

AGRICULTURAL
ECONOMICS
RESEARCH UNIT



Lincoln College

PROCESSING PEAS:
A SURVEY OF
GROWERS' RETURN
1967-8

by

B. N. HAMILTON and
R. W. M. JOHNSON

Research Report No. 53

1968

THE AGRICULTURAL ECONOMICS RESEARCH UNIT

THE Unit was established in 1962 at Lincoln College with an annual grant from the Department of Scientific and Industrial Research. This general grant has been supplemented by grants from the Wool Research Organisation and other bodies for specific research projects.

The Unit has on hand a long-term programme of research in the fields of agricultural marketing and agricultural production, resource economics, and the relationship between agriculture and the general economy. The results of these research studies will in the future be published as Research Reports as projects are completed. In addition, technical papers, discussion papers, and reprints of papers published or delivered elsewhere will be available on request. For a list of previous publications see inside back cover.

Director

Professor B. P. Philpott, M.Com., M.A.(Leeds), A.R.A.N.Z.

Senior Research Economist

R. W. M. Johnson, M.Agr.Sc., B.Litt.(Oxon.), Ph.D.(Lond.)

Research Economists

Mrs M. J. Woods, B.Sc. B. J. Ross, M.Agr.Sc.
T. W. Francis, B.A.

Assistant Research Economists

D. D. Hussey, B.Agr.Sc. D. R. Edwards, B.Agr.Sc.
D. McClatchy, B.Agr.Sc. H. J. Plunkett, B.Agr.Sc.
A. C. Lewis, B.Agr.Sc. G. W. Kitson, B.Hort.Sc.

UNIVERSITY LECTURING STAFF ASSOCIATED WITH
THE UNIT'S RESEARCH PROJECTS:

J. D. Stewart, M.A., Ph.D.(Reading)
Professor of Farm Management

A. T. G. McArthur, B.Sc.(Agr.)(Lond.), M.Agr.Sc.
Senior Lecturer in Rural Education

R. C. Jensen, B.Econ.(Qld.), M.Ag.Ec.(N.E.), A.Ed., Q.D.A.
Senior Lecturer in Economics

N. W. Taylor, M.Agr.Sc.
Lecturer in Farm Management

R. G. Cant, M.A., Ph.D.(Malaya)
Lecturer in Geography, Canterbury

C. A. Yandle, B.Agr.Sc.

PROCESSING PEAS : A SURVEY OF GROWERS'

RETURNS 1967/68

by

B. N. Hamilton

and

R. W. M. Johnson

Agricultural Economics Research Unit Research Report No. 53

P R E F A C E

In addition to our basic research programme, the Agricultural Economics Research Unit has, from time to time, accepted requests from outside organisations to carry out, on a contract basis, special investigations of particular aspects of New Zealand agriculture.

The present report stems from such a request from the New Zealand Vegetable and Produce Growers' Federation (Inc.) for a survey of the costs of growing processing peas.

The results of the survey are of primary importance to growers and processors of peas. But we felt it would be useful to make the results of the survey available to a wider public, especially as processed horticultural products are assuming new and growing importance in New Zealand's export earnings and a greater general knowledge of the processed pea industry is highly desirable in this context.

We would like to express our gratitude to the farmers who co-operated in the survey and helped to make it a success.

B. P. Philpott

Lincoln College,
December 1968

PROCESSING PEAS : A SURVEY OF GROWERS'
RETURNS 1967/68

INTRODUCTION

In recent years, some 12,000 acres in New Zealand has been used for green pea production for processing. The greater proportion of this land is in Hawkes Bay, but commercial crops are also grown in Nelson, Marlborough, Canterbury and South Canterbury. There are five main processing firms which let advance contracts to growers, supply many essential inputs, and usually provide harvesting services as well. Finding markets for the resulting product, usually frozen peas, is undertaken by these firms.

With the devaluation of the New Zealand dollar in November 1967, the prospect for exports of frozen peas improved markedly and greater sales were negotiated in both Australia and England. During 1968, the processing firms enlarged their operations in anticipation of greater export contracts, and over 15,000 acres is now under crop.

Although devaluation has made exports a worthwhile economic proposition at present, internal costs of production could easily increase too rapidly to maintain this situation and to preserve an adequate return to growers of processing peas. With this problem in mind, the New Zealand Vegetable and Produce Growers' Federation commissioned the Agricultural Economics Research Unit in late 1967 to undertake a cost of

production survey in Hawkes Bay and Canterbury for the 1967/68 growing season.

The Federation had commissioned an earlier report from the Department of Agricultural Economics and Farm Management at Massey College, and this private report was available for comparative purposes.* It is referred to in the text below as the Massey Report. Owing to a difference in approach to the measurement of indirect costs on farms the two surveys are not exactly comparable and this should be borne in mind in making comparisons from the results given.

SELECTION OF THE SAMPLE

In discussions with the Processing Division of the New Zealand Vegetable and Produce Growers' Federation, it was decided that 30-35 farms in each district would give a suitably representative sample.

The actual sample was drawn from an alphabetical list of all processing factory suppliers. Each supplier was given a number and then the required sample was drawn from tables of random numbers. Ten extra farms were drawn in each district to provide replacements for drop-outs.

Farmers in Canterbury were interviewed personally in the period from December 10th to December 31st 1967, and those in the Hawkes Bay area from January 10th to January 24th

* "Financial Returns from Processed Peas and other Crops in Hawkes Bay", Report of a Survey, February and March, 1962. Manuscript in Office of the New Zealand Vegetable and Produce Growers' Federation (Inc.), Wellington.

1968. Farmers were telephoned beforehand for an appointment, and new appointments were made until the required sample sizes of 30 in Canterbury and 35 in Hawkes Bay were reached. In both districts one important area of production was overlooked in the drawing of the sample, and a further random drawing of one farm was made in each case. The areas affected were the Ruataphinia area in Hawkes Bay and the Rangiora area in Canterbury.

Three replacement farms were needed in Hawkes Bay and seven replacements were needed in Canterbury. In Hawkes Bay one farmer had since died, one did not grow peas as contracted and one was a contractor and was too busy to answer questions. The final sample was 34 farms.

In Canterbury a number of farmers drawn in the original sample refused to co-operate in the survey and others were too busy. Five farms were replaced for lack of co-operation and two farmers were too busy. After his interview, one further Canterbury grower did not provide full information, and the Canterbury sample fell back to 29.

No attempt was made to achieve a balance of Federation or non-Federation members, as the emphasis was placed on a random selection of all processing pea growers.

In addition to these factors, a certain number of farmers in each district do not have their peas harvested for the processing trade. This is called "by-passing" and is due to the simultaneous ripening of too many fields for the viners to harvest, or the factory to process. In 1967/68, there was one such farm in the Hawkes Bay sample, and 7 farms in the Canterbury sample. In addition four further farms in

Canterbury were partially bypassed. Bypassed crops are saved for seed, and the farmer is only charged for half of his initial seed cost by the companies concerned.

In the results that follow, this reduction in the cost of seed is added to the gross returns received for the harvested crop. Harvested seed is bought back at a premium price in Hawkes Bay but not in Canterbury. As can be seen in the following comparison for the Canterbury sample, the basic cost of growing peas to the harvest stage remains the same, but the level of gross returns is much lower for bypassed crops.

| | <u>No. of growers</u> | <u>Average Cost/acre</u> | <u>Average Returns/acre</u> |
|--------------|---------------------------|------------------------------|---------------------------------|
| Process peas | 18 | \$55.66 | \$90.42 |
| Mixed peas | 4 | 55.13 | 78.93 |
| Seed peas | 7 | 55.03 | 55.31 |

It is not possible to state what the return on seed peas would have been if they had been harvested green.

In summary, the sample area in Canterbury was 584 acres, of which 157 acres, or 27 per cent, was bypassed by the processors in the 1967/68 season.

THE FARMS

In both districts, a wide range of soil types, size of farm and type of farm were found. Processing peas can be small enterprises on large farms, or the only crop grown by a contractor.

The number of farms chosen in each farm type was as follows:-

| | <u>Hawkes Bay</u> | <u>Canterbury</u> |
|---|-------------------|-------------------|
| Cropping with intensive stocking (small farm, mainly cropping) | 15 | 5 |
| Sheep and Cropping (mixed farms) | 9 | 10 |
| Dairy and Cropping (dairy and crop) | 2 | 5 |
| Intensive Cropping (little or no stock possibly) | 4 | 5 |
| Cattle, Sheep and Cropping (hill farms with flat) | 3 | 1 |
| Orchard and Cropping | 2 | - |
| Part-time Cropping | - | 2 |
| | <u>35</u> | <u>29</u> |

Farming practices are fairly similar in both districts. The normal practice in Hawkes Bay has been to graze sheep through the winter and sell off in the spring. Ploughing and cultivation of the seed bed are then carried out fairly quickly just before sowing. In the South Island, the pea crop fits more normally into the cropping system and fat lamb production.

Cultivation is commonly by grubbers in Canterbury and by discs in Hawkes Bay. After harvest the Hawkes Bay farmers tend to cultivate more immediately, either for new grass or a second crop like beans.

The vines are utilised to a greater extent in Hawkes Bay although some farms have their vines removed to the factory for shelling. Vines suitable for baling are invariably baled and have been sold in the past for up to \$1.00 per bale. In 1967/68, the ruling price was 45 cents however.

Few farmers bale the vines in Canterbury and most farmers plough them in.

Peas occupy the ground longer in Canterbury. The average length of the period from date of first ploughing for peas to date of first ploughing for the following crop is 7.14 months in Canterbury as compared with 5.68 months in Hawkes Bay. This difference is explained by the faster rate of growth in Hawkes Bay and by a tendency for Canterbury farmers to spend more time on cultivation. The harvest season lasts from the beginning of December to the end of January.

Intensive cultivation in Hawkes Bay has brought with it more weed and disease problems. Yields per acre in Hawkes Bay on some farms were heavily depressed by Fusarium wilt, and some growers have had to cease production altogether. The processors recommend a two year spell before returning to the same ground, but this has not always been possible. Maize has been suggested as an alternative crop for the area, but cultivation costs are higher and the crop is in the ground for very much longer.

The value of land used for peas is higher in Hawkes Bay. On the survey farms the average capital value was \$480 per acre in Hawkes Bay and \$360 per acre in Canterbury. More pea land is rented in Hawkes Bay than in Canterbury. Growers will pay up to \$40 per acre for one pea crop. Some of this Hawkes Bay land is under Maori ownership, and is only available for renting, and the wider distribution of market gardening in the Napier-Hastings area means that sub-division is greater and more small parcels of land are available.

Yields per acre were higher in Hawkes Bay in 1967/68. The survey farms with peas used for processing had an average yield per farm of 1.43 tons in Hawkes Bay compared with 1.43 tons per acre in Canterbury.

Direct costs tend to be slightly higher in Hawkes Bay. Spraying costs \$5.87 per acre compared with \$3.43 in Canterbury. The Hawkes Bay farmers use both D.N.B.P. and M.C.P.B., while in Canterbury farmers use a little more of M.C.P.B. alone. Fertiliser costs \$3.93 per acre compared with \$2.49 in Canterbury. This is because the average rate of application is 2 cwt compared with 1½ cwt per acre and because 30% potassic superphosphate is used in Hawkes Bay. Sowing rates are higher in Canterbury. The average cost of seed is \$16.49 per acre compared with \$15.88 per acre in Hawkes Bay. The recommended sowing rates are 4 bushels and 3½ bushels respectively.

COSTING PROCEDURES

All costing procedures are to some extent arbitrary, and the results of costing surveys must be carefully interpreted with this in mind.

In this report, similar procedures to those employed by Massey University in 1961/62 on the previous survey were used. A major difference is in the use of a different set of standard costs for tractors and implements. A reconciliation table is shown later which demonstrates how this change of procedure affects the results.

The following categories of costs and revenue were collected from the growers or calculated from the information

provided by them:

- (a) Gross Revenue.
- (b) Cash or direct costs.
 - 1. Seed
 - 2. Fertiliser
 - 3. Cartage
 - 4. Spray materials
 - 5. Contract charges
- (c) Imputed or non-direct costs.
 - 1. Labour
 - 2. Tractor and machinery expenses
 - 3. Implements
 - 4. Land overheads
 - 5. General expenses
 - 6. Management opportunity-cost

Definitions:

(a) Gross Revenue

This is the total value of the crop from factory receipts and sale of vine hay. Allowance was made for vine hay in those cases where it was actually baled, whether it was sold thereafter or not. Cutting and transport costs for vine hay are deducted from the total sale value of the hay.

Where a farm was bypassed, the proceeds from seed production were counted as revenue, and half of the cost of seed was added to revenue as well.

The Canterbury bonus of \$2 per ton for all deliveries below a tenderometer reading of 100 has also been added to revenue, as well as an early planting bonus where applicable.

(b) Direct Costs

Information on seed, fertiliser, cartage, spray materials and contracting charges were obtained from growers and checked with invoices where possible. In the case of cartage, a charge of 8 cents per mile was allowed where cartage was done by the grower. Where the grower sprayed his own crop, the cost was estimated at the standard ruling rate of contractors in the district.

(c) Imputed Costs

Imputed costs were calculated on each farm according to the cultivation details provided by each grower.

1. Labour. All employed labour was costed at the actual wage paid. Where the grower did the work, the rate of \$1.25 per hour was used.

2. Tractor and Machinery costs. These costs include the cost of irrigation where it was practised (six growers in Hawkes Bay; four growers in Canterbury). A standard list of tractors found on the farms surveyed was drawn up and the cost of one hour of operation determined by consulting Department of Agriculture officials and the Department of Agricultural Engineering at Lincoln College. Where information was lacking the cost per hour was interpolated on the basis of the H.P. of the model concerned. An allowance was made for the actual numbers of operating hours each tractor would be expected to be in use. Details of these costs are shown in an appendix to this report.

The hourly operating cost of each make of tractor includes fuel and oil, repairs and maintenance, depreciation,

interest and insurance, shelter and registration.

3. Implements. A similar set of operating costs per hour for all makes of implements was drawn up, using information from the Queensland Department of Primary Industries, Economic Research Branch Farm Management Handbook and from the Department of Agricultural Engineering, Lincoln College. (The help of Mr George Lindsay is gratefully acknowledged.)

The total operating costs of implements are expressed as a percentage of purchase price. From the average length of life of an implement, and the average number of hours of use per year, the hourly costs of operation were calculated.

In summary, tractor and implement costs are based on average hourly cost rates applied to each individual grower's cultivation plan.

In comparison with the Massey College survey, these cost rates are more standardised and involve less assumptions about each farmer's individual capacity to operate and maintain his plant. The cost rates employed can also be used directly in further surveys and should be revised from time to time.

4. Land Overheads. Land overheads consist of rates, land tax and equivalent annual rental value. Rates and Land tax were obtained directly from growers in the questionnaire. Rental value is based on two different sources of information:

A. Where the land was rented, actual rent paid was used.

B. Where the grower was an owner-occupier, the capital value from the current government valuation was used as a basis. In cases where different titles were held, only the valuation of the pea-growing block was used. The value of the house was deducted from the capital value at the standard rate of \$9000 per farm, where the grower lived on his own property. This procedure puts owner-occupiers on the same basis as growers who rent land and leads to a slight understatement of the opportunity cost of owner-occupied land.

In all cases where government capital valuations were used, the equivalent rental value was determined by converting the capital value to annual equivalents at a 6½ per cent rate of interest.

$$\text{(e.g. Equivalent rental value} = \frac{C \cdot V}{.065} \text{)}$$

The combined value of rates, land tax and rental value was then expressed as an annual overhead cost per acre and finally adjusted by the length of the period the pea crop is in the ground.

(e.g. For \$1000 land overheads on 50 acres in Hawkes Bay the annual cost of land per acre of peas

$$= \$ \frac{1000}{50} \times \frac{5.68}{12.00} = \$9.46 \text{ per acre.})$$

5. General Expenses. Items included here are all those costs which are part of the cost of growing processing peas, but which cannot be allocated directly to any one crop. This includes charges for insurance, electric power, telephone, accounting fees and sundry expenses. A further element of general farm depreciation is also added to general expenses to cover plant and buildings not directly

used for processing peas or beans.

It was estimated on the basis of a sample of records that 33 per cent of all depreciation was not directly concerned with pea growing machinery and buildings. It was therefore assumed that one third of all depreciation shown in the farm accounts should be added to general expenses.

The total value of general expenses was then expressed on a per acre basis, and finally corrected for the period the pea crop is in the ground.

6. Wages of Management. This is the opportunity cost of the grower's supervision of the crop as opposed to his direct working on the crop. It is intended to estimate this cost separately from all others, as net profit is usually thought of as the return to management after all other costs have been allocated.

The Massey College survey estimated the management reward for each crop by allocating the total estimated management reward for the farm among each of the crops according to their contribution to gross farm income. It was not possible to do this in the present survey, because most of the Canterbury growers in the sample did not wish to reveal their gross incomes.

The alternative procedure was therefore employed of working out management rewards in proportion to total capital value on the assumption that better managers generally command and build up more capital

The basic reward to management was set at \$1,800 for a property worth \$40,000. For every \$10,000 of capital

value the wages of management were increased by \$200 to a maximum of \$3,000 at a capital value of \$100,000.

| e.g. | <u>Capital Value</u> | <u>Return to Management</u> |
|------|----------------------|-----------------------------|
| | \$40,000 | \$1,800 |
| | 41,000 | 1,820 |
| | 42,000 | 1,840 |
| | ⋮ | ⋮ |
| | 60,000 | 2,200 |
| | ⋮ | ⋮ |
| | 100,000 | 3,000 |

Below a return of \$1,800, for each fall in capital value of \$1,000, \$45 was deducted. Thus a capital value of \$20,000 would have a return to management of \$900.

This total return to management was then allocated to the pea crop on an acreage basis. Finally, the per acre figure was adjusted by the time period factor for length of time in the ground.

RESULTS1. The 1967-68 Survey

This set of results shows yields, costs and returns on the average farm acre. Results per acre grown are given in the next section.

| | <u>Hawkes Bay</u> | <u>Canterbury</u> |
|--------------------------------------|-------------------|-------------------|
| Number of growers | 34 | 29 |
| Average acreage | 30.0 | 20.1 |
| Average yield (green) per acre | 1.48 tons | 1.43 tons |
| <u>Direct Costs per acre</u> | | |
| Seed | \$15.99 | \$17.02 |
| Fertiliser | 3.79 | 2.48 |
| Spraying | <u>5.90</u> | <u>3.42</u> |
| Total direct cost | 25.68 | 22.92 |
| <u>Imputed Direct Costs per acre</u> | | |
| Labour | 3.69 | 5.17 |
| Tractors | 2.80 | 3.31 |
| Implements | 1.48 | 2.01 |
| Contractors | <u>2.28</u> | <u>1.99</u> |
| Total imputed direct cost | 10.25 | 12.48 |
| Total direct cost | 35.93 | 35.40 |
| <u>Overhead Costs per acre</u> | | |
| Land | 16.94 | 15.54 |
| General | <u>2.20</u> | <u>4.49</u> |
| Total overheads | 19.14 | 20.03 |
| Total Cost per acre | <u>\$55.07</u> | <u>\$55.43</u> |
| Average gross return per acre | \$94.00 | \$81.35 |
| Average net return to management | 38.93 | 25.92 |
| Estimated "cost" of management | \$ 8.79 | \$ 9.36 |
| Net profit per acre | 30.14 | 16.56 |

It is clear that a rather higher area of peas per farm is grown in Hawkes Bay compared with Canterbury, though the yield per acre on the area taken for processing is very nearly the same. Fertiliser and spraying costs are higher in Hawkes Bay, but cultivation costs are slightly higher in Canterbury. The average cost of production is the same in both areas.

As already pointed out, gross returns are calculated on the whole area planted to peas, and here the bypassing in Canterbury brings the average return per acre to a level \$12.65 lower than Hawkes Bay. Net returns per acre in Canterbury are therefore lower by this much.

2. Costs and Returns per Acre Grown

In this section total returns and costs are worked out on a whole farm basis, added together, and then divided through by the total acreage of crop sown. Only total costs have been assessed in this manner and individual items can be fairly closely seen in the previous section.

For the 34 farms surveyed in Hawkes Bay (including one bypass where appropriate), the following results were obtained.

| | |
|--|----------------|
| Green yield of peas per acre harvested | 1.54 tons/acre |
| Gross return of peas per acre harvested | \$98.65 / acre |
| Hay return per acre grown | \$ 1.83 / acre |
| Hay return per acre of hay | \$ 3.91 / acre |
| Total cost per acre (without "management") | \$55.19 / acre |

For the 29 farms surveyed in Canterbury (including by-pass farms where applicable), the following results were obtained:

| | |
|--|----------------|
| Green yield of peas per acre harvested | 1.49 tons/acre |
| Gross return of peas per acre on farms completely harvested | \$93.52 / acre |
| Hay return per acre sown | \$ 0.40 / acre |
| Hay return per acre of hay | \$ 2.37 / acre |
| Total cost per acre (without "management") | \$53.82 / acre |

3. Distribution of Cost per Acre - Peas 1967/68

The range of costs per farm per acre in Hawkes Bay and Canterbury are shown next. Costs per acre range from \$37.50 per acre to \$75.00 per acre in both areas. This analysis is based on costs after overheads have been included but before "management cost" is included.

| <u>Cost per Acre</u> | <u>Hawkes Bay</u> | <u>Canterbury</u> |
|----------------------|-------------------|-------------------|
| \$35 - 39.9 | 2 | 1 |
| 40 - 44.9 | 2 | 1 |
| 45 - 49.9 | 1 | 5 |
| 50 - 54.9 | 11 | 6 |
| 55 - 59.9 | 10 | 8 |
| 60 - 64.9 | 5 | 5 |
| 65 - 69.9 | 2 | 1 |
| 70 - 74.9 | <u>1</u> | <u>2</u> |
| | 34 | 29 |
| Mean | \$ 55.37 | 55.43 |

There is clearly a fairly remarkable agreement in costs per acre in the two districts, and the distribution pattern shows this.

4. Costs per pound weight - Peas 1967/68

To express costs in terms of actual yield per acre, it is necessary to assume that all farms in the sample could have reached the yield per acre that was found on the areas actually harvested for processing. Costs per acre are very similar in the two areas surveyed, the main difference being the area bypassed by the processors. If the bypassed crops had a lower expected yield per acre, then the cost of production per pound of processed peas would be higher than the following figures for Canterbury show.

| | <u>Hawkes Bay</u> cents/lb. | <u>Canterbury</u> cents/lb. |
|--------------------|--------------------------------|--------------------------------|
| Seed | .482 | .531 |
| Fertiliser | .114 | .077 |
| Spraying | <u>.178</u> | <u>.107</u> |
| | <u>.774</u> | <u>.715</u> |
| Labour | .111 | .161 |
| Implements | .044 | .063 |
| Tractors | .084 | .103 |
| Contractors | <u>.068</u> | <u>.062</u> |
| | <u>.309</u> | <u>.389</u> |
| Land | .511 | .485 |
| General | <u>.066</u> | <u>.140</u> |
| | <u>.577</u> | <u>.625</u> |
| Total cost per lb. | <u>1.661</u> | <u>1.730</u> |

Because of the slightly lower yield per acre of green peas in Canterbury, costs per lb. tend to be slightly higher throughout.

5. Comparison of Hawkes Bay Costs 1959/62 and 1967/68

To make a valid comparison with the cost survey carried out by Massey College for the years 1959/62, the costing methods must be as nearly comparable as possible. This section therefore sets out the calculations required to bring the 1967/68 survey into line with the 1959/62 survey.

Costs of seed, fertiliser and spraying are collected directly from growers, and any change between the two surveys will measure the increase in quantities used (e.g. spraying frequency and rates) and the increase in the unit cost of purchase.

Direct costs of labour and machinery for growing the crop are worked out by a set of rules. These are as follows:

1. Tractors:

(a) Fuel and Oil. Massey used farmer estimates. The Agricultural Economics Research Unit uses in this section estimates from the Farm Management Department, Lincoln College, of 35 cents/hour for diesel tractors and 45 cents/hour for petrol tractors.

(b) Repairs and Maintenance. This is calculated at 75 per cent of new cost, spread over a service life of 10 years or 10,000 hours, whichever was reached first.

(c) Depreciation. This is expressed as new cost per hour of economic life as defined in (b).

(d) Interest. Calculated as 60 per cent of original cost to give average annual amount on which interest is charged. The rate of interest was taken as 6 per cent, and the result divided by hours worked per year.

(e) Sundries. Calculated as 1.5 per cent of original cost as cost per year, and then expressed as cost per hour worked.

2. Implements:

(a) Repairs and Maintenance. The following annual percentage charges from the Massey report were used:

| <u>Machine</u> | <u>Annual Average Cost as Percentage of Original Cost</u> |
|----------------|---|
| Plough | 7.4 |
| Cultivator | 3.8 |
| Discs | 3.5 |
| Harrows | 1.1 |
| Roller | 1.5 |
| Drill | 2.2 |
| Rotary Hoe | 10.0 (not in Massey Report) |

The annual average cost is divided by the number of hours worked per year to obtain cost per hour. It appears the Massey method was to obtain information on the yearly use of implements from the growers. A.E.R.U. uses the average use rates of the Queensland survey already referred to.

| <u>Machine</u> | <u>Economic Life</u> | | <u>Hours per Year</u> |
|----------------|----------------------|--------------|-----------------------|
| | <u>Years</u> | <u>Hours</u> | |
| Plough | 15 | 2000 | 133 |
| Grubber | 12 | 2500 | 208 |
| Discs | 15 | 2000 | 133 |
| Harrows | 20 | 2500 | 125 |
| Roller | 25 | 1500 | 60 |
| Drill | 20 | 1200 | 60 |
| Rotary Hoe | 10 | 2500 | 150 |

(b) Depreciation. Original cost per hour of economic life.

(c) Interest. Calculated as 60 per cent of original cost, at 6 per cent interest, per hour per year.

(d) Sundries. Calculated as 1 per cent of new cost as cost per year, and converted to cost per hour.

The total cost of tractors and implements is calculated for each farm and the result expressed as the average cost of cultivation for the whole sample of farms whether they did their own cultivation or employed contractors.

Labour costs are based on actual wages paid, or growers' actual labour time costed at \$1.25 per hour. The average of labour costs is then expressed as the average of all growers in the sample.

Contract costs for machinery and associated labour are enumerated separately and show the average cost of these services over the whole sample.

The following table shows the increase in the cost of production since 1959/62 as closely as the data available permits.

| | <u>1959/62</u> 28 farms | <u>1967/68</u> 34 farms |
|----------------------------|----------------------------|----------------------------|
| Seed | \$13.20 | \$15.99 |
| Fertiliser | 2.24 | 3.79 |
| Sprays | <u>3.56</u> | <u>5.90</u> |
| Total Direct Cost per acre | <u>19.00</u> | <u>25.68</u> |
| Labour | 3.72 | 3.69 |
| Tractors | 2.84 | 4.40 |
| Implements | 3.84 | 1.39 |
| Contractors | <u>3.50</u> | <u>2.28</u> |
| Total Direct Imputed Cost | 13.90 | 11.76 |
| Total Direct Cost per acre | <u>32.90</u> | <u>37.44</u> |

| <u>Cont'd</u> | <u>1959/62</u> 28 farms | <u>1967/68</u> 34 farms |
|----------------------|----------------------------|----------------------------|
| Land | 8.92 | 16.94 |
| General | <u>1.62</u> | <u>2.20</u> |
| Total Overhead Cost | 10.54 | 19.14 |
| Total Costs per acre | <u>43.44</u> | <u>56.58</u> |

Taking into account differences in the method of calculation, it would be fair to assume that direct cash costs of production have increased by 35 per cent over 7 years; that imputed direct costs have been comparatively stable and possibly declined; and that total costs of production have increased by about 30 per cent over the period.

The net return to management in the two surveys therefore works out as follows:

| | <u>1959/62</u> 28 farms | <u>1967/68</u> 34 farms |
|----------------------|----------------------------|----------------------------|
| Revenue per acre | \$91.48 | \$94.40 |
| Total Costs per acre | <u>-43.44</u> | <u>-56.58</u> |
| Net Return | <u>48.04</u> | <u>37.82</u> |

Over the 7 years the relative profitability of processing peas appears to have declined by about \$10 per acre.

A measure of net profit can also be calculated by calculating the wages due to the grower for general supervision and management work. In the Massey survey, this information is only available for 17 growers, hence the gross returns, total costs and management costs appropriate to this 17 group alone are shown:

| | <u>1959/62</u> 17 farms | <u>1967/68</u> 34 farms |
|------------------|----------------------------|----------------------------|
| Revenue per acre | \$96.72 | \$94.40 |
| Total Costs | -46.30 | -56.88 |
| Management Costs | <u>- 8.96</u> | <u>- 8.79</u> |
| Net profit | <u>41.46</u> | <u>29.03</u> |

Given the difference in the method of estimating the management "cost", net profit per acre still seems to have declined by about \$10 per acre over the period.

The 1959/62 survey gave an average yield of green peas of 1.36 tons (21 growers). Costs of production per pound of green peas can therefore be compared also.

| | <u>1959/62</u> | <u>1967/68</u> |
|--------------------|------------------|----------------|
| Number of farms | 28 | 34 |
| | <u>cents/lb.</u> | |
| Seed | .433 | .482 |
| Fertiliser | .073 | .114 |
| Spraying | <u>.117</u> | <u>.178</u> |
| | <u>.623</u> | <u>.774</u> |
| Labour | .122 | .111 |
| Implements | .126 | .044 |
| Tractor | .093 | .084 |
| Contractors | <u>.115</u> | <u>.068</u> |
| | <u>.456</u> | <u>.309</u> |
| Land | .293 | .511 |
| General | <u>.053</u> | <u>.066</u> |
| | <u>.346</u> | <u>.577</u> |
| Total cost per lb. | <u>1.426</u> | <u>1.661</u> |

APPENDIX ITRACTOR COSTS USED ON SURVEY

| | B.H.P. | <u>Total Operating Costs per Hour</u> | | |
|----------------------|--------|---------------------------------------|-----------|-----------|
| | | <u>Operating Time per Year</u> | | |
| | | 500 hrs. | 1000 hrs. | 1500 hrs. |
| | | \$ | \$ | |
| Case OC4 | - | .50 | .48 | .47 |
| Cat D2 | - | .94 | .79 | .77 |
| David Brown 850 | 42.5 | .82 | .68 | .72 |
| David Brown 950 | 40.0 | .80 | .66 | .71 |
| David Brown 990 | 55.0 | .90 | .74 | .72 |
| Ferguson 24 | 24.0 | .75 | .60 | .58 |
| Ferguson 35D | 36.0 | .80 | .65 | .63 |
| Ferguson 35P | 35.0 | .85 | .71 | .69 |
| Fordson Dexta | 29.5 | .77 | .62 | .56 |
| Fordson Major | 38.5 | .83 | .68 | .66 |
| Fordson 3000 | 46.0 | .87 | .72 | .68 |
| Fordson 4000 | 56.0 | .92 | .75 | .72 |
| International 414 | 39.8 | .89 | .73 | .71 |
| International 434 | 39.0 | .88 | .72 | .70 |
| International 606 | 66.0 | 1.30 | 1.11 | 1.08 |
| John Deere 3020 | 82.0 | 1.37 | 1.18 | 1.15 |
| Lanz | - | .50 | .48 | .47 |
| Massey Ferguson 350 | 42.0 | .85 | .71 | .69 |
| Massey Ferguson 65 | 47.0 | .92 | .76 | .74 |
| Massey Ferguson 135D | 45.5 | .90 | .74 | .72 |
| Massey Ferguson 165 | 58.3 | 1.21 | 1.02 | .99 |
| Nuffield 4/66 | 60.0 | 1.16 | .97 | .92 |
| Nuffield 10/60 | 60.0 | 1.16 | .97 | .92 |
| Oliver OC4 | 26.0 | .77 | .62 | .60 |
| Oliver 70 Crawler | 37.0 | .93 | .78 | .76 |

APPENDIX IIIMPLEMENT COSTS USED IN SURVEY

| | <u>Years to Obsolescence</u> | <u>Hours to wear out</u> | <u>Annual Expenses as % of New Cost</u> |
|-------------|----------------------------------|------------------------------|---|
| Ploughs | 15 | 2000 | 17.5 |
| Discs | 15 | 2000 | 13.5 |
| Rotary Hoes | 12 | 2500 | 15.5 |
| Rollers | 25 | 1500 | 8.0 |
| Drill | 20 | 1200 | 10.5 |
| Grubber | 12 | 2500 | 15.5 |
| Harrows | 20 | 2500 | 10.5 |

Source: Farm Management Handbook
Queensland Dept. of Primary Industries.

RECENT PUBLICATIONS

RESEARCH REPORTS

15. *The Problem of Scheduling Sales of New Zealand Butter on the United Kingdom Market*, Robert Townsley, 1965.
16. *A Market Target for the New Zealand Dairy Industry*, A. R. Frampton, 1965.
17. *Breeding Flock Composition in Relation to Economic Criteria*, R. J. Townsley and W. Schroder, 1965.*
18. *Trends in Production, Trade and Consumption of Wool and Wool Textiles*, B. P. Philpott and D. M. Beggs, 1965.
19. *Standardisation of Farm Accounts for Managerial Analysis*, J. W. B. Guise, 1965.
20. *The Use of Linear Programming in Least-cost Feed Compounding*, N. W. Taylor, 1965.
21. *The Maximisation of Revenue from New Zealand Sales of Butter on the United Kingdom Market—A Dynamic Programming Problem*, R. J. Townsley, (reprint) 1965.*
22. *The Economic Approach to Resource Development in New Zealand*, J. T. Ward, (reprint) 1965.*
23. *An Analysis of the Retail Demand for Meat in the United Kingdom*, B. P. Philpott and M. J. Matheson, 1965.
24. *The Profitability of Hill Country Development—Part 2: Case History Results*, J. S. Holden, 1965.
25. *Strategic and Tactical Planning in International Marketing Policies*, B. P. Philpott, (reprint) 1965.*
26. *Indexes of Cost of Investment Goods 1949-50 to 1963-4*, G. C. Scott, 1966.
27. *An Economic Analysis of Large-scale Land Development for Agriculture and Forestry*, J. T. Ward and E. D. Parkes, 1966.
28. *A Review of the Argentine Beef Cattle Situation*, R. J. Townsley and R. W. M. Johnson, 1966.
29. *Aspects of Productivity and Economic Growth in New Zealand 1926-64*, B. P. Philpott, 1966.*
30. *Estimates of Farm Income and Productivity in New Zealand 1921-65*, B. P. Philpott, B. J. Ross, C. J. McKenzie, C. A. Yandle and D. D. Hussey, 1967.
31. *The Regional Pattern of the Demand for Meat in the United Kingdom*, Mary J. Matheson and B. P. Philpott, 1967.
32. *Long-Run Swings in Wool Prices*, B. P. Philpott, in preparation.
33. *The Economics of Hill Country Development*, J. S. Holden, (reprint) 1966.*
34. *Report on a Survey of Farm Labour in Patangata County, Hawkes Bay 1965-6*, D. McClatchy, 1966.*
35. *Programming Farm Development*, G. A. G. Frengley, R. H. B. Tonkin and R. W. M. Johnson, 1966.
36. *Productivity, Planning and the Price Mechanism in the Zealand Manufacturing Industry*, B. P. Philpott, 1966.
37. *Some Projections of Retail Consumption in New Zealand*, R. H. Court, 1966.
38. *The Nature and Extent of the Farm Labour Shortage in Cheviot County, Canterbury*, J. L. Morris and R. G. Cant, 1967.
39. *Index to New Zealand Agricultural Publications, 1964*, G. A. G. Frengley, 1967.
40. *High Country Development on Molesworth*, R. W. M. Johnson, 1967.
41. *Input-Output Models for Projecting and Planning the Economy*, B. P. Philpott and B. J. Ross, 1968.
42. *Statistics of Production, Trade Flows and Consumption of Wool and Wool-type Textiles*, B. P. Philpott, H. T. D. Acland, A. J. Tairo, 1967.
43. *Survey of Christchurch Consumer Attitudes to Meat*, C. A. Yandle, 1967.
44. *Fertiliser and Production on a sample of Intensive Sheep Farms in Southland 1953-64*, R. C. Jensen and A. C. Lewis, 1967.
45. *Computer Methods for Development Budgets*, K. T. Sanderson and A. T. G. McArthur, 1967.
46. *Budgeting Further Development on Intensive Sheep-Farms in Southland*, R. C. Jensen and A. C. Lewis, 1967.
47. *The Impact of Falling Prices on Taranaki Hill-Country Development*, R. W. M. Johnson, 1967.
48. *Proceedings of an N.Z. Seminar on Project Evaluation in Agriculture and Related Fields*, R. C. Jensen (Ed.), 1968.
49. *Inter-Industry Structure of the New Zealand Economy, 1961-5*, B. J. Ross and B. P. Philpott, 1968.
50. *Fresh Vegetable Retailing in New Zealand*, G. W. Kitson, 1968.
51. *Livestock Targets in North Canterbury Hill Country: The Impact of Changing Prices*, J. L. Morris, H. J. Plunkett and R. W. M. Johnson, 1968.
52. *Sectoral Capital Formation in New Zealand, 1958-65*, T. W. Francis. Studies in the Structural Development of the New Zealand Economy: No. 3. 1968.
53. *Processing Peas: A Survey of Growers' Returns, 1967-8*, B. N. Hamilton and R. W. M. Johnson, 1968.

TECHNICAL PAPERS

1. *An Application of Demand Theory in Projecting New Zealand Retail Consumption*, R. H. Court, 1966.
2. *An Analysis of Factors which cause Job Satisfaction and Dissatisfaction Among Farm Workers in New Zealand*, R. G. Cant and M. J. Woods, in preparation.
3. *Cross-Section Analysis for Meat Demand Studies*, C. A. Yandle, in preparation.
4. *An Econometric Analysis of Land Sale Prices in New Zealand 1950-68*, R. W. M. Johnson, in preparation.
5. *Sectoral Capital Formation in New Zealand*, T. W. Francis, in preparation.
6. *Fixed Capital Formation in New Zealand Manufacturing Industries*, T. W. Francis, in preparation.

DISCUSSION PAPERS

1. *A Review of Evaluation Studies in New Zealand Agriculture and Forestry*, R. W. M. Johnson, from Research Report No. 48, 1968.
2. *The Economic Evaluation of Investment in Large-Scale Projects: An Essay to Recommend Procedures*, R. C. Jensen, from Research Report No. 48, 1968.
3. *Economic Evaluation of Water Resources Development*, R. C. Jensen, A.N.Z.A.A.S., Christchurch, 1968.
4. *An Illustrative Example of Evaluation Procedures*, A. C. Norton and R. C. Jensen, N.Z. Assn. of Soil Conservators, May 1968.
5. *The Shape of the New Zealand Economy in 1980*, B. P. Philpott and B. J. Ross, N.Z. Assn. of Economists, August 1968.
6. *Economic Problems of New Zealand Agriculture*, R. W. M. Johnson, A.N.Z.A.A.S., Christchurch, 1968.
7. *Recent Trends in the Argentine Beef Cattle Situation*, R. W. M. Johnson, November 1968.

* Out of print.

While stocks last, single copies are available to interested individuals, institutions and firms, on application.