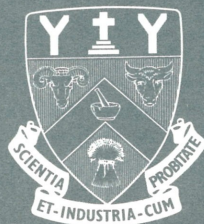


AGRICULTURAL
ECONOMICS
RESEARCH UNIT



Lincoln College

ESTIMATES OF FARM INCOME
AND PRODUCTIVITY
IN NEW ZEALAND 1921-65

by

B. P. PHILPOTT, B. J. ROSS, C. J. MCKENZIE
C. A. YANDLE and D. D. HUSSEY

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B. P. Philpott

B. J. Ross

C. J. McKenzie

C. A. Yandle

and

D. D. Hussey

P R E F A C E

I consider it a great privilege to write the preface to this important publication. Although earlier versions of this bulletin have been published elsewhere, this is the first time that the complete set of data has appeared as an Agricultural Economics Research Unit Publication. Since Professors Philpott and Stewart prepared the original estimates in 1957 and 1958, Messrs. Ross, McKenzie, Yandle and Hussey have been successively employed in making revisions and bringing the data up-to-date. At present all the series are complete up to the end of the 1964/65 farming season. Revisions to previously published series are referred to in the notes to the tables.

We have been considerably helped in the preparation of the data by a grant from the Nuffield Foundation.

Although New Zealand changed to decimal currency in July 1967, we have retained the monetary units appropriate to the period of the study.

In editing the script and tables for publication, I have been greatly aided by Mr B.J. Ross on points of definition and estimation problems; by Mrs M.M. Charlton in typing the tables and by Mr T. Young in the printing.

R.W.M. Johnson

July 1967

LIST OF TABLES

Table		Page
I	Gross Income, Expenditure, and Net Income	19 & 21
II	Real Gross Output, Real Inputs, and Real Net Output	23 & 25
III	Prices Received and Prices Paid	27
IV	Value of Real Farm Capital	29
V	Output per Unit of Aggregate Input	31
VI	Reconciliation of Net Farm Income with Official National Income Estimates	33
VII	Estimates of Net Farm Income and Wages Paid from Censuses	35
VIII	Estimate of Wage Payments	39
IX	Estimates of Farm Labour Force	41
X	Estimate of Interest Paid	43
XI	Estimate of Rent Paid	45
XII	Gross Farm Income	47
XIII	Index Numbers of Volume of Farm Production	49
XIV	Price of Farm Inputs	53
XV	Value of Livestock (at constant prices)	55
XVI	Value of Plant and Machinery at Depreciated 1949/50 Costs	59
XVII	Real Value of Improvements	61

INTRODUCTION

The purpose of this bulletin is to bring together the complete set of data on income and productivity for the New Zealand agricultural sector for the period 1922 - 1965. It is anticipated that the resulting tables will be of interest to those concerned with policy-making and those who wish to examine past trends for their own purposes. In this introduction we outline the order in which the material appears, the conceptual viewpoint taken of the agricultural sector, and the definition of terms. In the second section, we set out a brief discussion, with the relevant graphs, of some of the main trends which the data show. Since further analysis of the data is obviously desirable, we conclude these introductory sections with a bibliography of papers so far prepared in this department on the general theme of agricultural productivity.

The reader who is unfamiliar with this material would be well advised to read on to the end of these introductory sections to discover the meaning of the terms used and the broad trends which the data exhibit. Regular users of the data will find the more important aggregates set out in five main tables facing page 18 to page 30. These include the main product series in money values, the same product series in real values, the price series, the capital series and the volume series of aggregate inputs. There then follow a further twelve tables which set out the supplementary data from which the main tables are derived. These are found facing page 32 to page 60. Finally, notes to the tables are set out in numerical order facing the tables. Sources of data are indicated, and the major assumptions in the construction of the tables explained.

The basic series of data, taken from official statistics, is the Government Statistician's estimates of Gross Farming Income. This series provides the basic viewpoint of the agricultural sector and all subsidiary estimates are constrained to match this series as closely as possible. Gross Farming Income measures the output of the national farm at farm gate.

It includes personal consumption of farm-produced products and livestock valuation changes. It excludes crops and wool held back, and the product of kitchen gardens. Between-farm livestock sales and purchases are excluded, and 80 per cent of all grass and clover cut for hay is also excluded. It is thus assumed that 20 per cent of hay and chaff produced passes to other sectors (e.g. horse training). Green fodder crops are not included.

Gross Farming Income is valued at farm gate prices, and includes estimates of all products which pass through official marketing channels, i.e. wool sales, slaughter houses and milk factories. The products of part-time farmers would thus tend to be included. This situation can be compared with the official statistics on Farm Production. Up to 1959-60, these statistics were collected from occupiers of all holdings greater than 1 acre outside borough boundaries. Since 1959-60, the collection has been made from all occupiers of holdings greater than 10 acres. It is stated that although 13 per cent of holdings in 1956/57 fell within this size group, only 0.40 per cent of dairy cattle, 0.04 per cent of beef cattle, and 0.07 per cent of sheep came from these holdings. Commodities most affected are potatoes and onions, and the areas in market gardens, orchards and nurseries. In this publication, the main estimates affected by the acreage definition of holdings are livestock numbers (Table XV) and numbers of tractors and machinery on farms (Table XVI). These definitions are also consistent with our estimate of the value of farm improvements which is taken from county valuation summaries.

The estimates of real output of the agricultural sector are based on the official index of the volume of farm production. The value series and the volume series then provide the main series for the index of the price of farm outputs (Table III). The index of the price of farm inputs is not related to any official series but is a new series, details of which are given later (Table XIV).

The official series on Gross Farm Income extends back only to 1928/29. Further calculations for these series and the derived price series were therefore required back to 1922. These are indicated in the notes to Tables I and II.

The official series on Net Farm Income in the National Income Statistics extends back only to 1946/47, with a further reference point in 1938/39. With certain adjustments, this series is adopted as the base-line for the Net Farm Income series, and earlier estimates are found as a residual after total farm expenses have been estimated. Further details of the procedure used may be found in the notes to Tables I and II (especially line 11 - other inputs).

Finally, all the estimates within the body of the main tables are based on original research. The exact details of the procedures used are indicated in the appropriate places, and further reference to these problems is not required here.

The system of nomenclature used distinguishes between estimates in money terms and those in real terms.

1. For all items expressed in current prices we have used the terms incomes and expenses; when expressed in 1949/50 prices we have used the terms output and input.
2. By Gross Farm Income we mean total gross receipts at farm gate from the sale of farm produce, net of commissions, transport, and other selling costs, and after allowing for certain inter-farm sales. It includes an adjustment for the value of changes in livestock inventory.

Gross Farm Output is Gross Farm Income in 1949/50 prices.

3. Factor Expenses are those amounts actually paid by farmers to factors of production used in farming, such as wages, actual rent for land and interest on borrowed capital; plus amounts paid by way of taxes such as rates and land tax but not income tax.
4. Non-Factor Expenses means all expenses paid out by farmers other than factor expense.

Non-Factor Inputs means non-factor expenses in 1949/50 prices.

5. Net Farm Income means income available to farmers (before payment of income tax) and equals gross farm income less the sum of factor expenses and non-factor expenses.
6. Factor Incomes equal the sum of Factor Expenses and Net Farm Income, and equals Gross Farm Income minus Non-Factor Expenses.
7. Net Output equals Gross Farm Output minus Non-Factor Inputs.

The definitions can be summarised in the following two identities:-

$$\text{Gross Farm Income} = \text{Non-Factor Expenses} + \text{Factor Incomes}$$

$$\text{Gross Farm Output} = \text{Non-Factor Inputs} + \text{Net Output}$$

(in 1949/50 prices)

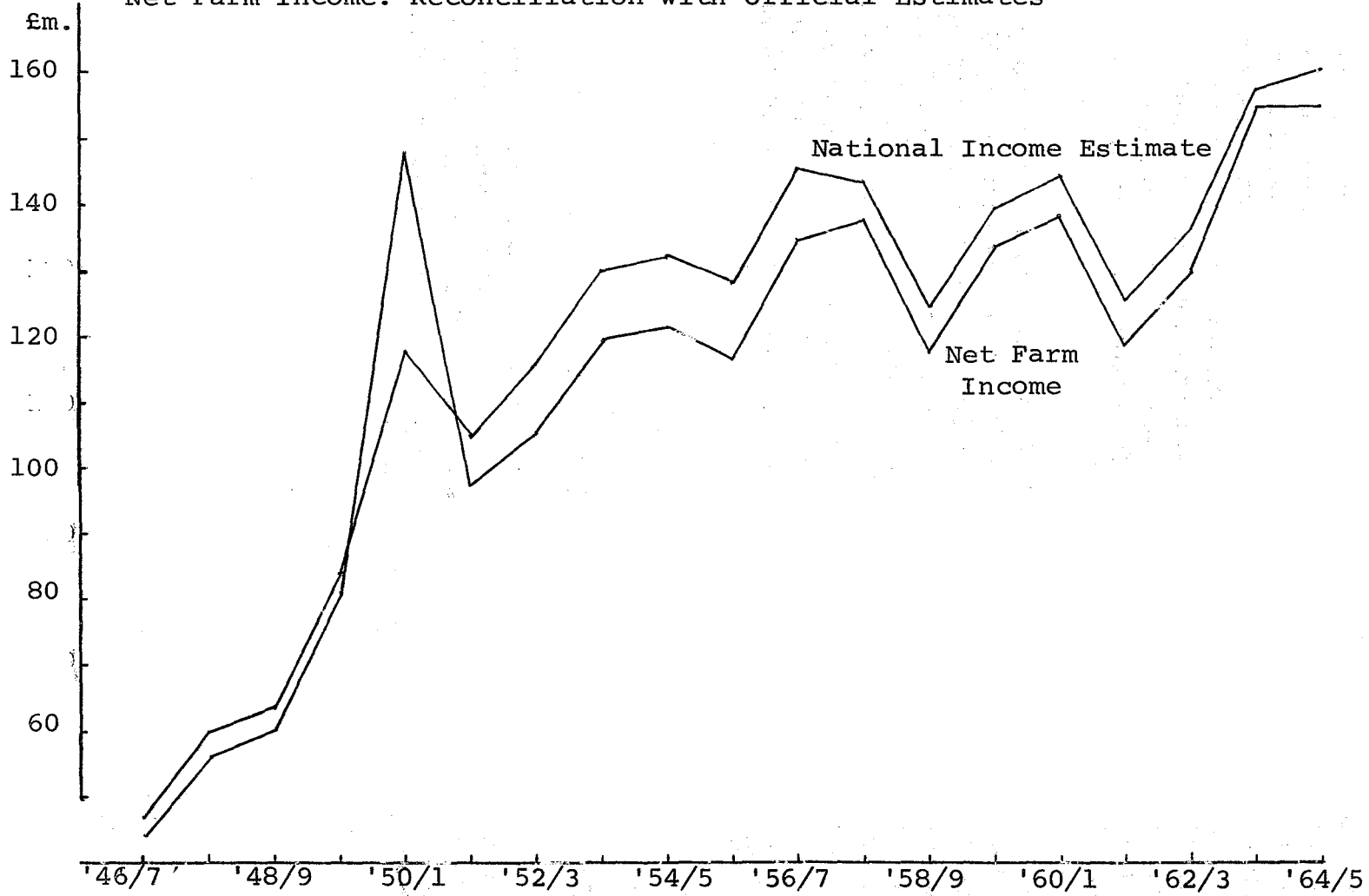
Factor Incomes, or the total income arising in agriculture, represent the contribution made by agriculture to the national income in current prices. Net Output represents agriculture's contribution to real national income.

Net Farm Income is thus defined as income available to farmers after they have paid rates, actual interest and rent, but before income tax, Reserve fund payments and mortgage repayments are paid. It is not disposable farm income, which could be measured after all the above items have been paid if data were available. If the net return to management is required, users of the data would have to estimate the labour reward of owner-occupiers and the annual return on total capital invested. Farm labour force data is shown in Table IX and capital employed in Table IV. (Interest paid on borrowed capital and rents would also have to be taken into account.) Total Factor Income earned in farming is thus equal to Net Farm Income plus wages, interest, rent, rates and land tax. The corresponding real term for Total Factor Income is Net Output.

The official estimate of Net Farm Income differs from the above definition in its treatment of income of farm companies, local authority rates and land tax, and Reserve

Graph 1

Net Farm Income: Reconciliation with Official Estimates



fund payments. The exact reconciliation of the two series is shown in Table VI, where income of farm companies is added in and rates and land tax deducted as normal factor expenses. Wool receipts paid into the Reserve fund are here counted as receipts in the year of sale and not as disbursements from the fund. This procedure allows the correct evaluation of net returns in the year in which it occurred, and when suitably deflated, gives a measure of product related to the resources employed.

These two series are shown in Graph 1 for the period since 1946/47. The official series are generally higher than the Unit's estimates as rates and land tax are bigger items than company income. For the period 1950/51 to 1955/56, the Reserve fund created after the wool boom shifts the official estimate a little higher where the Government Statistician included the disbursements from the fund and which we show as one receipt in 1950/51 only. A further £5 mn. was paid into the Reserve fund in 1963/64 and 1964/65, and is shown as income in these years.

Trends in Income and Productivity

The main trends in income and productivity are summarised in Table A. Each of the main series is expressed as an annual average per decade. Year to year variations are shown in the main tables. Some of the main series are also set out in the graphs.

TABLE A : Summary of Farm Income and Productivity Trends
Annual Averages

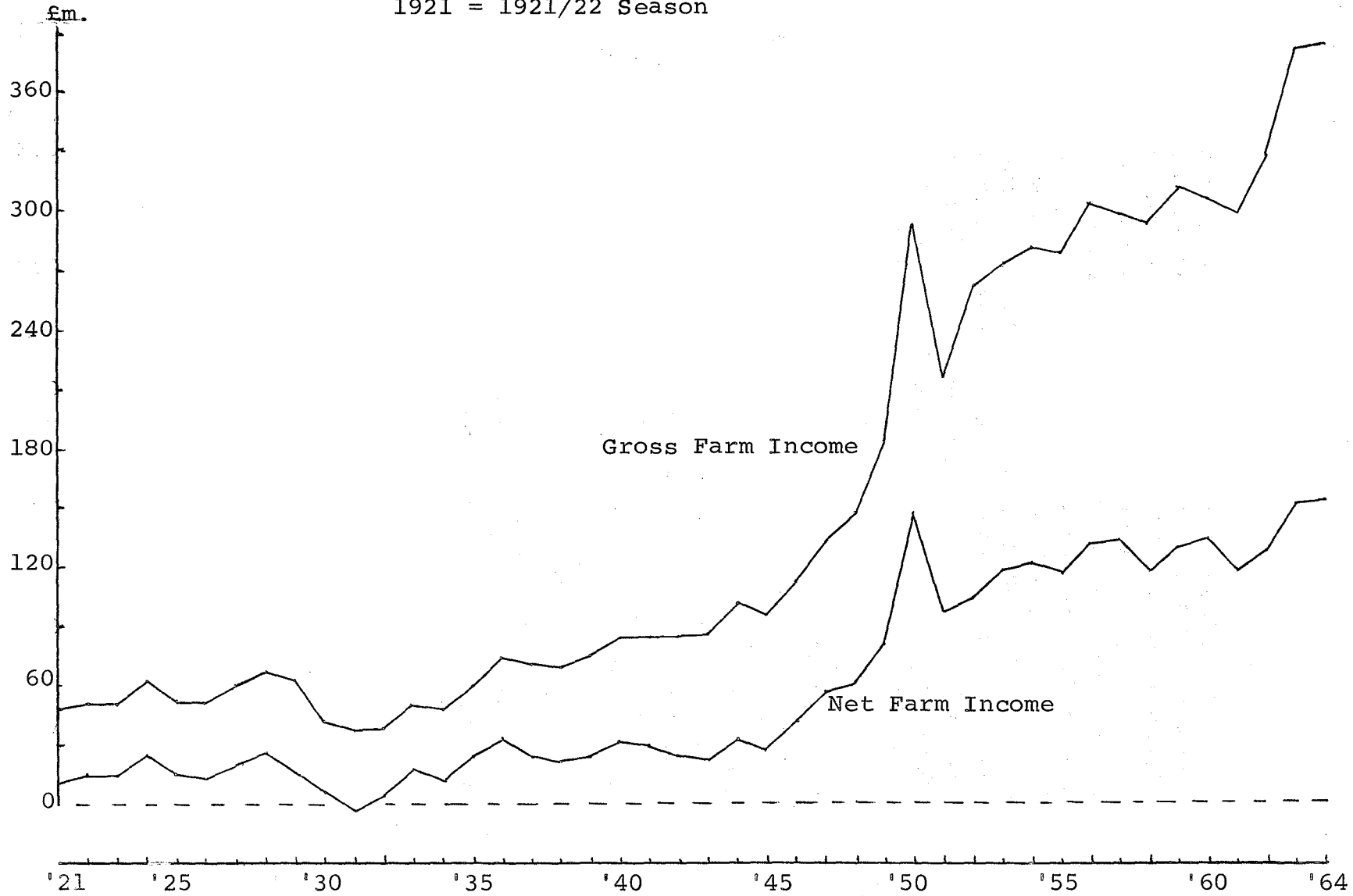
	1921-30	1931-40	1941-50	1951-60	1961-65
	£m.	£m.	£m.	£m.	£m.
<u>1 Farm Income(Current Prices)</u>					
1.1 Gross Farm Income	56.5	56.5	111.6	279.8	339.1
1.2 Non-factor Expenses	15.1	18.5	44.3	111.1	129.6
1.3 Factor Income	41.3	38.0	67.2	168.6	209.5
1.3.1 Wages	8.5	8.9	13.2	24.6	34.6
1.3.2 Interest, Rent	11.3	10.4	8.9	13.8	25.3
1.3.3 Rates, Land Tax	3.4	2.6	3.6	7.2	10.9
1.3.4 Farm Income	18.1	16.1	41.5	123.1	138.8
<u>2 Farm Output(1949-50 prices)</u>					
2.1 Gross Farm Output	104.0	143.5	166.7	207.1	261.6
2.2 Non-factor Inputs	26.3	33.5	53.3	81.8	82.2
2.3 Net Output	77.8	110.0	113.4	125.3	179.4
<u>3 Capital Employed(1949-50 prices)</u>					
3.1 Improvements	206.5	271.6	303.1	470.4	643.2
3.2 Plant and Machinery	20.3	30.2	40.9	67.0	73.9
3.3 Livestock	114.5	141.4	152.8	185.6	224.9
3.4 Total	341.4	443.2	496.8	721.9	941.9
<u>4 Farm Labour</u>					
4.1 Labour Force '000s	145.0	159.4	132.0	129.8	121.7
<u>5 Index of Prices Received & Paid</u> (1949/50=100)					
5.1 Index of Prices Received	54.7	39.0	66.4	135.6	129.6
5.2 Index of Prices Paid	57.3	53.5	80.4	139.9	164.1
5.3 Ratio of Prices Received to Prices Paid	95.5	72.9	82.6	96.9	79.0
<u>6 Productivity Ratios('49/50=100)</u>					
6.1 Gross Output	56.5	79.0	91.5	113.1	142.8
6.2 Net Output	69.5	98.4	99.4	105.2	160.5
6.3 Real Capital	64.3	82.2	92.2	134.1	174.7
6.4 Labour	108.6	119.4	98.9	97.3	91.1
6.5 Aggregate Inputs	68.3	79.5	88.6	114.1	123.6
6.6 Gross Output/Capital	87.8	96.1	99.2	84.3	81.7
6.7 Gross Output/Labour	52.1	66.2	92.5	116.3	156.2
6.8 Gross Output/All inputs	82.7	99.3	103.2	99.1	115.5
6.9 Net Output/Capital	108.0	119.7	107.8	78.4	91.9
6.10 Net Output/Labour	64.0	82.5	100.5	108.2	176.1

Over the period under review, Gross Farm Income in New Zealand agriculture has increased from £56 m. in money values to £339 m. After an apparently static period in the twenties and thirties the value of output has increased very rapidly since 1945. As Graph 2 shows, the wool prices of 1950-51 caused a marked increase in values, which have since been overtaken as a result of higher volume of output. Net Farm Income follows the pattern of Gross Farm Income over the period but tends to be an increasing proportion of gross income in the three later decades.

The distribution of Gross Income between Non-Factor Expenses and Factor Income has shifted toward non-factor expenses in the post-war period. Non-factor expenses have increased from under 30 per cent of gross income to around 40 per cent. The allocation of categories within factor income has changed most markedly. Paid wages reflect the declining labour force in agriculture, and there has been a downward trend in actual payments for land and capital services. As a result net farm income has increased from 44 per cent of factor income to around 70 per cent in the last 15 years.

Graph 2

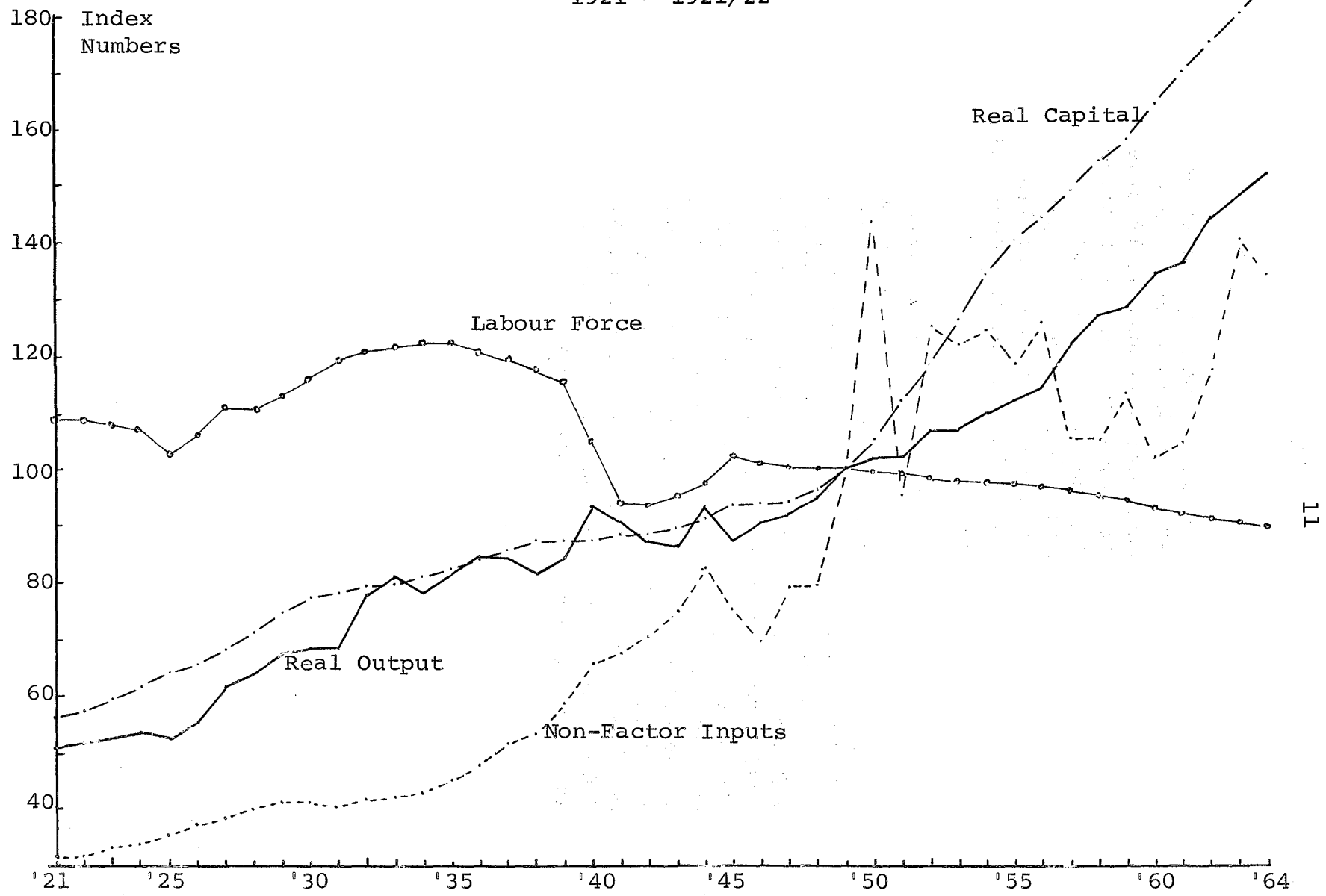
Gross and Net Farm Income 1921-65
1921 = 1921/22 Season



The Gross Farm Income series conceals changes in volume and prices. Graph 3 shows trends in Gross Farm Output, that is the volume series of production, compared with real measures of capital, labour and non-factor inputs. Output did in fact increase steadily through the twenties and thirties, but the improvement was disguised by falling product prices in Graph 2. The long-run rate of increase in the volume of output has been 2.6 per cent per annum. Non-factor inputs are an increasing proportion of gross farm output, except in the last five years.

The measure of Real Capital in Graph 3 includes an estimate of the value of improvements. The physical area of land available for agriculture has not changed greatly in the period, but its productivity has. The steady increase in Gross Output has thus been achieved from a static to declining labour force and from increased capital and non-factor inputs. Part of the real improvement of the land factor is a result of spending on non-factor inputs such as fertiliser and seed. These inputs plus direct capital investment in buildings, fences and machinery, tend to be governed by the level of net farm income, as by far the largest proportion of investment is internal capital.

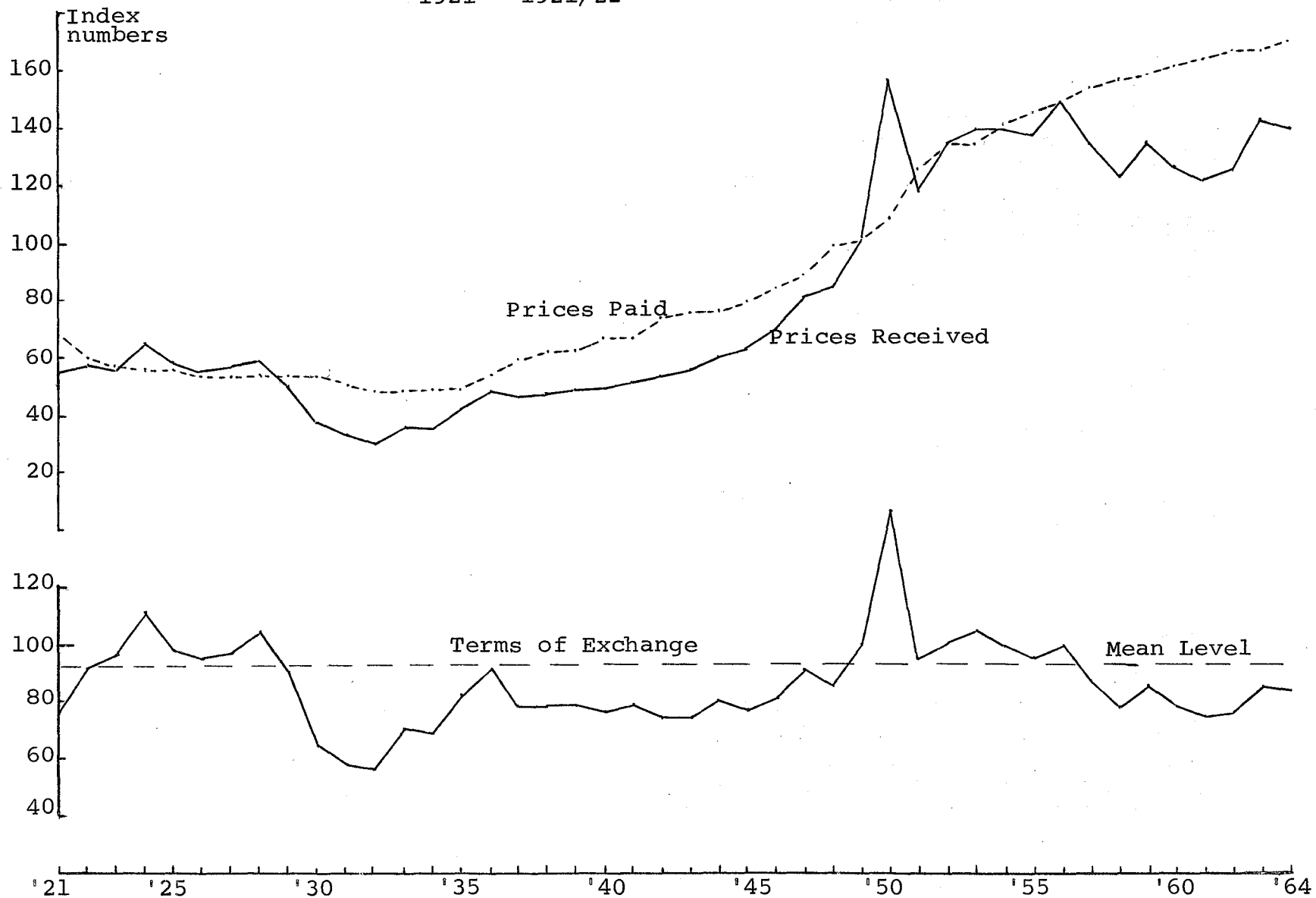
Graph 3 Real Output, Capital, Labour and Non-Factor Inputs
1921 = 1921/22



Price changes over the period are shown in Graph 4. The Prices Paid series is based on the average expenditure patterns of 1948/49 and 1949/50. In the long run, Prices Received and Prices Paid have tended to follow world trends in price levels, but in recent years New Zealand farm prices received have fallen well below prices paid, in a movement comparable with the early thirties.

In our opinion the best productivity ratio for the agricultural sector is the rate of output per unit of aggregate input. Owing to the changing roles of capital and labour, productivity measures based on one factor alone may be misleading. In addition, some of the wage paid labour which has left farm employment has not been lost to the industry completely but has been absorbed by service industries which appear in the tables as non-factor inputs. Output per unit of capital increased over the first 3 decades of the study, but has declined in the latter two decades. Output per unit of labour has shown an almost spectacular upward trend throughout.

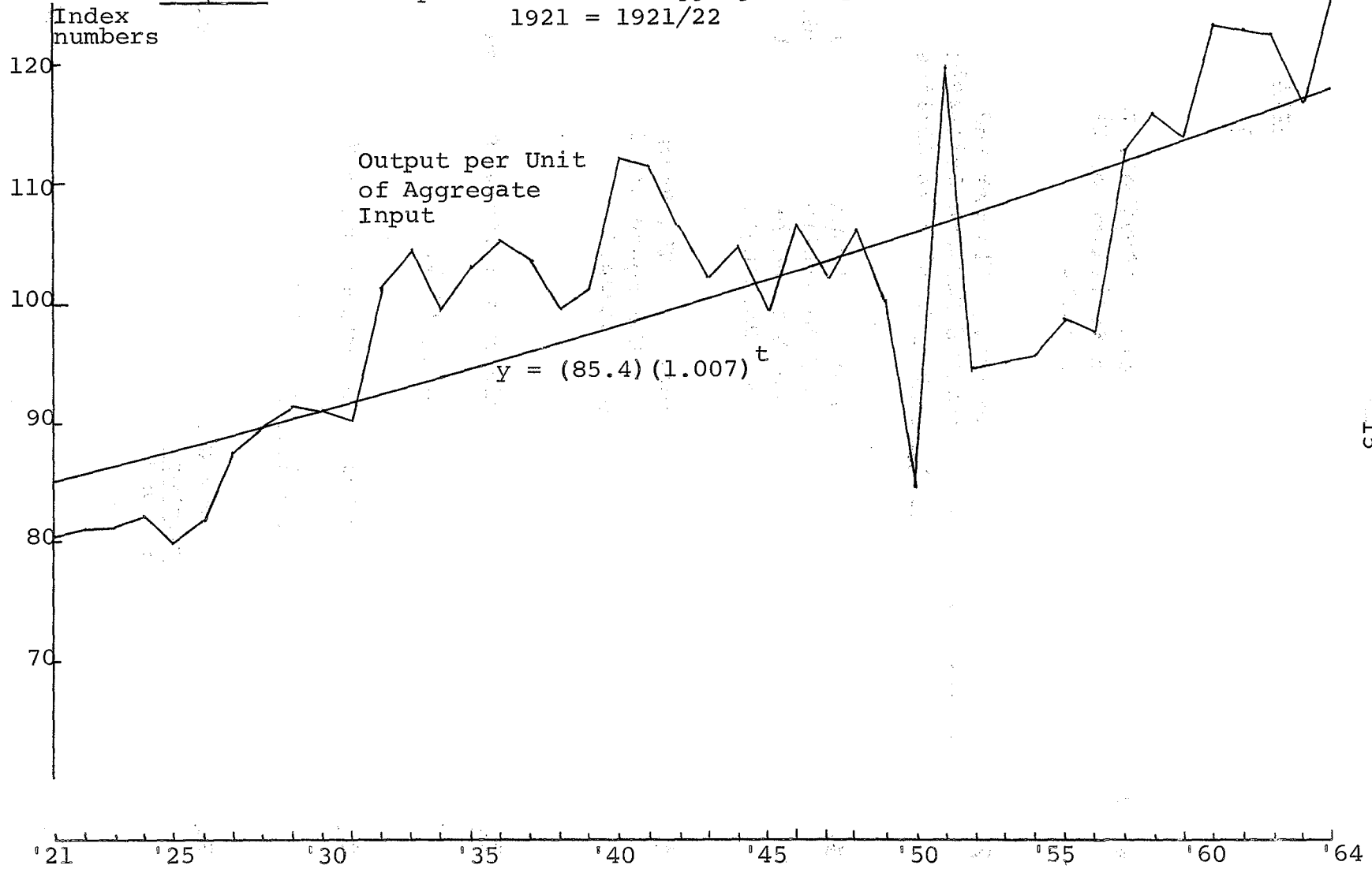
Graph 4 Prices Received and Prices Paid
1921 = 1921/22



The trend in output per unit of aggregate input is shown in Graph 5. The long-run trend is also shown. The average rate of increase in overall productivity in New Zealand agriculture has been at the rate of 0.7 per cent per annum. But it is also apparent that there have been fluctuations or surges in productivity over the period. These surges appear to be related to changes in the level of investment mentioned earlier. In the 1920's, early 1950's and early 1960's inputs were high in relation to outputs achieved. These were periods of high business confidence and satisfactory liquidity. In the early 1930's, the early 1940's and late 1950's, confidence declined and re-investment slackened. But previous investment in improvements continued to raise output in these periods. As a result output per unit of aggregate input increased rapidly. It seems likely that the high level of investment from 1962 to 1964 will have a similar effect in the next few years.

Graph 5

Output Per Unit of Aggregate Input
1921 = 1921/22



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Notes on Tables I and II
Gross and Net Income and Output

There was a considerable degree of interdependence in the process of estimating expenses in money terms and real terms. For this reason, and also to avoid undue repetition, it is convenient in the following notes to discuss the sources and procedures adopted for each item in money terms and real terms at the same time. Each specific item of expense or input has the same line number in both tables.

Unless otherwise indicated below, the figures relating to output in New Zealand of certain items of farm input are derived from the annual official "Report on the Industrial Production Statistics of New Zealand". Figures relating to imports of items of farm input are derived from the "Report on Overseas Trade Statistics of New Zealand". Import statistics are only available in detail for calendar years up to 1962, and June years since 1962/63, while industrial production statistics refer to a production year which in most cases ends on 31st March. Import figures have therefore been added to production figures for the year ending 31st March following.

Line 2 - Farm Requisites:

- (a) Sacks and Woolpacks, Insecticides, Dips, Licks, Weed Killers, Strainers, Netting and Saddlery.
 - (i) In money terms - from Import Statistics and Industrial Production Statistics.
 - (ii) In real terms - from deflation of money figures by non-food component of New Zealand Wholesale Price Index.
- (b) Miscellaneous Dairy Expenses - shed expenses, veterinary and herd testing expenses.
 - (i) In real terms - number of dairy cows multiplied by 12/- per cow plus number of cows tested by 10/- per cow.
 - (ii) In money terms - from application to real figures of non-food commodity component of wholesale price index.

The item (a) above represents all the odd items of farm expenditure which can be identified in the production and import statistics other than those which are more properly components of such sections of farm expenditure as repairs and maintenance which are separately estimated.

TABLE I : GROSS INCOME, EXPENDITURE, AND NET INCOME
(£000 in current prices year ended 30th June)

	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36	36/37	37/38	38/39	39/40	40/41	41/42	42/43	43/44	
1. <u>Non-Factor Exps.</u>																								
2. Farm Requisites	1281	1139	1390	1410	1579	1410	1365	1421	1444	1359	1083	1092	1282	1347	1383	1322	1544	1466	1559	1949	1724	1651	2056	
3. Fertiliser	354	463	641	879	1272	1284	1465	1731	1921	1550	1347	1491	1464	1449	1520	1832	2268	2225	2634	2771	2103	1680	1613	
4. Lime	142	152	220	241	226	231	240	239	248	240	196	198	204	231	269	321	370	378	377	512	566	668	724	
5. Seeds (Imported)	204	128	239	280	209	264	163	212	224	164	88	117	109	138	134	127	173	130	160	207	109	89	127	
6. Fuel, Oil & Grease	105	91	101	180	296	340	398	352	415	492	493	558	646	651	718	828	990	1084	1296	1689	1503	2079	2217	
7. Electricity - Power	434	435	452	463	485	502	541	493	616	692	708	741	716	697	730	761	808	850	890	945	966	973	985	
8. R. & M.																								
(i) Bldgs, Fences, Struc.	1917	1699	1651	1779	1816	1874	1956	2039	2100	2139	2065	1978	2107	2137	2195	2376	2733	2906	2907	3221	3538	3681	3879	
(ii) Plant & Mach.	638	663	718	845	975	1073	1139	1164	1240	1285	1243	1196	1134	1190	1272	1520	1888	2098	2188	2255	2253	2442	2632	
9. Rail & Cartage	1426	1242	1111	1127	1089	1117	1262	1233	1297	1314	1296	1509	1580	1492	1582	1670	1718	1657	1812	2147	1968	2107	2098	
10. Depreciation:																								
(i) Bldgs & Structures	1169	1111	1102	1142	1197	1253	1294	1319	1360	1391	1377	1338	1390	1414	1447	1541	1717	1829	1834	1990	2184	2321	2460	
(ii) Plant & Mach.	303	345	375	456	528	626	684	675	672	712	909	876	759	875	913	1059	1394	1631	1763	1769	1984	2258	2155	
11. Other Expenses	6696	6506	6316	6126	5936	5746	5556	5366	5175	4985	4795	4605	4415	4225	4783	5341	5899	6457	9646	12835	16024	19213	22402	
12. Total Non-Factor Expenses	14669	13974	14316	14928	15608	15720	16063	16244	16712	16323	15600	15699	15806	15846	16946	18698	21502	22711	27066	32290	34922	39162	43348	
13. <u>Factor Expenses</u>																								
14. Wages	7980	7733	8160	8130	7493	8086	8927	10098	10406	10556	8860	6089	5428	5548	6210	9394	12134	12829	12438	10659	8671	9586	11090	
15. Interest	7355	7752	8054	8401	8695	8770	9034	9217	9603	9824	9745	9558	7412	7416	7396	7421	7373	7253	7254	7142	7045	6794	6540	
16. Rent	2841	2795	2823	2767	2744	2734	2689	2681	2688	2399	2393	2203	2281	2302	2323	2302	2290	2280	2277	2230	2233	2220	2207	
17. Rates	1557	1792	1837	1959	2092	2111	2229	2238	2231	1839	1737	1470	1701	1595	1664	1898	2159	2269	2356	2416	2415	2495	2504	
18. Land Tax	1638	1541	1426	1335	1267	1229	1154	1140	1507	1146	542	499	499	493	459	1048	1038	1058	1019	959	1009	976	988	
19. Total Factor Expenses	21371	21613	22300	22592	22291	22930	24033	25374	26435	25764	23277	19819	17321	17354	18052	22063	24994	25689	25344	23406	21373	22071	23329	
20. Total Expenses	36040	35587	36616	37520	37900	38650	40096	41618	43147	42087	38877	35518	33127	33200	34998	40761	46496	48400	52410	55696	56295	61233	66677	
21. Net Farm Income	11700	15800	14900	24700	14900	14000	20300	27000	18100	1400	-1000	2500	16500	13400	24000	33800	24600	21700	22600	29100	27500	23600	20000	
22. Gross Farm Income	47700	51400	51500	62200	52800	52600	60400	68600	61200	43500	37900	38000	49600	46600	59000	74600	71100	70100	75000	84800	83800	84800	86700	

Line 3 - Fertiliser:

- (i) In money terms - value at factory gate or c.i.f. of locally produced fertiliser from industrial production statistics and of imported fertiliser from import statistics. In the case of imported fertiliser it was assumed, up to 1944/45, that a quarter of the sulphate of ammonia, two thirds potash, and all the basic slag, comprised raw materials for the New Zealand fertiliser industry and was therefore excluded. From 1945/46 on the quantities of potash, sulphate of ammonia and basic slag used as raw materials for the New Zealand fertiliser industry were taken from the Industrial Production Statistics.
- (ii) In real terms - quantities imported valued at 1949/50 unit value of each component. Value of local production 1920/21 - 1930/31, deflated by price index of superphosphate; for 1931/32 - 1964/65 quantity of all fertilisers produced valued at 1949/50 production prices.

Line 4 - Lime:

- (i) In money terms - value of agricultural lime produced.
- (ii) In real terms - 1920/21 - 1939/40 money values deflated by non-metallic minerals component of wholesale price index. 1940/41 - 1964/65 quantities produced valued at 1949/50 production price.

Line 5 - Seeds Imported:

- (i) In money terms - value of seeds imported.
- (ii) In real terms - money values deflated by index of seed prices.

Line 6 - Fuel Oil and Grease:

- (i) In real terms - number of farm tractors multiplied by £110.9.0 each. Number of farm trucks multiplied by £30 each. These figures of annual cost derived from New Zealand Department of Agriculture's annual tractor survey and from farm budgets.
- (ii) In money terms - real figures converted by using wholesale price index of mineral oils.

Line 7 - Electricity and Power used by
Milking and Shearing Machines:

- (i) In real terms - number of cows in milk at 12/6d per cow, number of sheep shorn by machine at 8/- per 100.
- (ii) In money terms - real figures converted with the retail price index of fuel and power.

Line 8 - Repairs and Maintenance:

- (i) In real terms - for buildings and structures it was assumed on the basis of farm budgets that buildings represented 40 per cent and fences 30 per cent of total real farm improvements as calculated for the farm capital estimates. Repairs and maintenance on these figures was then allowed at the rate of 2 per cent per annum for buildings and structures and 3 per cent for fences. For plant and machinery, the following rates were applied to the value of real depreciated capital (Table XVI). Trucks 12.5 per cent (10% after 1945/46), tractors 12.5 per cent, other plant 7.5 per cent.
- (ii) In money terms - converted with specially constructed index numbers of building costs, fencing costs and machinery repair costs, using prices of building materials, building wage rates, prices of fencing wire, prices of farm machinery and engineering wage rates.

Line 9 - Railage and Cartage:

- (i) In real terms - for 1949/50 the total railage and cartage was derived from the New Zealand Meat and Wool Boards' Economic Service Sheep Farm Sample and the New Zealand Statistics Department Dairy Farm Sample, giving railage and cartage per cow and per sheep which was multiplied by cow numbers and sheep numbers in 1949/50. For other years this figure was then adjusted by the index of volume of farm production.
- (ii) In money terms - using an index of price of railage and cartage consisting of the unweighted average of New Zealand rail freights collected per ton mile, index of transport wage rates and wholesale index of price of petrol.

TABLE II : REAL GROSS OUTPUT, REAL INPUTS, AND REAL NET OUTPUT
(£000 49/50 prices year ended 30th June)

	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36	36/37	37/38	38/39	39/40	40/41
1. Non-Factor Inputs																				
2. Farm Requisites	2111	2005	2754	2516	2746	2812	2737	3021	3230	3136	2688	2660	2942	3318	3233	3135	3561	3421	3208	3779
3. Fertiliser	246	483	862	1091	1489	1818	2102	2774	2974	2376	2530	2974	2677	2818	2959	3737	4468	4418	4740	5049
4. Lime	115	142	231	260	251	263	276	277	288	284	233	235	235	267	316	382	426	430	427	574
5. Seeds (Imported)	329	206	395	440	323	411	261	317	359	292	160	248	207	252	249	222	296	217	174	351
6. Fuel, Oil & Grease	70	80	119	225	376	486	535	590	662	786	805	855	916	976	1054	1185	1360	1562	1742	1875
7. Electricity & Power	481	521	567	589	612	627	675	611	776	875	898	963	1008	1039	1058	1075	1095	1105	1125	1178
8. R. & M.																				
(i) Bldgs, Structs. & Fences	3040	3152	3262	3377	3547	3717	3881	4033	4165	4248	4390	4477	4552	4622	4686	4745	4792	4822	4848	4860
(ii) Plant & Machinery	1114	1197	1347	1561	1769	1920	1984	2050	2202	2294	2219	2253	2305	2356	2475	2690	3025	3127	3185	3206
9. Rail & Cartage	1408	1436	1470	1515	1470	1554	1719	1798	1890	1912	1912	2184	2254	2184	2299	2366	2366	2276	2369	2618
10. Depreciation																				
(i) Bldgs & Structures	1788	1854	1919	1986	2086	2187	2283	2372	2450	2498	2583	2634	2678	2719	2757	2791	2819	2836	2852	2859
(ii) Plant & Machinery	765	910	990	1129	1307	1473	1603	1658	1729	1885	1972	1953	1972	2031	2080	2207	2430	2628	2790	2864
11. Other Inputs	10152	11434	11696	11261	10952	10720	10270	9739	9392	9097	9203	9554	9256	8839	9862	10021	9514	10431	15335	19214
12. Total N-Factor Inputs	21979	23420	25612	25950	26928	27988	28326	29240	30117	29683	29593	30990	31002	31421	33028	34556	36552	37273	42795	48427
13. Net Output	70900	71300	71400	74000	70100	74500	85100	87400	92400	94300	94400	110700	115100	110300	116200	119000	117000	110300	110800	121200
14. Gross Output	92900	94700	97000	99900	97000	102500	113400	116600	122500	124000	124000	141700	146100	141700	149200	153600	153600	147600	153600	169700

Line 10 - Depreciation on Buildings and Structures:

- (i) In real terms - $2\frac{1}{2}$ per cent of value of buildings as derived for repairs and maintenance in line 8 (i) above.
- (ii) In money terms - $2\frac{1}{2}$ per cent of money value of buildings and structures.

Depreciation on Plant and Machinery:

- (i) In real terms - average depreciation rate as given in notes on Table XVI was applied to real net capital value of plant and machinery.
- (ii) In money terms - average depreciation rate applied to net money values of plant and machinery.

Note: Depreciation was also estimated using diminishing balance or Inland Revenue procedures for the period 1921-64. It is available on request. See Notes in Reference 3, p.14.

Line 11 - Other Inputs: i.e. inputs not independently estimated as in lines 1-10.

- (i) In real terms - for the census years and for the years 1938/39 and 1946/47 to 1964/65, it was possible to estimate total expenses in current prices as the difference between gross farm income and net farm income and from this to estimate other expenses in current prices as the difference between total expenses, so estimated, and expenses independently estimated in lines 1-10. These estimates of other expenses in current prices were then converted into real terms using an "other" expenses price index (see Table XIV). Other inputs in real terms were then interpolated arithmetically for the intercensal years.
- (ii) In current prices - for census years and 1946/47 - 1964/65 as in (i) above. For intercensal years, the estimates of real other inputs were converted into current prices using the "other" inputs price index.

The item "other inputs" covers all inputs which it has not been feasible to estimate independently but it also includes distribution and transport costs, and profit margins on inputs valued at ex factory cost or landed cost.

Line 13 - Net Output: Line 14 minus line 12 (Table II).

Line 14 - Gross Output: Value, in 1949/50 prices, of New Zealand farm output derived from the volume index in Table XIII below by applying the volume index to the gross farm income figure for 1949/50.

Lines 14, 15, 16 - Wages, Interest, Rent: (Table I)

Derived as in Tables VIII, X and XI below.

Line 17 - Rates: Revenue derived from rates levied by Counties, Road Districts, Catchment Districts, Land Drainage Districts, and Rabbit Districts as given in New Zealand Year Books.

TABLE II (Cont'd)

	<u>41/42</u>	<u>42/43</u>	<u>43/44</u>	<u>44/45</u>	<u>45/46</u>	<u>46/47</u>	<u>47/48</u>	<u>48/49</u>	<u>49/50</u>	<u>50/51</u>	<u>51/52</u>	<u>52/53</u>	<u>53/54</u>	<u>54/55</u>	<u>55/56</u>	<u>56/57</u>	<u>57/58</u>	<u>58/59</u>	<u>59/60</u>	<u>60/61</u>	<u>61/62</u>	<u>62/63</u>	<u>63/64</u>	<u>64/65</u>
1.																								
2.	3542	2692	2723	3447	2153	2247	3619	2854	3497	2720	4346	3866	3079	3869	4608	5021	5034	5195	4785	4781	5129	4458	5375	5636
3.	3662	2920	2574	3389	3819	4852	5128	5100	5886	6492	6938	7176	7372	9576	10105	9383	9180	8307	10108	11953	11742	11804	13556	16119
4.	598	679	719	777	765	811	910	977	1044	1076	1182	1104	1164	1352	1246	1117	992	838	848	753	713	749	985	1075
5.	169	129	181	250	268	417	428	309	189	321	728	181	118	272	440	376	302	175	150	161	160	127	149	130
6.	2020	2139	2290	2456	2828	3087	3345	3794	4653	5241	5850	6609	6967	7696	8176	8747	8983	9191	9545	9809	10176	10267	10423	10752
7.	1196	1194	1195	1196	1084	1086	1127	1154	1228	1271	1286	1331	1366	1375	1384	1394	1389	1383	1366	1394	1421	1444	1457	1473
8.	4924	4975	5026	5079	5130	5191	5270	5404	5661	6024	6494	6900	7465	7947	8377	8721	9063	9290	9681	10079	10510	10937	11366	11777
	3100	3171	3400	3585	3939	3970	4054	4228	4472	4852	5292	5802	6131	6554	6898	7109	7221	7362	7352	7307	7433	7453	7464	7584
9.	2526	2436	2414	2618	2416	2509	2590	2663	2800	2870	2878	3004	3018	3072	3142	3200	3416	3556	3615	3758	3853	4032	4172	4256
10.	2896	2927	2957	2987	3018	3053	3100	3179	3330	3543	3820	4059	4392	4674	4927	5130	5332	5465	5694	5929	6182	6434	6686	6928
	2918	2948	2847	2940	3840	3866	3954	4107	4264	4634	5086	5599	5989	6417	6808	7020	7183	7391	7368	7315	7469	7548	7600	7758
11.	23881	26247	29476	33409	24448	16390	22798	22707	34220	63423	22912	41759	37542	32522	25801	29144	14223	14309	17808	6639	7317	15372	26856	16790
12.	51432	52457	55802	62133	53798	47409	56323	56476	71244	102467	66812	87390	84603	85326	81912	86362	72318	72462	78320	69878	72105	80625	96089	92278
13.	112500	105500	100900	107600	104300	116400	112000	119100	111900	85000	120700	108900	111700	115400	123400	121800	150700	159300	156400	175300	177500	182100	175600	186700
14.	163900	158000	156700	169700	158000	163900	168300	175600	183100	187500	187500	196300	196300	200700	205300	208200	223000	231800	234700	245200	249600	262700	271700	279000

Notes on Table III
Prices Received and Prices Paid

Price Index of Farm Outputs

Ratio of Value of Gross Farm Income at current prices to Volume of Production at 1938/39 prices.
See Tables XII and XIII.

Price Index of Farm Inputs

Weighted index of farm input prices according to average expenditure in 1948/49 and 1949/50.
See Table XIV.

Terms of Exchange

Price of all products sold in terms of all non-factor expenses and paid wages.

Notes on Tables I & II (Continued from previous page)

Line 18 - Land Tax: Revenue derived from Land Tax as given in New Zealand Year Book.

Line 21 - Net Farm Income: For the years 1925/26, 1934/35, 1944/45 from census estimates as in Table VII. For 1938/39 - 1964/65 from "Report on National Income Statistics and Sector Accounts" as in Table VI. For all other years net farm income equals gross farm income minus total expenses.

It should be noted that in 1950/51 the figure of net farm income includes £33.0 mn. wool retention money withheld from farmers, and that from 1951/52 to 1955/56 net farm income excludes amounts of wool retention moneys repaid to farmers. As it stands, net farm income represents income arising in the industry. To calculate disposable income (before tax) wool retentions would have to be deducted in 1950/51 and added back in 1951/52 - 1955/56. £4 mn. was also retained in 1964 and £1 mn in 1965 under the same scheme.

Line 22 - Gross Farm Income: Derived as in Table XII. Gross Farm Income figures aim to represent the revenue from farm production valued at the farm gate; it is the amount available to farmers to meet all production expenses, interest, rent, rates, taxes and living expenses. As far as possible interfarm transactions are excluded and that portion of crop production used for animal fodder is also excluded. Allowance is made for income arising from changes in Livestock inventories.

TABLE III : PRICES RECEIVED AND PRICES PAID
1949/50=100

	Price Index of Farm Outputs	Price Index of Farm Inputs	Terms of Exchange
1921/22	51.9	67.3	77.1
1922/23	54.8	59.6	91.9
1923/24	53.5	55.8	95.7
1924/25	62.8	56.5	111.2
1925/26	54.9	56.0	98.0
1926/27	51.7	54.7	94.5
1927/28	53.7	55.2	97.2
1928/29	58.9	55.6	105.9
1929/30	49.9	55.6	89.7
1930/31	35.2	55.2	63.8
1931/32	30.6	52.4	58.3
1932/33	26.9	48.4	55.6
1933/34	34.0	47.7	71.2
1934/35	32.9	47.8	68.8
1935/36	39.5	48.4	81.6
1936/37	48.5	53.1	91.3
1937/38	46.2	59.1	78.1
1938/39	47.5	60.9	77.9
1939/40	48.9	62.0	78.8
1940/41	49.9	65.6	76.0
1941/42	51.2	66.0	77.6
1942/43	53.7	72.2	74.3
1943/44	55.4	75.1	73.7
1944/45	60.4	75.4	80.1
1945/46	60.8	79.2	76.7
1946/47	67.9	83.7	81.1
1947/48	80.6	88.8	90.7
1948/49	84.0	98.3	85.4
1949/50	100.0	100.0	100.0
1950/51	156.0	107.8	144.7
1951/52	117.0	125.4	93.3
1952/53	134.0	134.0	100.0
1953/54	139.0	134.7	103.8
1954/55	139.0	140.6	98.8
1955/56	136.0	144.1	94.4
1956/57	147.0	147.7	99.5
1957/58	133.0	153.1	86.9
1958/59	121.0	154.9	78.1
1959/60	134.0	157.0	85.3
1960/61	125.0	159.9	78.1
1961/62	120.0	162.0	74.0
1962/63	124.0	164.5	75.3
1963/64	141.0	165.4	85.2
1964/65	138.0	168.6	81.8

Notes on Table IV
Value of Real Farm Capital

Real capital is divided into livestock, plant and machinery, and improvements to land. Little difficulty was experienced in deriving the value of livestock but some comments are necessary here on the methods used for estimating plant and machinery and improvements. A detailed description is given in the notes to Tables XV - XVII.

(a) Plant and Machinery:

The method used was to commence with the depreciated value, in 1949/50 Census of Agriculture. This base year figure was then extended backwards and forwards using a series of real net investment in plant and machinery. This in turn was derived, after allowing for depreciation, from a gross investment series built up from the official statistics of local production and imports of farm plant and machinery deflated by a specially constructed index of farm machinery prices, given in Table XIV.

(b) Improvements to Land:

This series is derived from the published statistics of the value of improvements in the Government valuations of rural counties. These have been deflated by a specially constructed index of the cost of improvements thus giving the value of improvements at depreciated 1949/50 replacement cost. See Notes to Table XIV.

The rationale underlying this procedure is that it is general practice for improvements to be valued at depreciated replacement cost, but it must at once be conceded that our method suffers from the following imperfections.

Firstly in periods of rapid change in the prices of primary products, when open market land values were rising or falling in sympathy, it is likely that the full effect was reflected by Government valuers, not as it should have been in changes in unimproved value only, but also in changes in the value of improvements. For this reason it is likely that the published value of improvements is too low in the 1930 period, and too high for the years since 1951. It is not possible however to measure the magnitude of this effect.

A second difficulty is that the annual valuation figures used are not the result of an annual revaluation of every county. It is more likely that at the least each county has been revalued only about once every five years. Years between valuations for each county were obtained by simple linear interpolation, giving approximate estimates of the annual value of improvements.

TABLE IV : VALUE OF REAL FARM CAPITAL
(£000 1949/50 Prices)

	Livestock	Plant and Machinery	Improvements	Total
1920/21	107938	12539	171968	292445
1921/22	109214	14680	178825	302719
1922/23	108969	15716	185428	310113
1923/24	112399	17639	191928	321966
1924/25	113315	20107	198626	332048
1925/26	114575	22312	208633	345520
1926/27	112688	23918	218684	355290
1927/28	114990	24378	228295	367663
1928/29	121191	25065	237227	383483
1929/30	130644	26925	244978	402547
1930/31	139162	27775	249837	416774
1931/32	136529	27127	258254	421910
1932/33	135807	27017	263352	426176
1933/34	135310	27448	267766	430524
1934/35	137736	27732	271886	437354
1935/36	138351	29040	275650	443041
1936/37	142950	31557	279066	453573
1937/38	147547	33694	281868	463109
1938/39	150894	35313	283620	469827
1939/40	149288	35581	285176	470045
1940/41	148026	36028	285867	469921
1941/42	150493	35924	289621	476038
1942/43	149113	34304	292650	476067
1943/44	150102	35004	295684	480790
1944/45	153646	37672	298724	490042
1945/46	156587	45178	301753	503518
1946/47	154466	44949	305323	504738
1947/48	154092	45452	309995	509539
1948/49	153684	46669	317917	518270
1949/50	158010	47907	333037	538954
1950/51	162234	51492	354337	568063
1951/52	166132	55889	382026	604047
1952/53	171783	60857	405896	638536
1953/54	178602	64401	439152	682155
1954/55	185373	68263	467441	721077
1955/56	189893	71658	492736	754287
1956/57	189575	73120	513044	775739
1957/58	196122	74053	533149	803324
1958/59	206740	75414	546470*	828624*
1959/60	209051	74425	569447*	852923*
1960/61	216487	73154	592911*	882552*
1961/62	222182	73952	618200*	914334*
1962/63	225133	74004	643383*	942520*
1963/64	228234	73787	668569*	970590*
1964/65	232398	74592	692759*	999749*

* Provisional

Notes on Table V
Output per Unit of Aggregate Input

Output Series

Volume index of gross farm production from Table XIII.

Aggregate Input Series

Total farm inputs are defined as all land, capital, labour and real working expenses used in agriculture. The annual input of capital is measured at 5 per cent of the value of real capital (Table IV), plus a constant representing the unimproved value of land. The constant was measured by the value of all unimproved agricultural land in counties in 1949/50. All men occupied in agriculture (Table IX) were valued at the standard wage for 1949/50 (£350 per year). Real working expenses are the total non-factor inputs in Table II.

TABLE V : OUTPUT PER UNIT OF AGGREGATE INPUT

	Index of Gross Output	Index of Aggregate Inputs	Output per Unit of Aggregate Input
1921/22	50.3	62.5	80.5
1922/23	51.3	63.2	81.1
1923/24	52.5	64.6	81.2
1924/25	54.1	65.4	82.7
1925/26	52.5	65.6	80.0
1926/27	55.5	67.7	82.0
1927/28	61.4	69.9	87.8
1928/29	63.7	71.1	89.6
1929/30	66.9	73.1	91.5
1930/31	67.7	74.2	91.2
1931/32	67.7	75.1	90.1
1932/33	77.4	76.1	101.7
1933/34	79.8	76.5	104.6
1934/35	77.4	77.5	99.8
1935/36	81.5	78.4	103.9
1936/37	83.9	79.4	105.6
1937/38	83.9	80.8	103.8
1938/39	80.6	80.9	99.6
1939/40	83.9	82.7	101.4
1940/41	92.7	82.5	112.3
1941/42	89.5	80.2	111.5
1942/43	86.3	81.2	106.2
1943/44	85.6	83.8	102.1
1944/45	92.7	88.3	104.9
1945/46	86.3	86.8	99.4
1946/47	89.5	83.8	106.8
1947/48	91.9	89.4	102.7
1948/49	95.1	89.7	106.0
1949/50	100.0	100.0	100.0
1950/51	102.4	121.3	84.4
1951/52	102.4	85.8	119.4
1952/53	107.2	113.4	94.5
1953/54	107.2	112.9	95.0
1954/55	109.6	114.4	95.8
1955/56	112.1	113.3	98.9
1956/57	113.7	116.6	97.5
1957/58	121.8	108.2	112.5
1958/59	126.6	108.9	116.3
1959/60	128.2	113.1	113.3
1960/61	133.9	108.2	123.7
1961/62	136.3	110.4	123.4
1962/63	143.5	116.7	123.0
1963/64	148.4	127.4	116.4
1964/65	152.4	125.6	121.3

Notes on Table VI

Reconciliation of Net Farm Income with
Official National Income Estimates

Line 1 - Personal income earned in farming is from "National Income and Expenditure 1965-66". It excludes income earned by farm companies but is calculated prior to deduction of rates and land tax. The year referred to is the year ended 31st March.

Line 2 - Income of Farm Companies

From "Official Report on Incomes and Income Tax Statistics".

Line 3 - Rates and Land Tax

From Table I, lines 17 and 18.

The figures given in line 4 are income net of the amount held back by the Government on account of wool retention in 1950/51, and gross of these amounts repaid to farmers in 1951/52 to 1955/56. Further deductions were made in 1963/64 and 1964/65 under the same scheme. They represent, therefore, net farm income for the year in which it was available and not, as we require, in the year in which it was produced. The figures as they stand could not be deducted from gross farm income to give an estimate of total expenses for 1950/51 to 1955/56 because gross farm income in 1950/51 includes the retention moneys withheld from farmers, and in 1951/52 to 1955/56 it excludes the amounts repaid.

The appropriate adjustment is made in line 5 to give in line 6 net farm income in the year it was produced.

TABLE VI : RECONCILIATION OF NET FARM INCOME WITH OFFICIAL NATIONAL INCOME ESTIMATES

	<u>38/39</u>	<u>46/47</u>	<u>47/48</u>	<u>48/49</u>	<u>49/50</u>	<u>50/51</u>	<u>51/52</u>	<u>52/53</u>	<u>53/54</u>	<u>54/55</u>	<u>55/56</u>	<u>56/57</u>	<u>57/58</u>	<u>58/59</u>	<u>59/60</u>	<u>60/61</u>	<u>61/62</u>	<u>62/63</u>	<u>63/64</u>	<u>64/65</u>	
	\$mn.																				
1. Personal Income earned in farming as given in Official National Income Estimates	25.0	47.0	60.0	64.0	84.0	118.0	105.0	116.0	130.0	132.0	128.0	145.0	143.0	124.0	139.0	144.0	125.0	136.0	157.0	160.0 *	
2. Income of Farm Companies as given in Income Tax Statistics	0.1	0.3	0.4	0.6	1.0	1.8	1.4	1.6	2.0	2.1	2.1	3.0	2.6	2.5	3.5	3.9	3.6	4.1	3.9	5.7	
<u>Total</u>	25.1	47.3	60.4	64.6	85.0	119.8	106.4	117.6	132.0	134.1	130.1	148.0	145.6	126.5	142.5	147.9	128.6	140.1	160.9	165.7	
3. Less Rates and Land Tax	3.3	3.4	3.7	4.0	4.3	4.9	5.8	6.0	6.7	6.8	7.4	7.8	8.4	8.8	9.3	9.9	10.4	10.5	11.5	12.1 *	
4. <u>Total</u>	21.8	43.9	56.7	60.6	80.7	114.9	100.6	111.6	125.3	127.3	122.7	140.2	137.2	117.7	133.2	138.0	118.2	129.6	149.4	153.6 *	
5. Add Wool Retention Funds collected from farmers in 1950/51 and deduct Wool Retention Funds repaid to farmers in other years	-	-	-	-	-	+33.0	- 3.0	- 6.0	- 6.0	- 6.0	- 6.0	- 6.0	-	-	-	-	-	-	-	+ 4.0	+ 1.0 *
6. Net Farm Income	21.8	43.9	56.7	60.6	80.7	147.9	97.6	105.6	119.3	121.3	116.7	134.2	137.2	117.7	133.2	138.0	118.2	129.6	153.4	154.6 *	

* Provisional

3

Notes on Table VII

Estimates of Net Farm Income and Wages Paid from Censuses

Lines 1 & 5 - Income of farmers and farm employees

The general sources for these estimates are as follows:-

Census and Statistics Department Population Censuses of New Zealand - 1926 Volumes 11 & 14, 1936 Volumes 3 & 12, 1945 Volumes 3 & 10.

In these censuses data were collected on each person's occupation, occupational status, and income. The income figures were requested and published in the form of frequency distributions with class intervals of £50 and upper open-end classes of £364 and over in 1926 and 1936, and £750 and over in 1945. The figures of aggregate income in lines 1 and 5 were then calculated from these distributions by multiplying the number of persons reporting income in each class interval by the mid point of the class. The following assumptions were made as to the average income earned in the open-end classes.

- (i) For 1926, £450, this being the figure used by the Statistics Department in estimating aggregate private income from the census as in New Zealand Year Book, 1932, page 669.
- (ii) For 1936, £975 for farmers this being the average assessable income of farmer taxpayers earning more than £364 in 1935/36. (Source: New Zealand Year Book.) For farm employees, an arbitrary estimate of £450 was used.
- (iii) For 1945, £1000 for farmers being the estimated average assessable income of farm taxpayers earning over £750. Taxation statistics were not published for 1944/45 but the 1945/46 statistics were adjusted by the difference in gross farm income between the two years. For farm employees an arbitrary estimate of £875 was used.

In cases where income was not specified the average for the whole group was used. Certain Government employees, though classed as farm workers, were excluded, e.g. Department of Agriculture employees. The inclusion in income of non-monetary benefits, such as board and lodging, were not requested in 1926 but were requested in 1936 and 1945. The 1926 figure for employees' earnings includes an estimate of such benefits, calculated by assuming that they applied to a third of the farm workers at a rate equal to the 1950 rate adjusted by the retail price index.

Lines 2 & 6 - Maori Income

Separate Maori censuses were conducted in each year, but no separate data on income by occupation was collected. However a number of Maoris returned income data on European schedules and these were published separately. This information was used in conjunction with the numbers of Maoris engaged in farming to estimate income of Maori farmers and farm workers.

TABLE VII Estimates of Net Farm Income and Wages Paid from Censuses

Year of Census	1926	1936	1945
Farm Income Year to which Data Refer	1925/26	1934/35	1944/45
	£000		
1. Income of Farm Employers and Workers on Own Account (excluding Maoris)	14,331	12,795	32,928
2. Income of Maori Farmers	559	492	1,064
3. Income of Farming Companies	11	100	300
4. <u>Total Farm Income</u>	14,901	13,387	34,292
5. Earnings of Persons in Farm Employment (excluding Maoris)	6,875	5,260	10,938
6. Earnings of Maori Farm Employees	618	288	872
7. <u>Total Income of Farm Employees</u>	7,493	5,548	11,810

Line 3 - Income of Farm Companies

This was calculated from the statistics of assessable income returned for income tax in the relevant years (Source: New Zealand Year Book). Tax data were not published for the year 1944/45 but 1945/46 data were adjusted by change in gross farm income between the two years.

It is by no means clear from the dates of some of the censuses to which farm income year the income figures refer. Considerable care was necessary in deciding on this question in view of the large annual fluctuations in gross farm income.

(i) The 1926 census was held on 20th April 1926, and income data were requested for the "previous 12 months". It was assumed that as far as farmers were concerned, this meant the farm year 1925/26.

(ii) The 1936 census was held on 24th March 1936 and income data were requested for the "year ended 31st December 1935 or the nearest year". It was assumed that as far as farmers were concerned this referred to the farm year 1934/35 for the following reasons.

(a) By no means all of the 1935/36 farm income would have been realised by 24th March 1936 and the nearest full year would have been the production year 1934/35.

(b) When compared with the 1926 census income figures and the farm expenditure figures derived from it, the 1936 census figure appears much more reasonable if assumed to refer to 1934/35 than to 1935/36 and similarly when the figure is compared with the 1938/39 official estimate of net farm income.

(iii) The 1945 census was held on 24th September 1945 and income data were requested for the "year ended 31st March 1945" or nearest 12 months". This quite clearly indicates that farm income refers to the production year 1944/45.

Notes on Table VIII
Estimate of Wage Payments

The information available for estimating the value of wage payments to hired labour, consists of:

- (a) The Official index of farm wage rates expressed in column (1) as index numbers for each separate period beginning and ending with a census year.
- (b) An estimate of the number of paid farm workers, calculated by deducting the number of persons in farm employment as given in Table IX. These figures are again expressed as index numbers for each between-census period in column (3).
- (c) The total wages bill derived as in Table VII from the censuses for the years 1925/26, 1934/35 and 1944/45. These census estimates are indicated in column 5 of this table.
- (d) The average earning per employee for the same years derived from the census estimates.
- (e) The Inter-Industry Sector Accounts for 1952/53, 1954/55 and 1959/60.
- (f) The Industrial Classification of Wage and Salary Payments derived from P.A.Y.E. returns, from 1958/59 to 1964/65.

For the intercensal year interpolations of total wages from 1921 to 1944, an attempt was first made using the index of wage rates (as an indicator of earnings per head) in conjunction with the index of paid workers. This was found to be unsatisfactory for the period 1925/26 - 1934/35 - 1944/45 for the reason that in the first part of this period earnings per head fell much more than the comparison of the wage rates index between the years would suggest; and in the second part earnings per head rose more.

It was found however that if the figure of earnings per head in 1934/35, expressed as a percentage of 1925/26, was multiplied by the index of paid farm workers in 1934/35, and the resulting product was applied as an

index to the 1925/26 census figure for total wages, viz. £7.493 mn., the result was very close to the actual census figure for 1934/35, viz. £5,548 mn; and the same applied for the period 1934/35 - 1944/45.

Accordingly the assumption was made that for that part of the 1925/26 - 1934/35 period during which wage rates fell, earnings fell proportionately greater, the proportion being based on the fall in earnings per head; and similarly for the period 1934/35 - 1944/45 when wage rates rose earnings rose proportionately faster than wage rates. On this assumption the index of wage rates was adjusted accordingly. Earnings per head appeared to keep pace with wage rates for the period 1925/26 back to 1920/21.

For the three periods, column 2 gives an index of earnings per head and this index is in each period based on the censal year beginning the period (except for the first period).

The index of total wages paid, column 4, is the product of the index of earnings per head and the index of paid workers. The intercensal estimates of total wages in column 5 were calculated by applying this total wages index to the census figure commencing the period.

For the period from 1944/45 to 1959/60, the industrial classification was used to establish the proportion of farm employees' wages in the wage payment shown in the sector accounts.

1952/53	:	£25,101	x	86.6%	=	£21,742
1954/55	:	£28,696	x	84.5%	=	£24,271
1959/60	:	£38,500	x	78.5%	=	£30,209

The falling percentage reflects the increasing amount of contracting services employed.

Earnings per head from 1944/45 were than derived in proportion to the wage index up to 1954/55 to get close agreement with these estimates. From 1954/55 to 1958/59 earnings per head apparently rose faster than wage rates, and the difference has been interpolated over these four years.

For the period from 1958/59 to 1964/65 the industrial classification of wage and salary payments was used directly.

TABLE VIII : ESTIMATE OF WAGE PAYMENTS

Year	(1) Index of Wage Rates	(2) Index of Earnings Per Head	(3) Index of Estimated Number of Paid Farm Workers	(4) Index of Total Wages Paid (2) x (3)	(5) Estimate of Total Wages Paid £000
			Changing Base Periods as Indicated		
1920/21	102.0	102.0	112.5	114.7	8600
1921/22	94.7	94.7	112.5	106.5	7980
1922/23	91.7	91.7	112.5	103.2	7733
1923/24	99.3	99.3	109.7	108.9	8160
1924/25	100.2	100.2	108.3	108.5	8130
1925/26	100.0	100.0	100.0	100.0	7493 Census
1925/26	100.0	100.0	100.0	100.0	7493 Census
1926/27	102.1	102.1	105.5	107.7	8086
1927/28	105.7	105.7	112.5	118.9	8927
1928/29	121.1	121.1	111.1	134.5	10098
1929/30	121.7	121.7	113.9	138.6	10406
1930/31	119.9	119.1	118.1	140.6	10556
1931/32	103.9	96.6	122.2	118.0	8860
1932/33	81.7	65.6	123.6	81.1	6089
1933/34	76.6	58.5	123.6	72.3	5428
1934/35	78.2	60.5	122.2	73.9	5548 Census
1934/35	100.0	100.0	100.0	100.0	5548 Census
1935/36	102.6	105.3	101.1	106.5	6210
1936/37	130.1	161.1	100.0	161.1	9394
1937/38	154.4	210.2	98.9	208.1	12134
1938/39	159.1	220.0	100.0	220.0	12829
1939/40	160.8	223.4	95.5	213.3	12438
1940/41	162.3	226.5	80.7	182.8	10659
1941/42	163.8	229.5	64.8	148.7	8671
1942/43	173.6	249.4	65.9	164.4	9586
1943/44	185.8	274.4	69.3	190.2	11090
1944/45	187.8	278.6	72.7	202.5	11810 Census
1944/45	100.0	100.0	100.0	100.0	11810
1945/46	113.6	113.6	108.7	123.5	14585
1946/47	125.6	125.6	103.9	130.5	15412
1947/48	131.9	131.9	100.9	133.1	15719
1948/49	146.6	146.6	98.5	144.4	17054
1949/50	154.3	154.3	96.4	148.7	17561
1950/51	167.7	167.7	93.9	157.5	18601
1951/52	191.4	191.4	91.0	174.2	20573
1952/53	206.8	206.8	90.0	186.1	21742
1953/54	214.5	214.5	88.6	190.0	22439
1954/55	229.5	229.5	88.2	202.4	24271
1955/56	234.7	246.2	87.8	216.2	25533
1956/57	234.7	257.8	86.5	223.0	26336
1957/58	244.4	280.4	84.7	237.5	28049
1958/59	244.1	292.2	83.4	243.7	28779
1959/60	245.4	315.8	81.0	255.8	30209
1960/61	254.0	343.7	78.7	270.5	31951
1961/62	256.8	369.8	76.9	284.4	33583
1962/63	257.3	378.4	75.1	284.2	33562
1963/64	257.7	411.7	73.2	301.4	35590
1964/65	265.7	455.9	71.5	326.0	38498

Notes on Table IX
Estimates of Farm Labour Force

Early years are based on the Census returns of 1926, 1936 and 1945, and the Agricultural and Pastoral Statistics for 1921, 1925, 1930, 1947 and 1948. Column (1) shows an extrapolated estimate of permanent men employed on holdings over 1 acre outside borough boundaries as set out in R. Freitag "Farm Labour in New Zealand", unpublished thesis, University of New Zealand.

Column 2 shows our estimate of all male and female labour engaged in agriculture.

1925/26 - 1944/45 is an extrapolated series drawn up by the Department of Labour based on adjusted census figures and Agricultural and Pastoral statistics in the Half Yearly Survey of Employment, January 1950.

1921/22 - 1924/25 is adjusted in proportion to column (1).

1945/46 - 1946/47 are based on 1947 Agricultural and Pastoral statistics estimate raised in proportion to 1945 census estimate.

1947/48 - 1949/50 "Primary industry" estimate in Labour and Employment Gazette corrected by proportion of "farming" to "primary industry" in 1951/52 to 1954/55. (89.5 per cent.)

1947/48 - 1964/65 The Labour and Employment Gazette figures are given for April and October of each year. To overcome the seasonal fluctuation between April and October, each October figure is weighted by the April figure on each side of it.

$$\begin{aligned} \text{i.e. } 1964/65 &= .25 \times \text{April } 1964 \\ &\quad .50 \times \text{October } 1964 \\ &\quad .25 \times \text{April } 1965 \end{aligned}$$

Column (3) is our estimate of the number of paid workers in the total labour force. The number of farm occupiers is calculated from the Census returns where they are shown as employers or "on own account". From 1957 to 1965 the number of farm occupiers was obtained by extrapolating the existing trend from 1952 to 1957. Paid workers are then obtained by difference from column (2).

TABLE IX : ESTIMATES OF FARM LABOUR FORCE

Year	(1) Permanent Males on Holdings 1 ac. and over Outside Boroughs. '000 Persons	(2) All Farm Labour Males and Females including Casuals, on all Holdings	(3) Paid Farm Workers
1921/22	101.8*	146	84.4
1922/23	108.0	146	84.4
1923/24	106.0	144	82.3
1924/25	105.3*	143	81.3
1925/26	101.1	137 (Census)	75.0
1926/27	100.6	142	79.2
1927/28	104.9	148	84.4
1928/29	111.2	148	83.4
1929/30	117.6	151	85.4
1930/31	119.0	155	88.6
1931/32	123.0	159	91.7
1932/33	125.0	161	92.7
1933/34	126.0	162	92.7
1934/35	126.0	163	91.7
1935/36	125.0	163 (Census)	92.7
1936/37	123.0	161	91.7
1937/38	121.0	159	90.7
1938/39	119.0	157	91.7
1939/40	117.0	154	87.6
1940/41	102.0	140	74.0
1941/42	87.0	125	59.4
1942/43	87.0	125	60.5
1943/44	89.0	127	62.6
1944/45	92.0	130 (Census)	66.7
1945/46	108.0*	137	72.5
1946/47	112.9*	135	69.3
1947/48	109.4*	134.2	67.3
1948/49	109.2*	133.7	65.7
1949/50	110.3	133.5	64.3
1950/51	111.4	133.0	62.6
1951/52	112.5	132.3	60.7
1952/53	113.6	131.6	60.0
1953/54	115.5	130.7	59.1
1954/55	116.7	130.4	58.8
1955/56		130.2	58.6
1956/57		129.3	57.7
1957/58		128.1	56.5
1958/59		127.2	55.6
1959/60		125.6	54.0
1960/61		124.1	52.5
1961/62		122.9	51.3
1962/63		121.7	50.1
1963/64		120.4	48.8
1964/65		119.3	47.7
1965/66		118.8	

* Agricultural and Pastoral Statistics

Notes on Table X
Estimate of Interest Paid

- Column (1) Estimated Mortgage Debt on Rural Land -
Source: New Zealand Year Books up to and including 1944, since when the figures have not been published. From 1945 - 1965 the series has been brought up-to-date by adding the Year Book statistics of registrations of rural mortgages and deducting the statistics of rural mortgages discharged.
- Column (2) Interest on Mortgages - It is not possible to calculate the average interest rate on the total mortgage debt each year as this would involve a knowledge of the average rate of interest on mortgages discharged each year which information is not available. An arbitrary rate of interest had therefore to be used. For the period 1921/1932 the rate used was 6.5 per cent, which was the average rate on new mortgages for the period. For the period 1933 - 1965 the rate used was 5.0 per cent. In 1933, rates on all mortgages were reduced by 20 per cent under the terms of the National Expenditure Adjustment Act.
- Column (3) Interest on Bank and Stock and Station Agency Advances to Farmers - For the years 1936-1965 the figures of trading bank advances to farmers and to stock and station agencies (as at 30 June) are published in the New Zealand Year Book. It was assumed that bank advances to stock and station agents were all made on behalf of farmers. The advances as at 30 June of each year were taken as referring to the season commencing at that date. For the period 1921/22 - 1935/36 the level of bank and stock and station advances was calculated by assuming it to bear the same relation to total farm expenses (excluding depreciation interest and "other expenses") as these advances did on the average in the period 1936/37 - 1940/41.
- The interest rate used was $\frac{1}{2}$ per cent greater than the minimum trading bank overdraft rate each year.

TABLE X : ESTIMATE OF INTEREST PAID

Year	(1) Estimated Mortgage Debt. on Rural Land	(2) Estimated Interest on Mortgages	(3) Interest on Bank and Stock and Station Advances	(4) Estimate of Total Interest Paid
	£mn	£000	£000	£000
1921/22	98	6400	955	7355
1922/23	105	6825	927	7752
1923/24	110	7150	904	8054
1924/25	115	7475	926	8401
1925/26	120	7800	895	8695
1926/27	120	7800	970	8770
1927/28	122	7930	1104	9034
1928/29	125	8125	1092	9217
1929/30	130	8450	1153	9603
1930/31	133	8645	1179	9824
1931/32	135	8775	970	9745
1932/33	135	8775	783	9558
1933/34	135	6750	662	7412
1934/35	135	6750	666	7416
1935/36	135	6750	646	7396
1936/37	130	6500	921	7421
1937/38	130	6500	873	7373
1938/39	125	6250	1003	7253
1939/40	125	6250	1004	7254
1940/41	125	6250	892	7142
1941/42	125	6250	795	7045
1942/43	120	6000	794	6794
1943/44	115	5750	790	6540
1944/45	113	5625	821	6446
1945/46	110	5500	886	6386
1946/47	113	5650	902	6552
1947/48	116	5800	914	6714
1948/49	121	6050	931	6981
1949/50	126	6300	898	7198
1950/51	127	6350	853	7203
1951/52	136	6800	927	7727
1952/53	152	7600	1172	8772
1953/54	164	8200	1066	9266
1954/55	179	8950	1184	10134
1955/56	199	9950	1367	11317
1956/57	218	10900	1436	12335
1957/58	239	11950	1284	13234
1958/59	260	13000	1657	14157
1959/60	284	14200	1651	15851
1960/61	312	15600	1557	17157
1961/62	349	17450	2695	20145
1962/63	378	18900	1929	20829
1963/64	408	20400	1707	22107
1964/65	454	22700	1913	24613

Notes on Table XI
Estimate of Rent Paid

- Column (1) Area of Private Leasehold Land -
Source: New Zealand Year Book.
- Column (2) Unimproved Value of Private Leasehold Land - Estimated at £6 per acre which was the Government unimproved value per acre for all North Island rural land for most of the period 1920 - 1952. From 1952 unimproved values tended to rise and so for the years 1953 - 1965 the average unimproved value per acre for all North Island rural land was used.
- Column (3) Estimated Rental on Private Leasehold Land. Calculated as 6.5 per cent of Unimproved Value.
- Column (4) Rentals Paid on Crown Land -
Source: New Zealand Year Book.

TABLE XI : ESTIMATE OF RENT PAID

Year	(1) Area of Private Leasehold Land 000 acres	(2) Estimated Unimproved Value £mn	(3) Estimated Rental on Private Leasehold Land £000	(4) Rentals Paid on Crown Land £000	(5) Total Rent Paid £000
1921/22	4398	26388	1715	1126	2841
1922/23	4261	25566	1662	1133	2795
1923/24	4284	25704	1670	1153	2823
1924/25	4220	25320	1646	1121	2767
1925/26	4148	24888	1618	1126	2744
1926/27	4131	24786	1611	1123	2734
1927/28	4130	24780	1611	1078	2689
1928/29	4128	24768	1610	1071	2681
1929/30	4132	24792	1611	1077	2688
1930/31	4358	26148	1307	1092	2399
1931/32	4335	26010	1300	1093	2393
1932/33	3704	22224	1111	1092	2203
1933/34	3976	23856	1193	1088	2281
1934/35	4055	24330	1216	1086	2302
1935/36	4137	24822	1241	1082	2323
1936/37	4171	25026	1251	1051	2302
1937/38	4184	25104	1255	1035	2290
1938/39	4407	26442	1322	958	2280
1939/40	4508	27048	1352	925	2277
1940/41	4500	27000	1350	880	2230
1941/42	4563	27378	1369	864	2233
1942/43	4543	27258	1363	857	2220
1943/44	4523	27138	1357	850	2207
1944/45	4503	27018	1351	849	2200
1945/46	4483	26898	1345	848	2193
1946/47	4461	26766	1338	847	2185
1947/48	3835	23010	1151	847	1998
1948/49	3606	21636	1082	887	1969
1949/50	3739	22434	1122	927	2049
1950/51	3500	21000	1050	915	1965
1951/52	3353	20118	1006	883	1889
1952/53	3176	22768	1476	889	2365
1953/54	2879	22687	1475	922	2397
1954/55	2879	25450	1654	955	2609
1955/56	2918	28334	1842	988	2830
1956/57	2958	30527	1984	1036	3020
1957/58	2787	30434	1978	1063	3041
1958/59	3107	35793	2327	1082	3409
1959/60	3427	40610	2640	1114	3754
1960/61	3400 ⁽¹⁾	43350	2818	1148	3966
1961/62	3400 ⁽¹⁾	45220	2939	1150	4089
1962/63	3400 ⁽¹⁾	45220	2939	1197	4136
1963/64	3400 ⁽¹⁾	52428	3408	1223	4631
1964/65	3400 ⁽¹⁾	51952	3377	1293	4670

(1) These years not available so assumed constant.

Notes on Table XII
Gross Farm Income

1921/22 - 1927/28

In this period the official estimate of value of farm production includes primary processing industries. Therefore the ratio of gross farm income to value of farm production in the period 1928/29 - 1934/35 (79.4%) was used to convert the existing series of value of farm production to gross farm income. Source of data 1938 Official Year Book.

1928/29 - 1937/38

1951-52 Official Year Book.

1938/39 - 1946/47

1959 Official Year Book.

1947/48 - 1961/62

1965 Official Year Book.

1962/63 - 1964/65

1966 Official Year Book.

Since 1947/48, the official series of gross farm income has been estimated on a narrower definition of products. First published 1963.

Due to rounding errors, the sum of the component series differs slightly from the total.

TABLE XII : GROSS FARM INCOME

Year	(1) Agricultural Produce		(2) Pastoral Produce		(3) Dairy Produce		(4) Total Farm Produce	
1921/22	.	.	.	.	.	.	.	47.7
1922/23	.	.	.	.	.	.	.	51.4
1923/24	.	.	.	.	.	.	.	51.5
1924/25	.	.	.	.	.	.	.	62.2
1925/26	.	.	.	.	.	.	.	52.8
1926/27	.	.	.	.	.	.	.	52.6
1927/28	.	.	.	.	.	.	.	60.4
1928/29	7.3	.	35.8	.	25.5	.	.	68.6
1929/30	7.4	.	29.4	.	24.4	.	.	61.2
1930/31	6.7	.	18.9	.	17.9	.	.	43.5
1931/32	6.5	.	14.0	.	17.4	.	.	37.9
1932/33	6.9	.	14.6	.	16.5	.	.	38.0
1933/34	7.0	.	24.8	.	17.8	.	.	49.6
1934/35	6.0	.	22.3	.	18.3	.	.	46.6
1935/36	7.4	.	27.7	.	23.9	.	.	59.0
1936/37	7.2	.	39.5	.	27.9	.	.	74.6
1937/38	7.3	.	34.0	.	29.8	.	.	71.1
1938/39	8.3	.	30.9	.	31.0	.	.	70.1
1939/40	9.6	.	31.4	.	34.0	.	.	75.0
1940/41	10.3	.	37.7	.	36.8	.	.	84.8
1941/42	11.4	.	37.1	.	35.3	.	.	83.8
1942/43	13.3	.	37.3	.	34.2	.	.	84.8
1943/44	14.4	.	38.8	.	33.6	.	.	86.7
1944/45	16.4	.	45.9	.	40.3	.	.	102.6
1945/46	15.9	.	43.5	.	36.7	.	.	96.1
1946/47	15.9	.	50.8	.	44.6	.	.	111.3
	Grain + Field Crops	Hort. Poultry Bees	Wool	Lamb & Mutton	Beef	Dairy	Pigs	All Farm Produce
1947/48	9.7	12.9	27.7	26.2	7.1	48.7	2.9	135.7
1948/49	11.3	13.6	29.1	27.7	7.0	54.7	3.3	146.7
1949/50	11.6	14.9	46.9	34.3	9.0	62.9	3.5	183.1
1950/51	12.5	15.0	113.6	65.7	12.1	68.2	4.2	291.3
1951/52	11.3	19.5	54.4	38.8	13.5	76.1	4.7	218.3
1952/53	11.9	20.3	64.0	46.8	22.3	90.0	5.9	261.2
1953/54	16.2	19.4	71.2	52.4	18.1	89.3	5.7	272.3
1954/55	15.9	20.7	75.8	56.0	22.4	84.5	5.6	280.9
1955/56	16.1	20.8	71.5	55.8	18.4	88.5	6.2	277.3
1956/57	14.8	22.5	91.5	62.0	20.9	89.6	5.7	307.0
1957/58	14.8	22.6	68.9	58.9	31.5	93.8	5.9	296.4
1958/59	15.9	21.8	65.2	53.0	33.7	86.4	6.1	282.1
1959/60	19.6	23.5	84.7	49.6	34.0	93.7	6.6	311.7
1960/61	21.1	25.2	79.1	54.6	21.1	92.3	7.1	306.9
1961/62	21.1	27.9	76.9	46.3	29.8	87.9	7.5	297.4
1962/63	21.7	28.5	90.2	53.9	34.4	90.3	8.0	327.0
1963/64*	25.0	31.2	115.1	65.6	37.2	99.1	8.5	381.8
1964/65	23.8	34.0	86.4	80.9	40.5	108.5	8.3	382.5

* Provisional

Notes on Table XIII
Index Numbers of Volume of Farm Production

- (a) From 1928/29 to 1945/47 these index numbers are the Official Volume of Farm Production figures re-calculated on base 1949/50 = 100.
- (b) The index was calculated back to 1921/22 in the following way:
- (1) Agricultural Produce: The Official figures of value of agricultural production were deflated by the export price index for agricultural products and the index then spliced to the Official volume series.
 - (2) Pastoral Produce: Value aggregates, at 1949/50 prices, were constructed for the following items -
 - Number of Lambs slaughtered
 - Number of Sheep slaughtered
 - Number of Pigs slaughtered
 - Quantity of greasy wool produced
 - Changes in livestock numbers.
 An index based on this value aggregate was then linked to the official series.
 Statistics for these items are all given in the New Zealand Year Book.
 - (3) Dairy Produce: The quantity of butterfat produced was linked as an index number to the Official series of Volume of Dairy Production.
 - (4) All Farm Production: The three series were combined by weighting in same proportion as the Official Series for the years in (a).
- (c) Figures from 1947/48 - 1964/65 are those of the new series in the N.Z. Official Year Book which give a greater breakdown of the agricultural industry.
- Sources: 1928/29-1937/38 Official Year Book for 1952/53
 1938/39-1946/47 Official Year Book for 1959
 1947/48-1948/49 Official Year Book for 1963
 1949/50-1964/65 Official Year Book for 1966

TABLE XIII : INDEX NUMBERS OF VOLUME OF FARM PRODUCTION

Year	(1)	(2)	(3)	(4)				
	Agricultural Produce	Pastoral Produce	Dairy Produce	All Farm Products				
	Index Numbers 1949/50=100							
1921/22	71.5	50.2	42.3	50.3				
1922/23	60.7	50.9	48.0	51.3				
1923/24	54.8	53.0	48.6	52.5				
1924/25	59.4	54.5	51.3	54.1				
1925/26	60.6	52.2	49.8	52.5				
1926/27	64.0	53.0	55.0	55.5				
1927/28	71.7	62.3	56.2	61.4				
1928/29	71.3	64.2	61.5	63.7				
1929/30	70.0	67.5	66.7	66.9				
1930/31	75.3	64.2	68.4	67.7				
1931/32	70.0	64.2	70.9	67.7				
1932/33	90.7	70.0	82.1	77.4				
1933/34	79.3	74.0	87.2	79.8				
1934/35	69.3	73.2	84.6	77.4				
1935/36	82.0	75.6	88.9	81.5				
1936/37	74.0	78.9	93.2	83.9				
1937/38	70.7	82.1	89.7	83.9				
1938/39	66.7	81.3	85.5	81.3				
1939/40	79.3	79.7	91.5	84.6				
1940/41	84.0	90.2	98.3	93.5				
1941/42	85.3	89.4	93.2	90.2				
1942/43	92.7	85.4	87.2	87.0				
1943/44	98.7	86.2	82.1	86.2				
1944/45	106.7	91.9	89.7	93.5				
1945/46	94.7	91.1	78.6	87.0				
1946/47	101.3	89.4	87.2	90.2				
	Grain + Field Crops	Hort. Poultry Bees	Wool	Lamb & Mutton	Beef	Dairy	Pigs	All Farm Produce
1947/48	99	99	93	96	102	86	93	91.9
1948/49	106	97	95	95	91	93	99	95.1
1949/50	100	100	100	100	100	100	100	100.0
1950/51	107	94	101	103	107	102	113	102.4
1951/52	96	99	107	102	112	102	103	102.4
1952/53	91	98	109	101	129	111	117	107.2
1953/54	102	102	112	111	114	106	113	107.2
1954/55	94	102	121	112	140	104	120	109.6
1955/56	84	108	123	118	135	107	116	112.1
1956/57	105	107	133	116	136	107	104	113.7
1957/58	101	106	134	131	159	116	115	121.8
1958/59	104	108	146	144	159	115	140	126.6
1959/60	126	110	152	147	163	112	123	128.2
1960/61	139	112	158	154	155	117	123	133.9
1961/62	126	127	159	162	177	115	128	136.3
1962/63	151	143	170	164	187	118	147	143.5
1963/64*	167	159	167	170	176	122	148	148.4
1964/65	157	166	169	170	188	130	137	152.4

* Provisional

Notes on Table XIV
Price of Farm Inputs

Three separate price indices are derived for deflation purposes:

(a) An overall input index weighted according to the quantities of inputs used in 1948/49 and 1949/50.

(b) An "other inputs" index weighted according to expected breakdown of such inputs in 1949/50.

(c) An improvements index weighted according to budget data on value of improvements in 1949/50.

The basic price series which enter the weighted indices were as follows:

1. Farm Requisites

Non-food component of the wholesale price index.

2. Fertiliser

Weighted average of indices of prices of locally produced and imported fertiliser - weights in proportion to the value of fertilisers produced and imported in 1949/50 and in 1949. Prices of imported fertilisers computed from unit values weighted by 1949/50 quantities. Prices of locally produced fertilisers 1920-31 from New Zealand Fertiliser Manufacturers' Association, 1931/32 - 1955/56 from unit value of production.

3. Lime

From 1921/22 - 1939/40 based on non-metallic minerals component of Wholesale price index. 1940/41 - 1964/65 based on average value per ton produced ex factory.

4. Seeds

From 1921/22 - 1947/48 based on index of price of agricultural output in Table IV. 1948/49 - 1964/65 based on index of price of grain and field crop output derived from Table XII.

5. Fuel, Oil and Grease
Mineral oil component of Wholesale price index.
6. Electricity and Power
Fuel and light component of Retail price index.
7. Repairs and Maintenance in Buildings
Weighted average of wholesale price of building materials and building wage rates.
8. Repairs and Maintenance on Fences
Weighted average of price of imported fencing wire, building materials and farm wage rates.
9. Repairs and Maintenance on Plant and Machinery
Weighted average of index of price of imported plant and machinery and index of engineering wage rates.
10. Railage and Cartage
Unweighted average of index of unit value of rail freights collected per ton mile, wholesale index of mineral oils and index of transport wage rates.
11. Depreciation on Buildings
As for repairs and maintenance on buildings.
12. Depreciation on Plant and Machinery
For 1921/22 - 1944/45 based on 1949/50 imports of machinery valued at landed price in each year.
For 1945/46 - 1964/65 based on ratio of money value of investment in machinery and tractors to real value in 1949/50 prices.
13. Other Inputs
Weighted combination of other price series as set out below.

14. Wages

Official index of farm wage rates.

The weights of the overall input index are based on an average of expenditure patterns in 1948/49 and 1949/50 in Table I and include all non-factor expenses plus wages. Other inputs were weighted according to the proportions of expenditure in 1949/50 on farm requisites, repairs and maintenance on buildings and plant, freight and one third of paid wages. The improvements index is based on weights derived from sheep farm and dairy farm budgets showing the proportions of the value of improvements represented by buildings, fencing and grassing.

	<u>All Inputs</u>	<u>Other</u>	<u>Improvements</u>
Farm requisites	41	159	
Fertiliser	72		100
Lime	12		
Seeds	3		
Fuel & Oil	53		50
Elec. & Power	14		
R. & M. Buildings	31	114	500
R. & M. Fences	35	129	150
R. & M. Plant	53	204	50
Freight	34	127	
Depreciation, Bldgs.	38		
Depreciation, Plant	52		
Other Inputs	348		
Wages	<u>215</u>	<u>266</u>	<u>150</u>
	<u>1000</u>	<u>1000</u>	<u>1000</u>

TABLE XIV : PRICE OF FARM INPUTS
(1949/50 = 100)

June Years	Farm Requisites	Fertiliser	Lime	Seeds	Fuel	Power	Building	Fences	Plant	Freight	Machinery	Wages	Other	Total
1921/22	82.9	99.2	110.9	57.6	149.6	90.3	65.4	61.0	57.3	98.7	39.7	41.3	63.7	67.29
1922/23	68.4	86.1	96.5	57.8	113.9	83.4	59.9	48.6	55.4	86.5	37.9	40.0	56.9	59.55
1923/24	61.1	76.6	85.9	56.2	85.1	79.7	57.4	44.6	53.3	75.6	37.9	43.3	54.0	55.78
1924/25	60.0	84.0	83.6	59.1	80.2	78.6	57.5	48.4	54.1	74.4	40.4	43.7	54.4	56.47
1925/26	60.0	81.2	81.3	60.1	78.6	79.3	57.4	45.7	55.1	74.1	40.4	43.6	54.2	56.02
1926/27	56.6	70.8	79.1	59.7	69.9	80.0	57.3	44.3	55.9	71.9	42.5	44.5	53.6	54.66
1927/28	54.2	67.7	78.4	58.0	74.4	80.2	56.7	44.8	57.4	73.4	42.7	46.0	54.1	55.18
1928/29	53.0	64.8	77.9	60.2	59.6	80.7	55.6	46.1	56.8	68.6	40.7	52.8	55.1	55.64
1929/30	53.5	63.4	77.5	56.4	62.7	79.4	55.5	45.9	56.3	68.6	38.9	53.1	55.1	55.62
1930/31	53.7	62.9	76.2	50.7	62.6	79.1	55.7	45.6	56.0	68.7	37.8	52.3	54.8	55.21
1931/32	54.0	57.7	75.6	49.6	61.3	78.8	53.5	41.5	56.0	67.8	46.1	45.3	52.1	52.42
1932/33	52.9	54.3	75.8	42.6	65.2	76.5	50.8	38.3	53.1	69.1	44.9	35.6	48.2	48.37
1933/34	54.2	54.7	78.2	47.5	70.5	71.0	51.9	41.3	49.2	70.1	38.5	33.4	47.7	47.73
1934/35	53.5	52.9	77.8	49.5	66.7	67.1	52.0	41.1	50.5	68.3	43.1	34.1	47.8	47.75
1935/36	54.0	51.6	76.7	48.7	68.1	69.0	52.5	41.8	51.4	68.8	43.9	35.0	48.5	48.36
1936/37	54.9	50.7	75.7	51.6	69.9	70.8	55.2	45.5	56.5	70.6	48.0	44.9	53.3	53.11
1937/38	60.0	50.7	78.4	52.8	72.8	73.8	60.9	53.6	62.4	72.6	57.4	53.3	59.5	59.06
1938/39	61.1	49.5	79.2	59.8	69.4	76.9	64.5	56.6	67.1	72.8	62.1	54.9	61.9	60.92
1939/40	62.2	50.0	79.6	58.3	74.4	79.1	64.3	56.1	68.7	76.5	63.2	55.5	62.9	62.01
1940/41	70.6	51.8	83.1	58.9	90.1	80.2	69.6	63.3	69.4	82.0	61.8	56.0	66.8	65.60
1941/42	62.2	56.6	88.7	64.2	74.4	80.8	75.4	68.7	72.7	77.9	68.0	56.5	67.1	66.02
1942/43	79.4	58.1	93.5	68.9	97.2	81.5	79.3	69.3	77.0	86.5	76.6	59.9	73.2	72.17
1943/44	84.4	63.5	96.1	70.1	96.8	82.4	83.2	71.8	77.4	86.9	75.7	64.1	76.0	75.06
1944/45	85.8	61.1	89.4	73.9	97.1	82.8	84.5	71.7	77.4	87.4	75.4	64.8	76.6	75.35
1945/46	87.2	55.9	89.9	80.0	96.4	83.3	90.0	78.6	80.6	88.9	72.3	73.6	81.3	79.18
1946/47	87.0	55.0	87.9	74.3	91.4	84.4	90.7	93.1	85.5	87.9	83.8	81.4	86.4	83.69
1947/48	89.2	89.6	91.2	84.6	96.0	87.3	90.6	91.4	88.6	92.7	86.7	85.5	88.9	88.78
1948/49	100.8	110.7	107.1	92.0	101.9	95.0	96.4	101.1	95.3	99.2	96.9	95.0	97.4	98.25
1949/50	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.00
1950/51	107.9	101.4	100.5	100.5	105.4	111.6	107.2	110.5	108.4	110.2	108.3	108.7	108.6	107.80
1951/52	128.1	129.7	105.6	101.7	119.3	121.4	122.1	141.9	123.6	123.8	124.9	124.0	126.5	125.35
1952/53	144.8	119.9	107.8	113.1	119.9	125.0	133.0	151.1	131.4	131.2	139.9	134.9	137.0	133.98
1953/54	144.6	111.4	111.2	136.5	125.1	134.3	137.5	128.9	136.4	139.7	130.7	139.0	137.8	134.66
1954/55	143.0	108.3	113.4	146.9	119.9	145.5	141.4	136.6	147.1	145.2	140.9	148.7	144.5	140.55
1955/56	146.2	109.4	115.8	165.4	119.9	148.1	145.6	142.9	151.9	147.7	145.5	152.1	148.4	144.06
1956/57	151.8	113.4	116.3	122.7	123.9	150.3	149.4	146.2	161.2	151.9	155.2	152.1	152.6	147.66
1957/58	158.5	115.1	121.8	127.4	130.2	154.3	156.1	149.1	164.4	158.5	162.5	158.4	158.0	153.10
1958/59	162.0	115.3	127.7	132.7	142.7	163.5	157.7	151.4	165.2	162.8	159.8	158.2	159.7	154.92
1959/60	161.4	114.7	127.7	133.6	148.1	167.2	161.2	153.7	168.4	167.9	164.4	159.0	161.8	156.99
1960/61	159.7	109.4	128.2	131.5	140.8	167.1	166.3	159.7	175.3	169.5	166.8	164.6	166.0	159.92
1961/62	163.9	105.1	131.6	144.6	139.8	167.8	169.2	165.0	178.2	171.3	169.6	166.4	169.0	162.00
1962/63	162.5	113.7	132.2	124.0	144.6	174.3	172.7	159.5	186.0	171.6	179.8	166.7	170.8	164.54
1963/64	160.2	113.1	133.6	129.2	144.0	179.8	175.6	158.6	190.6	172.5	184.9	167.0	171.1	165.36
1964/65	161.8	108.6	132.4	130.8	145.1	182.6	181.4	166.4	194.3	175.7	180.1	172.2	175.6	168.60

Notes on Table XV
Value of Livestock (at constant prices)

Cattle, sheep and pig numbers are from the Official Year Book. Prior to 1959 returns were collected from all holdings greater than 1 acre outside borough boundaries. Since 1959, returns are collected from holdings greater than 10 acres. Constant values adopted for the estimates are:

Sheep	£ 2. 10. 0	per head
Cattle	£15. 0. 0	per head
Pigs	£ 3. 0. 0	per head

TABLE XV : VALUE OF LIVESTOCK (AT CONSTANT PRICES)

Year	Sheep at middle of year shown	Cattle at 31st Jan. following year shown	Pigs at 31st Jan. following year shown	Total Real Value of Livestock for Season Commencing year shown
£000 (in 1949/50 Prices)				
1921	58213	49848	1153	109214
1922	55556	52210	1203	108969
1923	57704	53452	1243	112399
1924	59439	52556	1320	113315
1925	61370	51787	1418	114575
1926	62262	48866	1560	112688
1927	64122	49107	1761	114990
1928	67834	51687	1670	121191
1929	72628	56553	1463	130644
1930	77103	60653	1406	139162
1931	74481	60531	1517	136529
1932	71729	62326	1752	135807
1933	69390	63962	1958	135310
1934	71623	63848	2265	137736
1935	72692	63257	2402	138351
1936	75284	65282	2384	142950
1937	78264	67037	2245	147547
1938	80947	67920	2027	150894
1939	79743	67426	2119	149288
1940	77657	68084	2285	148026
1941	79379	69071	2043	150493
1942	80586	66713	1814	149113
1943	81793	66589	1720	150102
1944	83001	68864	1781	153646
1945	84937	70002	1648	156587
1946	83321	69507	1638	154466
1947	81704	70744	1644	154092
1948	81208	70842	1634	153684
1949	82112	74232	1666	158010
1950	84641	75900	1693	162234
1951	86965	77470	1697	166132
1952	88211	81689	1883	171783
1953	90482	86173	1947	178602
1954	95027	88302	2044	185373
1955	97793	90000	2100	189893
1956	100639	87129	1807	189575
1957	105955	88284	1883	196122
1958	115065	89600	2075	206740
1959	117191	89879	1981	209051
1960	117834	96687	1966	216487
1961	121156	98969	2057	222182
1962	122470	100365	2298	225133
1963	125476	100443	2315	228234
1964	128230	102020	2148	232398
1965	134370			

Notes on Table XVI
Value of Plant and Machinery at Depreciated
1949/50 Costs

1921-1945

Column (1) Real Gross Investment in Plant and Machinery

This series, except for farm trucks, is the sum of imports and local production of farm plant, machinery and tractors.

- (a) Imports (excluding parts) are from the official trade statistics and refer to the previous year of the March year shown.
- (b) New Zealand Production, for the March year shown, is from the "Official Reports on New Zealand Industrial Production Statistics".
Production of tractors is excluded on the grounds that component parts are already included in the import figures.
To the total of imports and local production an arbitrary margin of $33\frac{1}{3}$ per cent was added to cover distribution costs. The money figures were then converted into real terms by deflating with an index of imported machinery prices derived from import statistics.
- (c) Gross real investment in farm trucks was calculated by taking one third of the annual total registrations of trucks and valuing this quantity at 1949/50 prices. The proportion of one third is derived from the 1950 Census of Agriculture and in the absence of any other information the marginal proportion of farm trucks to total trucks registered was assumed to be the same as the average 1950 proportion.

Column (2) Real Depreciated Value of Plant and Machinery

The starting point for this series was the 1950 Census of New Zealand Agriculture. All items in the inventory of plant and machinery given in this census were valued at 1949/50 prices and two thirds of this

total taken to give the estimated depreciated replacement value in 1950. From this point the figure for the preceding years was calculated from a formula derived as follows:

Let C_t = depreciated capital value of plant
in year t

I = gross real investment

d = rate of depreciation

$$\text{Then } C_t = C_{t-1}(1 - d) + I$$

$$\text{and } C_{t-1} = \frac{C_t - I}{(1 - d)}$$

Given C_t for 1950 (i.e. £51,881,000) and given d , the figure for 1949 (C_{t-1}) can be derived and so for each preceding year by repeating the process. Figures after 1950 were obtained by transposing this formula to make C_t the subject.

The figure used for the depreciation rate was derived as follows: Using the 1950 Census inventory of equipment an average depreciation rate for all items of 9 per cent was struck. For 1930 when a similar inventory is available an average rate of 6.8 per cent was calculated. It was then assumed that between 1930 and 1950 the rate rose by equal arithmetical amounts each year from 6.8 per cent to 9.0 per cent and was interpolated accordingly.

1946-1965

This series is the sum of imports and local production of farm plant and tractors. Calendar year imports (June years after 1961/62) were converted to March years by use of the M.A.S. and then converted from C.D.V. to C.I.F. by the addition of 7½ per cent. Duty payable assessed in accordance with information supplied by the Customs Department. Local Production Statistics were obtained from Industrial Production Statistics. Retail values were then assessed on the following basis:

Imported Machinery	- Landed Cost	+ 40%
Imported Tractors (assembled)	- Landed Cost	+ 33 ¹ / ₃ %
Locally produced machinery	- Factory Cost	+ 33 ¹ / ₃ %
Locally assembled Tractors	- Factory Cost	+ 33 ¹ / ₃ %

These distributive margins were assessed in accordance with information supplied by Price Control Division.

Column (2)

Real depreciation of plant and machinery excluding Trucks was calculated as before.

Column (3)

Real depreciated value of farm Trucks: The number of farm trucks was assessed by linear interpolation between the figures given for farm trucks in 1950, 1960 and 1966. The 1950 figure is from the Census of Agricultural Production 1949/50 while the 1960 and 1966 figures are from the Report on Farm Production Statistics for 1961/62 and 1965/66. The real depreciated unit value of farm trucks in 1949/50 prices was assessed at £285.

TABLE XVI : VALUE OF PLANT AND MACHINERY AT DEPRECIATED 1949/50 COSTS

Year Ended 31st March	(1)	(2)
	Real Gross Annual Investment in Plant & Machinery 1949/50 Prices	Real Depreciated Value of Plant and Machinery at 1st January at 1949/50 Prices
	£000	£000
1921	2905	12539
1922	1946	14680
1923	2913	15716
1924	3596	17639
1925	3532	20107
1926	3100	22312
1927	2086	23918
1928	2369	24378
1929	3614	25065
1930	2761	26925
1931	1351	27775
1932	1870	27127
1933	2430	27017
1934	2342	27448
1935	3415	27732
1936	4753	29040
1937	4598	31557
1938	4280	33694
1939	3093	35313
1940	3329	35581
1941	2880	36028
1942	1334	35924
1943	3581	34304
1944	5643	35004
1945	5108	37672

	Plant and Machinery		Trucks:	Total
	Gross Investment during Year Shown	Real Depreciated Value at 31 Jany. Year shown £000	Real Value 31 Jany. Year Shown	
	(1)	(2)	(3)	(4)
1946	2940	38264	6914	45178
1947	3685	37952	6997	44949
1948	4472	38373	7079	45452
1949	4855	39507	7162	46669
1950	7121	40663	7244	47907
1951	8290	44165	7327	51492
1952	9297	48480	7409	55889
1953	8372	53365	7492	60857
1954	9064	56827	7574	64401
1955	9010	60606	7657	68263
1956	7451	63919	7739	71658
1957	7120	65298	7822	73120
1958	7694	66149	7904	74053
1959	5537	67427	7987	75414
1960	5205	66356	8069	74425
1961	7325	64992	8162	73154
1962	6729	65818	8134	73952
1963	6533	65899	8105	74004
1964	7602	65710	8077	73787
1965	7257	66544	8048	74592

Notes on Table XVII
Real Value of Improvements

The following procedure was adopted:

1. The valuation of improvements in each county was extracted from the Local Authorities Handbook at the year of re-valuation.
2. The valuation for each county at each re-valuation date was converted to real terms by the index of improvement prices described in the notes to Table XIV.
3. The valuations for years between re-valuations for each county were interpolated on a linear basis.
4. The county estimates were then added up to give the yearly totals of real value of improvements shown in Column (1).

This procedure thus spreads the effect of re-valuation evenly over the years between valuations, and produces a series which replaces the official series previously adopted. The official statistics of county valuations only incorporate new valuations as they take place. In the above procedure the most recent extrapolation is based on the previous between-valuation rate of increase.

Column (2) shows the index of improvement prices, and Column (3) the value of improvements at current prices, calculated from columns (1) and (2).

TABLE XVII: REAL VALUE OF IMPROVEMENTS

Year	Deflated Value of Improvements in 1949/50 prices fmn.	Index of Cost of Improvements	Value of Improve- ments at Current Prices £000
1920/21	171968	61.8	106300
1921/22	178825	64.2	114800
1922/23	185428	64.1	118900
1923/24	191928	64.8	124400
1924/25	198626	64.6	128300
1925/26	208663	60.7	126700
1926/27	218684	59.2	129500
1927/28	228295	58.5	133600
1928/29	237227	57.6	136600
1929/30	244978	56.9	139400
1930/31	249837	56.7	141700
1931/32	258254	55.6	143600
1932/33	263352	53.9	141900
1933/34	267766	52.6	140800
1934/35	271886	51.2	139200
1935/36	275650	50.9	140300
1936/37	279066	52.2	145700
1937/38	281868	54.6	153900
1938/39	283620	57.8	163900
1939/40	285176	61.0	174000
1940/41	285867	64.8	185200
1941/42	289621	67.9	196700
1942/43	292650	71.2	208400
1943/44	295684	75.2	222400
1944/45	298724	77.7	232100
1945/46	301753	80.5	242900
1946/47	305323	84.7	258600
1947/48	309995	88.6	274700
1948/49	317917	94.6	300700
1949/50	333037	100.0	333037
1950/51	354337	105.5	373800
1951/52	382026	114.9	438900
1952/53	405896	126.3	512600
1953/54	439152	134.2	589300
1954/55	467441	141.6	661900
1955/56	492736	143.9	709000
1956/57	513044	145.5	746500
1957/58	533149	150.3	801300
1958/59	546470*	154.3	843200
1959/60	569447*	157.8	898600
1960/61	592911*	161.4	957000
1961/62	618200*	164.7	1018200
1962/63	643383*	167.5	1077700
1963/64	668569*	170.0	1136600
1964/65	692759*	172.7	1196400

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