growth of just over three per cent per year in the volume of output. The increase in the value of output was, however, considerably greater than in non-factor costs, so that the level of value added rose in real terms. Not all of the growth in value added was absorbed by higher rent, interest and labour charges; the increase in net farm incomes on the dairy farms was much stronger than on the sheep farms in either the North or South Island. It must be recognised that the period 1978-1982 was more favourable for dairy farming than for sheep farming and the benefits of these better circumstances led to better incomes. This arose through the higher rate of price increases for dairy products and from the extra output that was stimulated on the dairy farms by the better economic climate. As the dairy farms are considerably smaller in area than the sheep farms, the level of rent and interest charges are correspondingly lower; this means that, although the net farm incomes are similar to those on sheep farms, the value added on these farms is somewhat lower.

The average results by system of farming should, however, be interpreted against the background of the large variation that exists within the sample for each variable. The size of the standard deviation around the mean for those variables in each of the farming systems (see Appendix 2) is indicative of the wide range of outturns of the individual farms within the different categories. This applies in both sheep and dairying systems.

4.4 Effects of Educational Standards

A set out in Section 3 the economic consequences of the four alternative educational levels required of settlers under the Land Settlement Scheme have been assessed in terms of the increases in output, income and value added in the first three years of settlement. The results in terms of the average increases in these variables by educational level are given in Table 14.

The differences in the average performance of the four educational groups show no consistent pattern nor any wide variations between them. On the basis of the ranking for the three variables, those with the Trade Certigicate did slightly better than the other groups, but not in a way that could be regarded as indicating a substantive difference. In general the exempt group was the only one with average results above those in the sample as a whole (and therefore above those in the non-exempt categories by a somewhat larger margin) for each of the three dependent variables, but again the differences were small.

TABLE 14

Average Increases[a] in Gross Output, Net Farm Income and Gross Value Added, by Level of Education ($)

	Level of Education				
	Flock House or Telford Land Settlement Course	Trade Certificate in Farm Management	Degree or Diploma from Massey or Lincoln	Exemption from Education Requirements	Total
No. in Sample	(41)	(21)	(42)	(64)	
Gross Output	25 174	24 137	22 772	26 491	24 946
Net Farm Income	11 051	13 841	13 552	13 230	12 855
Gross Value Added	11 074	12 785	13 579	12594	12 493

[a] Increases are those of the average of the first three years after settlement over those projected in the pre-settlement "charging budget". The figures are in current price terms.

The results showed the same large variations between farms as has been discussed earlier. The standard deviations and correlation matrix between the variables is set out for each of the educational groups in Appendix 3. The relationships between output, income and value added are not strong in any of the groups, though somewhat better in the Trade Certificate group than in any of the others. This points again to the need for a better understanding of the factors determining income and value added on New Zealand farms and of the consequences of changes in output levels.

The data on the increases in output, income and value added were then examined to see whether a linear regression model based on educational level, type of farm, age and deposit would give significant results. The format of this model is one in which the results for the settlers in each of the three agricultural education groups were compared with those in the exempt group, allowing for age, deposit paid and farm system.

The results of this analysis, based on ordinary least squares regression, are given in detail in Appendix 4 and the main co-efficients are given in Table 15. The regression co-efficients in this table give the

TABLE 15

Estimated Linear Regression Co-efficients

Type of Farm	Constant	Age	Deposit (÷1000)	Effect of Education Ed1	Ed2	Ed3
Change in Gross Output						
N.I. Sheep	33216.8	161.1	-177.5	1403.6	382.1	3453.5
S.I. Sheep	39786.6	-208.6	-130.6	-8344.8	1527.0	-12700.1
Dairying	-2672.9	713.9	-81.7	-883.6	4851.6	11719.4
All Farms	21555.0	115.2	-67.5	-431.6	1027.8	-2377.4
Change in Net Farm Income						
N.I. Sheep	17919.8	-118.6	7.0	-2294.7	4309.0	2131.2
S.I. Sheep	27899.8	-326.6	-3.7	-7288.6	6187.7	-6429.1
Dairying	14215.0	-73.7	-60.4	-5263.0	913.0	2843.0
All Farms	15996.0	-193.5	-3.1	-4601.5	807.6	-2017.0
Change in Gross Value Added						
N.I. Sheep	27279.3	-187.3	-116.1	-1278.0	2777.6	3272.7
S.I. Sheep	26622.0	-286.5	-34.8	-7240.2	8917.1	-5038.3
Dairying	13283.1	1.3	-113.3	-7030.0	1424.1	-2922.6
All Farms	17419.0	-182.3	-65.0	-3400.2	1311.7	-660.8

estimated levels of increase in output, farm income and value added in relation to age, deposit and the particular educational group concerned according to the system of farming. Thus the estimated change in output on North Island sheep farms with settlers meeting the Flock House/Telford Land Settlement course requirements is as shown by the following equation:

$$\text{Change in Output} = 33216.8 + 161.1\,(\text{age of settler}) - 177.5\,\frac{(\text{deposit})}{1000} + 1403.6.$$

As can be seen from the detailed data in Appendix 4, the level of statistical reliability attached to many of these co-efficients is very low. This is a consequence of the fact that the progress of individual farm businesses in this sample (in terms of output, income and value added) is a result of factors other than educational qualifications, the initial deposit or age (within the age range that actually occurred). This points to the need for a much more elaborate study of the multiplicity of factors affecting the development of individual farm businesses, but this would go a long way beyond the scope of the present study.

In the face of the low levels of statistical significance in the results of the regression analysis, the only firm conclusion that can be justified is that there is no evidence in the results to support the hypothesis that the lack of formal educational training of settlers in the Farm Settlement Scheme (i.e. those exempt from educational requirements) has had any impact on the level of economic performance in the first three years after settlement when compared with settlers who meet the requirements. In a general fashion the pattern of results would suggest that those settlers with the Trade Certificate in Farm Management did achieve somewhat better results than the other groups and those with the Flock House/Telford Land Settlement Course achieved poorer results, while the exempt group and the Massey/Lincoln group came somewhere in between. This is, however, a tentative view; the weight of the other factors in farm performance would not justify any more precise view about the relative merits of different levels of agricultural educational training. The evidence does not support the view that agricultural educational training over the past decade has been of importance in the on farm performance of New Zealand agriculture; this is not to say that it has no impact at all but that it would not appear to have been the critical factor that it has been portrayed. It is hoped that this conclusion will spur those involved in vocational agricultural educational training to examine their role in the development of New Zealand agriculture to see whether more clearly defined objectives for their teaching programmes and a greater input into tthe measurement of actual achievement in meeting those objectives would contribute to a more rapid growth in the agricultural sector.

The development of agricultural education and training in recent years and the level of resources allocated to it has not led to any growth in efficiency over the past decade; the study of "Agriculture in the Market Economy" (Philpott 1985) argues that while aggregate input growth over the period 1970-1983 at 0.9 per cent per annum has been much the same as between 1957-1970 (though its composition has changed away from fixed and working capital towards land and labour) "there has been a dramatic fall (a halving) in the output growth rate and an even more dramatic fall (a quartering) in efficiency growth". The reasons which are put forward to explain the fall in the growth in efficiency of production since 1970 include "the absence of new dramatic technical changes ..... such as aerial top dressing, rotational grazing, electric fencing etc." .... "the

possibility that pasture production potentials have reached a maximum plateau, the slowdown in the pace of investment ..... and the switch of investment towards buildings including farm houses". The paper refutes the argument that there has been any improved growth in output or efficiency in New Zealand agriculture - in fact it argues just the reverse. This adds further weight to the case for the part played by agricultural educational training to be carefully appraised. While the argument that factors other than agricultural educational training have been responsible for the "dramatic fall in efficiency growth" over the past decade or so would seem to have much merit, that view reinforces the conclusion that factors other than agricultural educational training are dominant in the rate of development of the agricultural sector (as defined in the paper by Philpott and in the present paper). It is disappointing to find the role of education and training to have been of such little consequence; it is hoped that ways of improving its effect can be found.

4.5 Relationship between the Main Economic Variables

As discussed earlier, the determinants of the change in levels of gross output, net incomes and value added clearly lie outside the issues which were the concern of the present study; any detailed explanation of these determinants of change will require much more extensive study. It was possible, however, with the data available to examine the three dependent variables to see whether there is any strong statistical relationship between them. This could give some useful insight into the extent to which:

(a) higher output on the farms in the Survey gives rise to greater net farm income;

(b) higher net farm incomes are related to higher value added (whether it is reasonable to pursue the two major objectives in national agriculture and on-farm policies simultaneously); and

(c) the outturn in one year is related to that in subsequent years, both within any one variable and between them (including consideration of the extent to which the pre-settlement budgets are an accurate prediction of the outturn).

The detailed results of the analysis of the relationships between the three main economic variables are given in Table 16. For the sample of farms as a whole, the level of total output projected in the pre-settlement budget was negatively correlated with net farm incomes (i.e. higher output per farm was associated with lower incomes) and, in the post settlement years, the association in any year was positive but very weak. This gives rise to the question as to whether the output level on many farms was reaching the point beyond which the costs of producing the marginal units of output exceeded the returns from that part of total production; if this is the case then these farmers would have generated higher net incomes by reducing the level of production. Further work on the data is necessary to establish whether or not this is the case, and the evidence of a weak correlation between output and incomes suggests that further study of this would be justified.

The results are, however, not easy to interpret, particularly in the light of the fact that the relationship between total output and value added was much stronger than between output and net farm income both in the projected pre-settlement budgets and in the outturn in each of the

TABLE 16

Correlation Matrix - All Farms in Survey

	TOUTS	NINCS	GVAS	TOUT1	NINC1	GVA1
TOUTS	1.00000					
NINCS	-0.34454	1.00000				
GVAS	0.85506	-0.00535	1.00000			
TOUT1	0.71174	-0.41924	0.59934	1.00000		
NINC1	-0.08474	0.08358	-0.08613	0.29531	1.00000	
GVA1	0.54541	-0.33864	0.46773	0.79444	0.68917	1.00000
TOUT2	0.57022	-0.35803	0.44079	0.62857	-0.00321	0.41437
NINC2	-0.25892	0.29731	-0.22196	-0.18148	0.17146	-0.08995
GVA2	0.38936	-0.12360	0.35339	0.41766	0.12259	0.38526
TOUT3	0.55403	-0.29492	0.46111	0.62027	0.04945	0.46537
NINC3	-0.14504	0.31985	-0.06270	-0.04710	0.31353	0.10241
GVA3	0.48072	-0.14452	0.46984	0.49404	0.16535	0.49029

	TOUT2	NINC2	GVA2	TOUT3	NINC3	GVA3
TOUTS						
NINCS						
GVAS						
TOUT1						
NINC1						
GVA1						
TOUT2	1.00000					
NINC2	0.29014	1.00000				
GVA2	0.76850	0.63880	1.00000			
TOUT3	0.64423	-0.02201	0.42971	1.00000		
NINC3	-0.02942	0.26803	0.15480	0.31320	1.00000	
GVA3	0.44577	-0.01320	0.40606	0.72232	0.58838	1.00000

Where TOUT = Total Output
GVA = Gross Value Added
NINC = Net Income
and S, 1, 2, and 3 are the pre settlement and first, second and third year after settlement respectively.

subsequent years. This would suggest that the non-factor costs have a relatively good correlation with total output, but as it is these costs which contain virtually all those which are of a directly variable character, it is difficult to understand how the problems of excessive marginal costs has arisen.

The relationship between net farm income and gross value added, on the farms in the study, was a reasonably strong positive one with correlation co-efficients of between 0.55 and 0.68; a stronger relationship would, however, have been more reassuring in terms of the objective of achieving a greater contribution from farming to the gross national product (i.e. higher value added) through encouraging individual farmers to direct their farm policies towards improving their net farm incomes. In so far as the settlers in the study aimed at higher gross output, then they achieved higher value added (the correlation co-efficients being of the order of 0.8). The interrelationships between output and farm incomes and increased gross value added are complex and this is clearly an area in which much more study is necessary before any firm conclusions can be derived.

The third issue is the extent to which the outturn in one year is indicative of achievement in subsequent years. Again there is a fairly strong relationship, but by no means an entirely reliable one, as far as total output is concerned, with the best one being that between the pre-settlement projection and the actual output in the first year. In the case of farm income, the relationship is a very weak one; it is least evident in the case of the pre-settlement budgets, but even in the post settlement years it is still weak. This is indicative of the large variability of net incomes at farm level from year to year; the causes lie in the variability in output and input costs and in the consequences of relatively small changes in these variables on net income, which is the residual between them. As might be expected the relationship between gross value added in one year and the level in subsequent years is considerably stronger than in the case of farm income, but not as good as in the case of output. Again, the results of the present study give rise to questions about the nature of the development process at farm level and the causes of the relationships between costs, output and income. It is hoped that the data from this sample of farms, which have a much greater degree of uniformity than exists in New Zealand farming generally will provide the basis for more detailed research on these major issues.

SECTION 5

CONCLUSIONS

5.1 The Need for Continuous Evaluation of Policy

While the need for, and value of vocational education and training in agriculture is generally acknowledged, there has been little if any discussion of the appropriate level of annual funding, the optimum distribution of the funds which are spent, or the returns which the current expenditure generates. These are not simple issues, but they do have to be faced. At present it is not possible to find any logical framework in which these questions can be addressed; the current expenditure level and its distribution are the result of a set of apparently largely unrelated decisions taken by a number of different government departments and government funded bodies. There appears to be no published information on the return earned by these investments; indeed the question has not so far played any significant part in the discussions on the policy for agricultural education and training.

The absence of discussion on the level of distribution of funding reflects the largely unstructured system of providing agricultural education and training in New Zealand. The current mix of some centrally organised education and training activities together with locally initiated developments has provided for participation of both national government and local bodies, but it has meant that there are no comprehensive arrangements with a clearly defined organisational basis. This has been acknowledged by the Agricultural Training Council (1983) which has referred to "the diverse range of government and private agencies who are in the business of delivering educational and training services to the farming, horticultural and equine sectors of the agricultural industry".

While there are no a priori reasons for expecting the present arrangements to be more, or less, effective than the more systematic provision of agricultural education that exists in many other developed countries, the looser organisation in New Zealand has added to the problems of any evaluation of the financial returns from the present level of investment.

In a rational system of determining the level and distribution of public expenditure, a continuous evaluation of the benefits from the wide range of competing demands on which the available funds are spent, needs to be maintained. The trend towards accounting for the disbursement of public funds on a programme basis, rather than simply on an item by item approach, requires that the questions on the specific objectives of the programmes, the allocations to and within the separate expenditure programmes and the extent to which the objectives are being achieved, must be answered in as precise terms as possible.

In New Zealand, the first tentative steps towards examining the programme of expenditure in the policy for agricultural education and training have only recently been taken. There are not yet an agreed set of objectives for the policy, except in the broadest and quite unexceptional terms which do not provide any criteria against which actual performance can be measured. The estimated total expenditure on education and training has only recently been compiled and, even here, not all of the problems involved in these estimates have been resolved. It has not been possible

to find the basis on which the allocation of the total expenditure between a diverse set of institutions has been decided. In these circumstances, it is not surprising that the extent to which the expenditures involved meet the objectives of the policy for agricultural education and training is not known; nor can it be known until the objectives themselves are agreed.

The definition of objectives and the reorganisation of the actual expenditures on to a programme basis are not intrinsically difficult. It is the assessment of the consequences of changes in the level of current expenditure and of changes in the distribution between different elements and institutions which give rise to real problems. The decisions on these issues can be assisted, though not determined, by improving the information on the returns that are generated from the current expenditure.

5.2 The Educational Training Requirements of the Land Settlement Scheme

The process of assessing the returns is a very complex one; the data available on the Land Settlement Scheme provide a valuable source of material to begin this process. The objective of the study is a relatively limited one; it does not set out to give a definitive answer to questions on the appropriate changes in the total funding of agricultural education and training or its distribution, but rather to present the issue in a more comprehensive framework than has been the case hitherto and to provide part of the information that is needed for better decisions to be made on the future levels of expenditure.

The immediate purpose of the study is to determine whether the educational training requirements laid down by the Department of Lands and Survey for applicants under the Land Settlement Scheme are relevant to the objectives of the scheme. The objective of "settling landless New Zealand farmers with limited finance", does not of itself imply that there should be any training requirements. It is only when the objective is further defined to incorporate the benefits from this policy for growth in the agricultural sector (in terms of the contribution from agriculture to Gross National Product) and the extent to which the farmers settled under this scheme achieved substantial net farm incomes after meeting the interest and all other charges, that the training requirement becomes relevant. Once these economic objectives are seen as important, a review of the present policy for educational training requirements in the Land Settlement Scheme will be facilitated by an analysis of the achievements of the settlers affected by these requirements.

Since the agricultural educational training requirements were introduced for applicants settled in 1978 and subsequently, there has been a rapid growth in the number of settlers achieving the qualifications laid down by the Land Settlement Board. There is a considerable, though diminishing, number who obtain exemption from those requirements, on the grounds of the length and breadth of their experience in farming (which is over and above the five years full time farming experience covering all seasons, which is a basic requirement of all applicants). One of the issues which have to be considered by the Land Settlement Board is whether the provision of exemptions from the educational and training requirements should be regarded as a temporary arrangement which could be phased out entirely, in view of the fact that its incidence has declined sharply since 1978.

5.3 Basic Conclusion of the Study

The conclusion from this study of the actual performance of those with the three categories of agricultural training specified for applicants compared to those with exemptions is that the provision of exemptions has been fully justified. Those in the latter category have achieved economic and financial results at least as good as, and to some limited degree better than, those who have met the training requirements.

It is necessary to stress that the study does not seek to justify a conclusion that the training requirements are superfluous. Applicants for settlement have to satisfy the Land Settlement Committee that they have the relevant and up to date experience and ability to successfully farm the areas applied for; agricultural education is one of the routes towards meeting these requirements, but people with a particularly wide range of experience and with evident personal qualities that are likely to lead to success in a farm business, can achieve results which on average are just as good as those meeting the formal training requirements.

The particular characteristics of the successful applicants for farm units under the Land Settlement Scheme need to be recognised. These people tend to be highly motivated towards the operation and management of their own farms. They know in advance that these units will carry very substantial rent and interest charges (in the explanatory booklet for prospective settlers, published by the Department of Lands and Survey, the example, provided to help applicants work out the rent and interest payments to be included in a draft budget, involves amounts of over $36,000 a year; in addition settlers normally have to meet interest on seasonal loans which often brings the total interest and rent charges to around $40,000). These debt charges are far higher than those carried by New Zealand farmers generally, even though they do not include any capital repayment element (which only comes into operation when the settler is transferred to the instalment mortgage arrangement; total capital charges are then greater than those illustrated above). In these circumstances settlers need to achieve a high level of performance if they are to prosper on their farms.

In addition to the high level of motivation which characterises settlers in this scheme, they must also meet the requirements of full time experience and be able to satisfy the Land Settlement Committee of their ability to farm successfully (which may include an indepth discussion of the settler's plan for farming the farm or farms applied for). Where, as is now often the case, an application is made jointly by husband and wife, both may be required to appear for interview. Furthermore applicants must have acquired funds (normally through saving) to meet the minimum deposits laid down for the units for which they apply and be prepared to contribute the whole of their available resources towards the settlement.

Those who are settled under the scheme must accept detailed budgetary control operated by the Department of Lands and Survey and the seasonal financier. The Land Settlement Board also requires that any seasonal surpluses be applied to reducing the outstanding debt until the amount owing has been reduced to an acceptable level. While there is no doubt whatsoever that the officers of the Department of Lands and Survey are concerned about the best interests of the settlers and provide valuable advice and help in the development of the individual farms, the controls over expenditure and the allocation of seasonal surpluses exercised by the Department involve constraints which other farmers do not have to accept;

(the widely held view is that settlers are anxious to transfer to an instalment mortgage, in spite of the heavier repayment costs involved, partly in order to be free of these budgetary control procedures).

These characteristics of the settlers, both of those who meet the educational requirements and those who have exemption from them, tend to make them a more highly qualified group than those entering farming generally. In his paper on "Entry into Farming in the 1980's" Ower (1984) observes that "not every farm worker, shepherd and tractor driver is capable of successfully managing their own farm" and he might have added that not every farmer who enters through his family circumstances is capable of doing so either. The successful applicants for the Land Settlement Scheme should, therefore, be seen as a group which on the whole is much more likely to succeed than the larger group who enter farming through other routes.

The most reasonable interpretation of the results of the present study is that for a particularly well qualified and highly motivated group of landless New Zealand farmers with limited finance, the benefits which flow from a wide and lengthy experience are as large as those from a somewhat shorter (but still considerable) experience plus formal agricultural training. In these circumstances the policy of allowing exemption from the educational and training requirements of the applicants who, in the opinion of the Land Settlement Board, would warrant this exemption in the light of their experience, has proved to be a realistic one. Since the agricultural education and training requirements were introduced for the 1977/78 settlement programme, a substantial proportion of those actually settled have been exempted from them (38 per cent of the settlers, in this study, were exempt). On the basis of the trends over the period since 1977/78, the number now obtaining exemption from the training requirements is likely to be relatively small. However, there would appear to be no justification, in terms of the economic performance of those in this group, for discontinuing the policy of allowing exemptions (provided those benefiting from such a policy are of the same calibre as those who have benefited from it in the past). It is, therefore, recommended that the policy of allowing exemptions from the training requirements be maintained on the same criteria which have operated hitherto.

It is possible that, in the period covered by the budgets of these settlers (i.e. the first three years after settlement), the benefits of formal education and training do not materialise but that the beneficiaries of such formal training may achieve better results than those without training over a longer period of time. In the methodology adopted in this study, which involved the use of the budgets held on the files of the individual settlers, an approach encompassing a longer time period would not have been practicable, as in only a few instances are such budgets available for a period of more than three years or so. It might be possible to cover a longer period if settlers made available the financial results of their farm businesses for years subsequent to those for which the budgets are available in the Department's files. Such an approach, however, would involve a great deal more time and resources, and give rise to considerable problems with the comparability of the data.

It is a matter of judgement as to whether such an extension of the present study would be worthwhile. There does not appear to be any a priori reason why the benefits of formal education should produce economic returns only after the end of the third year. As the first few years are of critical importance in the development of these farms, it would appear

unlikely that any worthwhile effects arising from agricultural education that appeared after these years would be of any significance. In these circumstances it is doubtful whether further expenditure of resources on a study of the effects of agricultural education after the end of the initial three year period would be justified, particularly in view of the other studies which could be undertaken from the available data on these farms if the necessary resources were available. Some of these possible studies are discussed below.

5.4 Some Further Possible Studies in the Farm Settlement Scheme

The major problem which has arisen in the analysis of the results of the present study has been the lack of any statistically valid explanation of the factors which determine farm business performance. The study shows clearly the wide range in the levels of gross output, value added and net farm income per farm that are generated among a group of farmers that would appear to have a greater degree of homogeneity than that to be found generally within types of farming in New Zealand. It is possible that, if the determinents of growth in these dependent variables were clearly identified, then the effects of agricultural education and training might be more clearly apparent. It is also possible, and more likely, that these effects would be more evident in the population of entrants into farming in New Zealand as a whole rather than in the 'elite' group who qualify for participation in the Land Settlement Scheme.

There is a strong case for a more detailed study of the causes of success and lack of success among New Zealand farmers, both for the population as a whole and for those who are in the Land Settlement Scheme. Such a study would be concerned with a wide range of factors, including physical efficiency factors (stocking rates, milk yields, lambing rates etc.), levels of expenditure on particular inputs (fertiliser, animal health etc.), estimates of the labour input of the farmer and family, management policies in relation to the enterprises on the farm (cattle to sheep ratios and cow replacement policies), external physical factors (climatic changes), capital invesment policies etc. A study involving all these factors, together with any other factors which may influence the output, value added and net income at farm level, would represent a major research project.

At present work along these lines is being undertaken by the Department of Economics, Wellington University on the farms participating over a long series of years in the farm survey carried out by the Meat and Wool Boards' Economic Service. The results of this study should considerably enlarge our understanding of the determinants of success at farm level. The possibility of extending the study to cover the participants in the Land Settlement Scheme should be considered, as it should not be taken for granted that results derived from the study of the farms in the Meat and Wool Boards' Farm Survey will apply equally to the Farm Settlement Scheme.

One of the major issues to which the present study gives rise is whether the institutions providing vocational training in agriculture are achieving the best results possible from the resources they have at their disposal. It is not possible to derive any firm conclusions from the results. There is, however, one issue that could usefully be further developed; this is the specific objective of the education and training programme. From discussion held with some of those involved in agricultural education and training, it is evident that the objectives of

the courses are seen in very general terms, e.g. 'to help young people gain skills and knowledge, and attitudes that will enable them to enter the farming industry with confidence', 'to cater for students who require or need to attain a sound knowledge of farming to be able to carry responsibility at an early age' etc. In some instances there do not appear to be any agreed objectives, at least in a written form.

In the present study farm performance has been measured in terms of three specific criteria - total output, valued added and net income. Total output is, however, of doubtful worth as an objective of policy either at farm level or at national level. For a vocationally oriented training programme, the objective should be to enable students to develop farm businesses in a way which maximises the level of net farm income (within reasonable constraints on the hours of work, reasonable working conditions and degree of risk). This should be set within a national policy which has the objective of increasing the level of value added in the agricultural sector (again subject to constraints, e.g. no net income transfers into the agricultural sector, or from it, other than those resulting from the general taxation system). While it could, no doubt, be argued that the present training programmes are concerned with better incomes on farms, it is evident that they are not specifically directed to this end. A more clear and precise identification of how the contents of the present courses which are taught at institutions providing vocational agricultural training lead to better incomes of farmers might enable them to be more effective in reaching this target. This in turn implies a clear knowledge of the income effects of the whole range of farming activities currently practised by New Zealand farmers. While there is good reason to believe that New Zealand farmers are more efficient than those in most, if not all, competing farming industries overseas (Attwood 1984) there are opportunities for further improvement.

A reappraisal of the cost effectiveness of agricultural education and training in New Zealand should take cognisance of the relatively low input of resources to this purpose compared with the position in many overseas countries, and the much less organisational structure here compared to many other countries. To what extent more resources and more formal structures would generate greater efficiency in farming and whether any such growth in efficiency would justify the additional resources involved is a topic which has given rise to little discussion so far.

The rate of growth in efficiency is the result of a wide variety of factors of which education and training is just one. If "the success of our farming community in doubling production" is in fact "proof of the success of past training" (Elworthy 1983) then the decline in the rate of growth in output and efficiency should give rise to a far more critical examination of the effectiveness of the current agricultural training arrangements than has been the case so far. The results of the present study show that, for a well qualified group of entrants to agriculture, there is cause for concern that the return from investment in education and training may not have justified the expenditure involved.

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APPENDICES

APPENDIX 1

AGRICULTURAL EDUCATION AND TRAINING IN SOME EUROPEAN COUNTRIES

In general, the system of agricultural education and training in European countries is of a more systematic and structured character than that in New Zealand. The European system is generally one that is imposed from the top and while not being unresponsive to local needs and circumstances, it involves basically uniform arrangements throughout the country concerned. Data on the levels of expenditure on agricultural education and training in Europe on a comparable basis to that for New Zealand are not readily available, but the impression from the scope of the arrangements is that the level of expenditure in these countries is greater in relation to the size of the agricultural sector and the proportion of the work force involved. It would, however, be necessary to undertake a far more detailed study of the situation to confirm whether or not this impression is a correct one.

In the case of those European countries which are members of the European Community, the development of agricultural education and training should be seen in the context of their part in the wider "structural" policy of the Community. In 1972, when the most detailed statement of this policy was incorporated into Community legislation, the third pillar of structural policy was agricultural education and training (the other two pillars being farm modernisation and farmer retirement). The policy of education and training was incorporated in Directive 161/72, which provides funding from the Community's agricultural budget towards the further development of agricultural education and training in the member states.

The following brief notes on the situation in seven European countries, based on a study in Ireland (ACOT 1981) is intended to give no more than a summary of the position. The countries are listed in alphabetical order:

(a) Denmark

After completing primary school at 16/17, and up to one year working on a farm, students studying agriculture take a five month course at one of the 17 agricultural colleges. After a further two year period of practical work, with part-time day release courses, students move on to a nine month residential course in husbandry and management and if successful are awarded the Farms (or Green) Certificate, usually at the age of 21 to 23. Two agricultural colleges provide more advanced training in a one year course generally of a specialised character.

The Green Certificate is now held by most new entrants to farming, and is essential in obtaining permission to buy a farm for those born after 1954. Holders of the certificate have been eligible for subsidised loans for land purchases.

(b) England and Wales

Agricultural education in England and Wales is under the Department of Education. The main full time courses are:

(a) National Certificate courses, full time one year courses on mainly husbandry topics at 41 agricultural colleges in England and Wales.

(b) Advanced National Certificate, for students with the National Certificate after a further full time year at agricultural college.

(c) Ordinary National Diploma, a three year course, of which two years are spent at an agricultural college.

(d) Higher National Diploma - similar to the ordinary National Diploma but of a more advanced character.

(e) Degree courses, through agricultural colleges which have links with universities or polytechnical colleges, as well as full time university degree programmes.

A large range of part-time courses are organised by the Agricultural Training Board.

(c) France

Agricultural education is organised by the Ministry of Agriculture; in 1978 120,000 students attended state and private agricultural schools. The two types of short cycle courses are (a) for trained farm workers and (b) for future farmers, and are usually completed by young people of 16 to 18 years of age. There are also longer courses leading to a technical qualification at the agricultural schools, completed usually by eighteen years of age with higher courses at tertiary level of a technical nature.

A more academic route leading to an agricultural Baccalaureat (at the end of second level education) and then to tertiary agricultural education caters for people seeking qualifications at degree level. The "Ingenieur" qualification is taken after five to six years at third level.

In addition there is a well developed system of agricultural education for adults, usually on a part-time basis, which attracts a wide participation. There are special provisions for funding the agricultural training programme, involving national and regional public funds, levies on employers and taxes on agricultural commodities.

(d) Ireland

The 11 agricultural colleges provide one year agricultural courses for 800-1000 students and for a much smaller number of students in a second year. In addition, there are specialised 15 month courses for pig husbandry and management, and a two year commercial and amenity horticulture course is attended by 200 students.

Over the past two decades 80 agricultural education centres have been built to provide adult education on a part-time basis. These are used in particular for "Farm Schools", part-time courses for young entrants to farming. In 1980 thirty courses were held for a total of 643 people.

Farm apprenticeship, catering for around 250 apprentices, is mainly confined to people who have completed the one-year course at agricultural colleges. It involves block release and day release courses, as part of the three years spent primarily on practical farm work.

(e) The Netherlands

The agricultural education process begins with the secondary agricultural schools, of which there are over 100 at lower level (for those up to 16 years of age) and 50 at middle level (for those from around 16 years old). These middle level schools give courses of two years duration for those going into farming, with a more academic three year course for those going on to one of the ten agricultural colleges. The colleges offer four year courses in a variety of specialised subjects at an advanced technical level, with full university teaching at Wageningen.

(f) Norway

Agricultural education in 38 specialised agricultural schools (with seven horticultural, three dairy science and two farm machinery schools), supervised and financially assisted by the Ministry of Agriculture. These cater for 16 to 17 year olds, taking a one or two year course, leading to middle and higher secondary and technical courses. The middle courses cater for many of the entrants to farming, while the higher secondary and technical courses provide for a greater degree of specialisation for people who find employment as instructors in agricultural schools, research assistants etc. In general one of the most striking features of agricultural education in Norway is the high level of participation by young people with urban as well as rural backgrounds.

(g) Sweden

Agricultural education is based on 34 residential agricultural schools, offering one and two year courses. Demand for places in these schools has been particularly high, with the 1800 places being filled from a much larger number of applicants. In addition courses for technologists are offered at the Swedish University of Agriculture, as well as the degree courses for agronomists.

(h) West Germany

Agricultural education and training begins at the agricultural vocational schools, which is followed by trainee programmes involving part-time education and on the job training. At 18, the trainee sits an examination for the basic farming qualification, and this is followed by a further part-time course over two years for the "Master Farmer" qualification, or a full time course for a technician type qualification. There is also provision for higher grade technician courses, at a level close to that for university graduates.

APPENDIX 2

TABLE A1

Mean and Standard Deviation of Main Dependent Variables by System of Farming

	Sheep Farms		Dairy Farms	
	Mean	Std	Mean	Std
TOUTS	65983.36	17234.61	41896.66	10752.25
NINCS	1732.71	6167.98	6481.63	5331.19
GVAS	31657.97	7768.18	22736.26	7007.30
TOUT1	87048.00	22081.23	50211.83	13562.55
NINC1	14852.07	12773.74	13138.56	6444.96
GVA1	43020.00	14034.78	24023.96	8833.73
TOUT2	91275.18	20116.91	65090.33	14416.12
NINC2	15196.01	12920.84	15247.93	7164.08
GVA2	45593.98	13523.88	31002.33	8245.75
TOUT3	96255.70	20109.99	76986.76	22362.26
NINC3	16273.60	12475.95	17855.16	7961.57
GVA3	46789.65	12936.72	37091.06	7672.93
No. of Observations	138		30	

Note: For code see note to Table 12.

APPENDIX 2

TABLE A2

Mean and Standard Deviation by Level of Education

Settlers Completing:	Flock House/Telford Course		Trade Certificate	
	Mean	Std Dev	Mean	Std Dev
Increase in Gross Output	25174.07	19212.13	24137.35	8585.86
Increase in Net Farm Income	11050.56	10127.18	13840.51	8311.82
Increase in Gross Value Added	11074.02	11543.89	12784.57	9891.50
Age	32.85	5.02	30.90	3.18
Deposit (/1000)	35.40	19.60	60.75	19.41
Number of Observations	41		21	

Settlers Completing:	Massey/Lincoln Degree		Exempt from Educational Requirements	
	Mean	Std Dev	Mean	Std Dev
Increase in Gross Output	22772.54	15189.10	26491.33	12622.41
Increase in Net Farm Income	13552.20	8181.82	13230.24	8175.08
Increase in Gross Value Added	13579.75	9175.75	12593.64	8030.19
Age	31.69	5.95	40.47	6.38
Deposit (/1000)	57.26	21.02	46.39	15.24
Number of Observations	42		64	

APPENDIX 3

TABLE A3

Correlation Matrices

	DQTY	DINC	DGVA	AGE	DEP
Settlers with Flock House/Telford Qualifications					
DQTY	1.00000				
DINC	0.53454	1.00000			
DGVA	0.73021	0.87760	1.00000		
AGE	-0.10978	-0.20927	-0.28627	1.00000	
DEP	-0.13871	0.09123	-0.07080	0.18162	1.00000
Settlers with Trade Certificate in Farm Management					
DQTY	1.00000				
DINC	0.71774	1.00000			
DGVA	0.81634	0.93964	1.00000		
AGE	-0.01524	-0.02399	-0.03360	1.00000	
DEP	-0.11242	-0.15862	-0.27496	0.34179	1.00000
Settlers with Massey/Lincoln Educational Qualifications					
DQTY	1.00000				
DINC	0.53069	1.00000			
DGVA	0.59411	0.94443	1.00000		
AGE	0.09116	0.06713	0.06003	1.00000	
DEP	-0.13227	-0.05107	-0.17563	0.13643	1.00000
Settlers Exempt from Educational Requirements					
DQTY	1.00000				
DINC	0.51876	1.00000			
DGVA	0.58728	0.86650	1.00000		
AGE	0.11161	-0.20797	-0.14794	1.00000	
DEP	0.05805	-0.04636	-0.11285	0.00817	1.00000

where DQTY = Increase in Total Farm Output
DINC = Increase in Total Farm Income
DGVA = Increase in Gross Value Added
DEP = Deposit

APPENDIX 4

TABLE A4

Estimated Linear Regression Co-efficients

Type of Farm	Constant	Age	Deposit (÷1000)	Effect of Education Ed1	Ed2	Ed3	Adjusted R^2	D-W	Number of Observations
Change in Gross Output									
NI Sheep	33216.8	161.1	-177.5	1403.6	382.1	3453.5			
	(2.372248)	(0.4991118)	(-1.519942)	(0.2703237)	(0.0500185)	(0.6275121)	-0.033104	1.1136	70
SI Sheep	39786.6	-208.6	-130.6	-8344.8	1527.0	-12700.1			
	(3.1964)	(-0.7193)	(-1.3043)	(-1.5608)	(0.1455)	(-2.5428)	0.09701	1.2265	68
Dairying	-2672.9	713.9	-81.7	-883.6	4851.6	11719.4			
	(-0.1347)	(1.4771)	(-0.8818)	(0.0984)	(1.1275)	(1.2705)	-0.05910	0.67	30
All Farms	21554.9	115.2	-67.5	-431.6	1027.8	-2377.4			
	(2.3791)	(0.5692)	(-1.0772)	(-0.1279)	(0.3002)	(-0.6829)	-0.0085	1.2049	168
Change in Net Farm Income									
NI Sheep	17919.8	-118.6	7.0	-2294.7	4309.0	2131.2			
	(2.0704)	(-0.5929)	(0.0962)	(-0.7130)	(0.9099)	(0.6248)	-0.00402	1.2361	70
SI Sheep	27889.6	-326.6	-3.7	-7288.6	6187.7	-6429.1			
	(3.8817)	(-1.9508)	(-0.0646)	(-2.3617)	(1.0212)	(-2.2300)	0.08158	1.5617	68
Dairying	14215.0	-73.7	-60.4	-5263.0	913.0	2843.0			
	(1.1535)	(-0.2455)	(-1.0497)	(-0.9434)	(0.3416)	(0.4962)	-0.09752	0.5456	30
All Farms	15996.2	-193.5	-3.1	-4601.5	807.6	-2017.0			
	(3.0986)	(-1.6777)	(-0.0872)	(-2.3932)	(0.4139)	(-1.0167)	0.0635	1.4893	168
Change in Gross Value Added									
NI Sheep	27279.3	-187.3	-116.1	-1278.0	2777.6	3272.7			
	(2.8576)	(-0.8487)	(-1.4543)	(-0.3600)	(0.5318)	(0.8699)	0.01291	1.2928	70
SI Sheep	26622.0	-286.6	-34.8	-7240.2	8917.1	-5038.3			
	(3.510921)	(-1.6221)	(-0.5710)	(-2.2229)	(1.3944)	(-1.6559)	0.08427	1.5372	68
Dairying	13283.1	1.3	-113.3	-7030.0	1424.1	2922.6			
	(1.1895)	(0.0049)	(-2.1724)	(-1.3906)	(0.5879)	(0.5629)	0.041396	0.6714	30
All Farms	17418.8	-182.3	-65.0	-3400.2	1311.7	-660.8			
	(3.1127)	(-1.4584)	(-1.6778)	(-1.6314)	(0.6202)	(-0.3073)	.07005	1.4798	168

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