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Potatoes - Cost of production o.s. (pd.)



NORTH OF SCOTLAND COLLEGE OF AGRICULTURE
School of Agriculture, Aberdeen
Agricultural Economics Department

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**Some Economic Aspects of
Potato Production
in the North of Scotland,
1965 Crop**

*by Margaret A. Haughs, B.Sc., J. S. Bone, M.Sc. and
Jacqueline P. French, B.Sc.*

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NORTH OF SCOTLAND COLLEGE OF AGRICULTURE

AGRICULTURAL ECONOMICS DEPARTMENT

SOME ECONOMIC ASPECTS OF POTATO PRODUCTION

IN THE NORTH OF SCOTLAND

1965 CROP

by

Margaret A. Haughs, B.Sc., J. S. Bone, M.Sc., and

Jacqueline P. French, B.Sc.

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INTRODUCTION

Under the terms of the Potato Marketing Scheme, all growers producing one acre or more of potatoes for sale are required to register with the Potato Marketing Board. For some years now, the number of registered producers in Great Britain has been falling steadily. Table 1 illustrates the magnitude of this decline over the decade 1956 to 1965.

TABLE 1
NUMBER OF REGISTERED PRODUCERS (GREAT BRITAIN), 1956 TO 1965

Crop Year	No. of Registered Producers
1956	82,957
1957	81,685
1958	78,359
1959	76,446
1960	76,825
1961	74,933
1962	70,056
1963	66,380
1964	60,940
1965	57,726

Despite a contraction in the number of producers, the acreage actually planted has remained relatively static, averaging about 660,000 acres during the ten-year period.

The Potato Marketing Board estimates that, given an average yield of about 9 tons per acre, registered producers could satisfy the country's requirements by planting an average of some 650,000 acres. (1).

Table 2 indicates the relationship between the acreage grown by Scottish producers and that found in England and Wales. One-fifth of the total acreage planted by registered producers in Great Britain is grown in Scotland, the proportion having remained remarkably constant over the past ten years.

Most of the Tables in this section and in the Appendix have been derived from the Handbook of Potato Statistics, prepared by the Potato Marketing Board, or from the Register of Potato Crops Certified, produced annually by the Department of Agriculture and Fisheries for Scotland.

(1) Annual Report and Statement of Accounts, 1966. Potato Marketing Board.

TABLE 2

ACREAGE PLANTED BY REGISTERED PRODUCERS & BASIC ACREAGE (GREAT BRITAIN)

Crop Year	Scotland ('000 Acres)	England & Wales ('000 Acres)	Great Britain ('000 Acres)	Basic Acreage Great Britain ('000 Acres)
1956	146	586	732	734
1957	136	524	660	748
1958	135	535	670	753
1959	135	536	671	760
1960	138	554	692	796
1961	125	467	592	810
1962	131	494	625	792
1963	139	514	653	758
1964	140	527	667	737
1965	133	516	649	739

Potatoes occupy an important place in the economy of many Scottish farms, but there is some evidence to suggest that the crop is becoming increasingly concentrated in the hands of large-scale growers. Over the period 1956 to 1965, large numbers of Scottish growers have given up potato production altogether, while an analysis by acreage size groups shows a decline in the numbers growing small acreages (Appendix A, Table 1). Although some farmers have expanded the scale of their potato enterprises, it appears that many more have ceased production. The number of large-scale growers with over 40 acres has increased during the decade, and in terms of acreage, losses at the lower end of the size group scale have been adequately covered by expansion amongst the larger units.

Roughly one-half or some 75,000 acres of the total Scottish potato acreage, consists of certified seed crops. Grade A crops account for about two-thirds of the total. In general, Virus Tested and Foundation Stock acreages are increasing, while Stock Seed and Grade H acreages are tending to decline. (Appendix A, Table 2).

One-fifth of the total Scottish potato acreage is grown within the area served by the North of Scotland College of Agriculture. Over the decade from 1956 to 1965, the acreage grown in this area by registered producers has fluctuated between 24,350 and 29,190 acres, but its importance as a proportion of the total Scottish acreage has remained almost constant. In most counties within the College area, a slight decline in the total potato acreage is evident (Appendix A, Table 3).

There have, nevertheless, been changes in the importance attached to different

varieties. Table 3 shows that, of the leading varieties planted in Scotland, Kerr's Pink has decreased in popularity, while King Edward and Arran Pilot have maintained their position. Majestic and the newer varieties Record and Pentland Dell are becoming increasingly popular.

TABLE 3
PERCENTAGE OF TOTAL POTATO ACREAGES IN SCOTLAND PLANTED WITH CERTAIN LEADING VARIETIES

Variety \ Year	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Arran Pilot	4.3	4.9	4.4	4.8	6.2	5.9	5.6	5.8	5.6	4.2
King Edward	12.3	12.1	11.1	8.8	9.3	11.5	12.3	11.5	11.0	11.1
Kerr's Pink	23.6	22.0	21.7	20.0	17.0	16.2	15.6	14.5	12.3	11.5
Majestic	19.9	23.5	25.3	26.9	26.9	24.7	22.4	22.4	24.9	27.5
Record	0.5	0.5	1.0	0.9	0.8	1.4	2.3	3.8	5.6	4.2
Pentland Dell	-	-	-	-	-	-	-	-	-	1.2
Others	39.4	37.0	36.5	38.6	39.8	40.3	41.8	42.2	40.6	40.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

In 1965, over 40 per cent of the Kerr's Pink acreage certified in Scotland and over one-third of the certified Pentland Dell and King Edward acreages were grown in the College area. Approximately one-quarter of the certified acreage of Majestic produced in Scotland was grown in the North, and 15 per cent of the Record. Table 4 shows that in terms of certified acreage, the most important varieties in the North of Scotland were Majestic and King Edward. Seed crops of these two varieties together accounted for almost one-half of the registered potato acreage in the College area. Plantings of other certified varieties were small in relation to those named in Table 4.

TABLE 4
CERTIFIED ACREAGE OF CERTAIN LEADING VARIETIES 1965 (N.O.S.C.A. AREA)

Variety	Acres
Majestic	7,995
King Edward	4,804
Kerr's Pink	933
Arran Pilot	683
Pentland Dell	580
Record	490
Home Guard	42
Total	15,527

The distribution of certified varieties within the area of the North of Scotland College of Agriculture is shown in Table 5. It is clear from this that preferences exist for certain varieties in specific counties.

TABLE 5
LOCATION OF MAIN CERTIFIED VARIETIES WITHIN N.O.S.C.A. AREA

COUNTY	Percentage Distribution of Certified Crops					
	Majestic	Kerr's Pink	King Edward	Pentland Dell	Arran Pilot	Record
Aberdeen	32	45	17	31	36	31
Kincardine	42	12	-	11	57	42
Moray	-	-	46	-	-	-
Ross	12	19	23	43	-	-
Other N.O.S.C.A. Counties	14	24	14	15	7	27
Total	100	100	100	100	100	100

In Table 6 the certified acreages of the seven varieties listed in Table 4 are shown in total, and compared with the equivalent Scottish acreages. The percentage importance of the selected varieties in the College area is indicated, as is the total acreage certified under each grade in Scotland as a whole. From these figures, it is evident that a relatively high proportion of the better grades of seed produced in Scotland is grown in the College area.

TABLE 6
CERTIFIED ACREAGES OF CERTAIN LEADING VARIETIES PRODUCED IN 1965

GRADE	7 VARIETIES			ALL VARIETIES
	N.O.S.C.A. area Acres	Scotland Acres	N.O.S.C.A. area as % of Scottish Production	Total Acres Certified in Scotland
Virus Tested	47	98	48	116
Foundation Stock	2,872	6,182	46	7,302
Stock Seed	1,626	3,329	49	3,594
Grade A	9,579	43,372	22	54,037
Grade H	1,403	5,986	23	7,758
Total	15,527	58,967	26	72,807

Crop yields have fluctuated considerably over the past ten years, as Table 7 indicates. These year to year movements are probably due mainly to climatic effects, so that the higher yields of the last few favourable growing seasons will not necessarily continue. However, the use of newer, disease-resistant varieties, coupled with the spread of irrigation, make it possible that higher yields will be maintained in the future.

TABLE 7
AVERAGE POTATO YIELDS (TONS PER ACRE)

Country \ Year	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Scotland	8.5	6.5	6.8	9.3	8.9	8.7	8.8	7.3	8.7	8.7
England & Wales	8.3	7.2	6.9	8.4	8.6	9.1	9.2	9.0	9.2	10.6
Great Britain	8.4	7.1	6.9	8.6	8.7	9.0	9.1	8.6	9.1	10.2

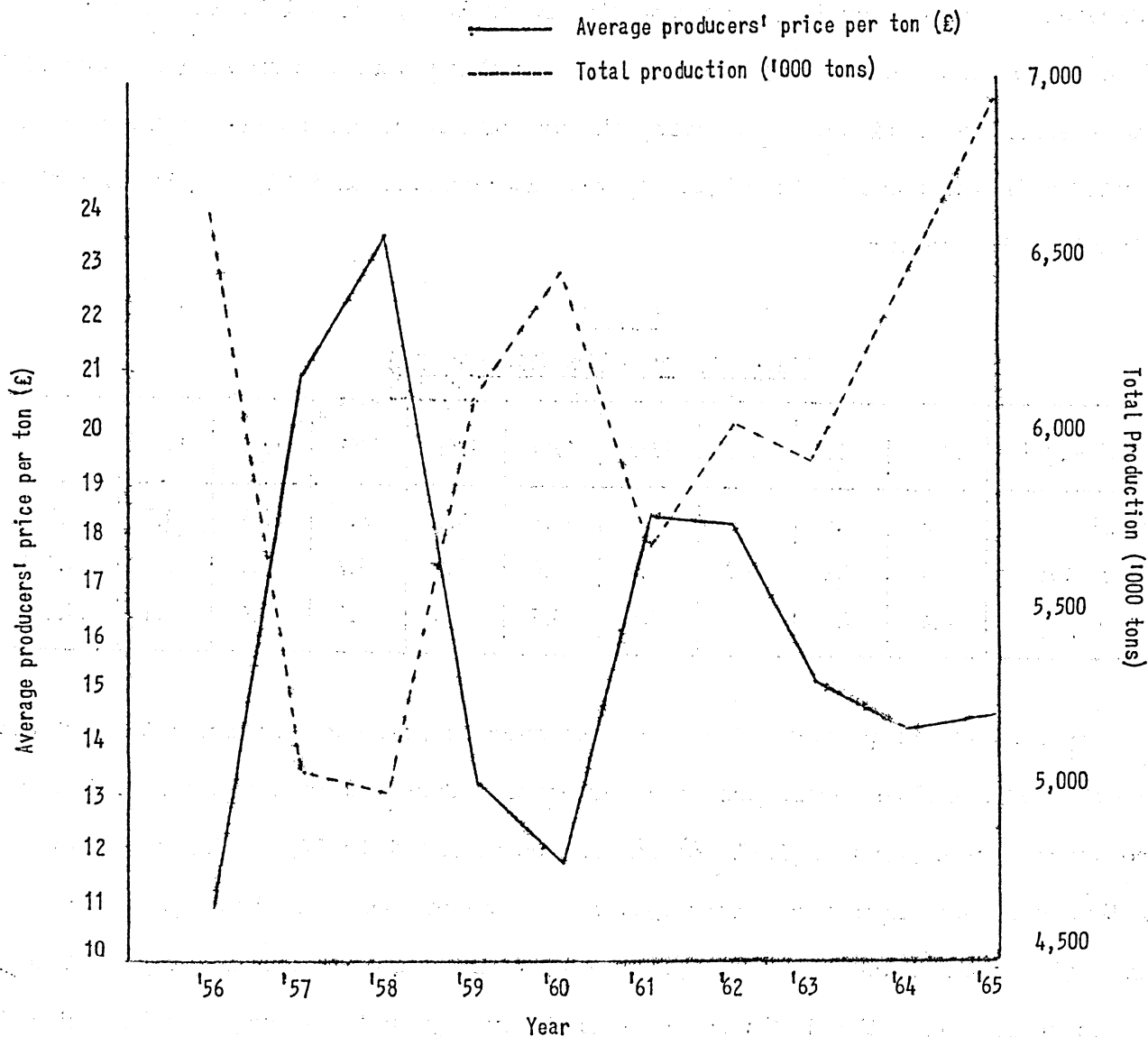
Returns to the producer depend on the average price received per ton and the quantity of saleable tubers produced per acre. Over the last ten years, the average producers' price per ton (Table 8) has ranged from £11 to £23. Price variations of this sort are explained mainly by the steady consumer demand for potatoes (averaging about 2 cwt. per head per year), coupled with a changing supply from season to season. The influence of overall supply on the average producers' price per ton is shown in Diagram 1.

TABLE 8
TOTAL PRODUCTION (1000 TONS)

Area \ Year	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Scotland	1,374	938	1,002	1,391	1,354	1,179	1,249	1,096	1,326	1,228
England and Wales	5,285	4,092	3,980	4,803	5,101	4,459	4,764	4,833	5,085	5,726
Great Britain	6,659	5,030	4,982	6,194	6,455	5,638	6,013	5,929	6,411	6,954
Average Producers' Price per Ton	£ 10:19:-	£ 20:17:-	£ 23: 8:-	£ 13: 3:-	£ 11:15:-	£ 18: 5:-	£ 18: 1:-	£ 15: -:-	£ 14: 1:-	£ 14: 4:-

TOTAL PRODUCTION ('000 TONS) AND AVERAGE PRODUCERS' PRICE PER TON

DIAGRAM 1



Producers of ware potatoes are protected from overseas competition to a large extent by the bulky nature of the product and the relatively low price per ton. Scottish seed growers, however, are exposed to competition from producers in Northern Ireland, the Irish Republic, and to a lesser extent, the Isle of Man. Exports of seed potatoes from Ireland have now some influence on the market, and details of the acreages certified in Northern Ireland are given in Appendix A, Table 4. Over the period 1956 to 1965, the proportion of seed certified in Northern Ireland has varied from 28 per cent to as much as 43 per cent of the Scottish figure.

It is probable that a higher percentage of the seed exported from Northern Ireland is of the better grades. A Seed Potato Marketing Board now operates in Ulster and some 100,000 tons of seed potatoes are exported annually. About half of this total goes to England, while the remainder is taken by about twenty

different countries, mostly in the Mediterranean area.

Seed potatoes certified by the Department of Agriculture and Fisheries, Dublin, are exported from the Republic of Ireland. The main seed growing areas are along the northern and western coasts, and again markets are found in England and the Mediterranean countries.

Details of potato exports from these two countries to Great Britain are given in Appendix A, Table 5, parts (a) and (b).

1965 POTATO CROP - SURVEY RESULTS

THE SAMPLE

In conjunction with similar investigations undertaken by the Economics Departments of the other two Scottish Agricultural Colleges, the North of Scotland College of Agriculture carried out a survey of potato growing within the College area covering the 1965 crop. This survey was confined to two parts of the area, which were considered to be reasonably representative of the main potato growing districts. These were:

- (i) Kincardineshire (Southern Area),
- (ii) Easter Ross, Inverness, Moray, Nairn and Banff (Northern Area).

To lessen the risk of bias towards any particular size of enterprise, the sample was designed to include a proportion of growers in several potato acreage size groups. The sampling fractions chosen, and the number of farms within each acreage size group, are shown in Table 9.

TABLE 9
NUMBER OF FARMS IN ORIGINAL SAMPLE

Potato Acreage Size Group (Acres)	Sampling Fraction	NO. OF FARMS		
		Southern Area	Northern Area	Whole Sample
3 - 4.99	1/50	2	3	5
5 - 9.99	1/50	2	4	6
10 - 19.99	1/20	5	7	12
20 - 49.99	1/10	7	12	19
50 and over	1/3	5	2	7
Total number of farms		21	28	49

The original sample of 49 farms was based on the potato acreage grown in 1964, but it was found that several farms, because of changes in the acreages grown, fell into different potato acreage size groups in 1965. For a variety of reasons, a number of growers had to drop out during the course of the year, so that the final sample included only 18 farms in Kincardineshire, and 23 in the Northern area, with the distribution shown in Table 10. This indicates some bias towards farms with smaller acreages in the Northern area, as no costs were obtained from farms in the "over 50 acres" size group in that district.

TABLE 10
NUMBER OF FARMS SURVEYED

Potato Acreage (Acres)	NO. OF FARMS		
	Southern Area	Northern Area	Total Sample
Less than 3	-	1	1
3 - 4.99	2	1	3
5 - 9.99	1	5	6
10 - 19.99	5	6	11
20 - 49.99	6	10	16
50 and over	4	-	4
Total number of farms	18	23	41

Each farmer in the survey was asked to keep field record sheets of man and tractor hours devoted to the potato crop, while the costs of other inputs such as seed, fertiliser, and contract services were also noted. Field visits to the farms were made to obtain further management information and to collect financial figures relating to crop disposal.

Total Acreage, Cropping and Stocking

The majority of the farms in the sample were under 400 acres in extent, and several of the larger farms had quite extensive areas of rough grazing. The distribution of the farms by total acreage size groups. is shown in Table 11.

TABLE 11
DISTRIBUTION OF NUMBER OF FARMS IN SAMPLE BY ACREAGE SIZE

Acreage Size Group (Acres)	SOUTHERN AREA		NORTHERN AREA		TOTAL SAMPLE	
	Total Acreage	Arable Acreage	Total Acreage	Arable Acreage	Total Acreage	Arable Acreage
0 - 199.9	5	6	10	10	15	16
200 - 399.9	9	8	8	9	17	17
400 - 599.9	1	3	1	2	2	5
600 and over	3	1	4	2	7	3

Cereals were important on most of the farms, substantial acreages of barley being grown on all but two. Turnips were grown on the majority of holdings.

Only two farms (in the Northern area) had permanent grassland, although almost one-half of those in the total sample had some rough grazing.

The average potato break was 33 acres in Kincardine and 18 acres in the North, with potatoes covering 10 per cent of the total area surveyed in Kincardine, but only 5.5 per cent of the total in the Northern district. Table 12 shows how the total acreage in the sample was cropped.

TABLE 12
CROPPING OF TOTAL ACREAGE IN THE SAMPLE

CROP	SOUTHERN AREA		NORTHERN AREA		TOTAL SAMPLE	
	Acres	Per 100 Acres	Acres	Per 100 Acres	Acres	Per 100 Acres
Oats	125	2.0	405	5.0	530	4.0
Barley	1,821	31.0	1,948	25.5	3,769	28.0
Wheat	106	2.0	307	4.0	413	3.0
Potatoes	591	10.0	407	5.5	998	7.5
Turnips	329	5.5	312	4.0	641	4.5
Other Arable	132	2.5	56	0.5	188	1.5
Land Let	23	0.5	26	0.5	49	0.5
Rotation Grass	2,233	38.5	3,077	40.0	5,310	39.0
Permanent Grass	-	-	174	2.0	174	1.5
Rough Grazing	477	8.0	984	13.0	1,461	10.5
Total	5,837	100.0	7,696	100.0	13,533	100.0

Potato Acreage Costed and Varieties Planted

Each crop or field of potatoes was costed separately, so that two different grades of the same variety, or two separate fields of the same grade on one farm were treated as two crops.

The 18 farms in Kincardineshire provided cost data for 36 crops of potatoes covering 549 acres. In the Northern district, 23 farmers costed 46 crops of potatoes, giving a total of 401.75 acres. The total costed area was therefore 950.75 acres.

The popularity of varieties differed in the two areas sampled. In Kincardineshire, Majestic made up 78 per cent of the acreage surveyed, while in the Northern district, 63 per cent of the costed potato acreage was planted with the variety King Edward. The Paracrinkle-Free strain was used for almost one-half of

the total King Edward acreage. Table 13 shows how the different varieties encountered during the survey were distributed.

TABLE 13
POTATO VARIETIES PLANTED

Potato Variety	SOUTHERN AREA			NORTHERN AREA			TOTAL SAMPLE		
	No. of Crops	Acreage	Per Cent of Total Acreage	No. of Crops	Acreage	Per Cent of Total Acreage	No. of Crops	Acreage	Per Cent of Total Acreage
King Edward - Ordinary	1	15.00	3.0	13	140.00	35.0	14	155.00	16.0
Paracrinkle-Free	2	23.50	4.0	10	114.50	28.0	12	138.00	14.0
Kerr's Pink	4	16.25	3.0	10	41.25	10.5	14	57.50	6.0
Majestic	19	428.75	78.0	5	53.50	13.5	24	482.25	50.5
Pentland Dell	1	1.00	0.5	4	36.50	9.0	5	37.50	4.0
Record	3	31.00	5.0	1	10.00	2.5	4	41.00	4.5
Golden Wonder	-	-	-	1	2.00	0.5	1	2.00	0.5
Redskin	1	1.50	0.5	-	-	-	1	1.50	0.5
Earlies	5	32.00	6.0	2	4.00	1.0	7	36.00	4.0
Total	36	549.00	100.0	46	401.75	100.0	82	950.75	100.0

In the Northern area, 231.5 acres, or 59 per cent of the sample were planted with Foundation or Stock Seed potatoes and 197 acres or 49 per cent were granted Foundation or Stock Seed certificates on inspection. In Kincardineshire, however, only 65.5 acres or 12 per cent were planted with Foundation or Stock Seed grades and 62 acres or 11.5 per cent were granted certificates on inspection for these grades. A higher proportion of Grade A seed was planted in Kincardineshire than in the Northern area. Only a small proportion of the acreage surveyed was planted with uncertified seed. A total of 31.25 acres (slightly over 3 per cent) was uncertified at lifting and sold mainly to meet local demands for ware. The grades of seed planted and the grades ultimately obtained are detailed in Table 14.

TABLE 14
GRADES OF SEED PLANTED AND GRADES CERTIFIED

AREA		GRADES					TOTAL
		F.S.	S.S.	A	H	Uncertified	
Southern	Acres Planted	62.00	3.50	480.00	-	3.50	549.00
	% of Total	11.5%	0.5%	87.5%	-	0.5%	100.0%
	Acres Certified	62.00	-	460.50	17.50	9.00	549.00
	% of Total	11.5%	-	84.0%	3.0%	1.5%	100.0%
Northern	Acres Planted	190.50	41.00	152.75	-	17.50	401.75
	% of Total	47.0%	12.0%	37.0%	-	4.0%	100.0%
	Acres Certified	146.00	51.00	175.50	7.00	22.25	401.75
	% of Total	36.0%	13.0%	44.0%	2.0%	5.0%	100.0%
Total Sample	Acres Planted	252.50	44.50	632.75	-	21.00	950.75
	% of Total	26.5%	4.5%	66.5%	-	2.5%	100.0%
	Acres Certified	208.00	51.00	636.00	24.50	31.25	950.75
	% of Total	22.0%	5.5%	67.0%	2.5%	3.0%	100.0%

Previous Cropping

Over three-quarters of the potato crop in Kincardineshire was grown after ley, but in the Northern area, three-fifths of the acreage followed cereals. Table 15 shows the previous cropping of fields included in the survey.

TABLE 15
PREVIOUS CROPPING OF FIELDS

Previous Crop	SOUTHERN AREA			NORTHERN AREA			TOTAL SAMPLE		
	No. of Crops	Acreage	Per Cent of Total Acreage	No. of Crops	Acreage	Per Cent of Total Acreage	No. of Crops	Acreage	Per Cent of Total Acreage
Grass	22	425.5	78	16	158.50	39	38	584.0	61
Cereals	13	106.5	19	30	243.25	61	43	349.75	37
Roots	1	17.0	3	-	-	-	1	17.0	2
Total	36	549.0	100	46	401.75	100	82	950.75	100

COST OF PRODUCTION OF POTATOES PER ACRE

The average costs of production of one acre of potatoes for the two areas, and for the sample as a whole, are given in Table 16. Production costs averaged over the 950.75 acres covered by the total sample amounted to £114 13s. per acre, but there was a difference of £14 per acre between the average costs recorded in the two areas surveyed. This difference is made up of higher charges for a variety of inputs, including seed, tractor work, regular and casual labour, rent and other overheads.

TABLE 16
AVERAGE PRODUCTION COSTS PER ACRE

	SOUTHERN AREA		NORTHERN AREA		TOTAL SAMPLE	
	£ s.	Per Cent of Total	£ s.	Per Cent of Total	£ s.	Per Cent of Total
Fertiliser	9: 9	9	9: 7	8	9: 8	8
Seed	21:13	20	22:16	18	22: 5	19
Operational Costs - Regular Labour	18:10	17	21:15	18	20: 2	18
Tractor Costs	5:18	5	6:13	5	6: 6	5
Casual Labour	10:14	10	11:12	10	11: 3	10
Contract Work	7: -	7	8: 2	7	7:11	7
Sundries	5:19	5	5: 9	4	5:14	5
Specialised Equipment	3:19	4	7: 5	6	5:12	5
Rent	4:14	4	5:18	5	5: 6	4
Overheads	19:17	19	22:16	19	21: 6	19
TOTAL COSTS	107:13	100	121:13	100	114:13	100

Range in Total Costs

The range in total costs is shown in Table 17. In Kincardineshire, just under 60 per cent of the fields had total costs of less than £110, whereas less than one quarter of the fields in the North had total costs of less than this figure. The majority of fields in Kincardineshire incurred total costs of between £90 and £119 19s. but in the Northern area most fields had costs falling between £100 and £129 19s. Two fields in the North had total costs exceeding £150, in one case due to a very high seed cost and in the other to an exceptionally high labour bill.

TABLE 17
RANGE AND AVERAGE TOTAL COSTS PER ACRE

Total costs Per Acre	SOUTHERN AREA		NORTHERN AREA		TOTAL SAMPLE	
	Acres	Per Cent of Total	Acres	Per Cent of Total	Acres	Per Cent of Total
£70 - £79 19s.	25.00	4.5	2.00	0.5	27.00	3.0
£80 - £89 19s.	34.50	6.5	49.75	12.5	84.25	9.0
£90 - £99 19s.	76.00	14.0	9.00	2.0	85.00	9.0
£100 - £109 19s.	187.00	34.0	54.00	13.5	241.00	25.5
£110 - £119 19s.	108.00	19.5	49.50	12.5	157.50	16.5
£120 - £129 19s.	96.00	17.5	105.50	26.5	201.50	21.0
£130 - £139 19s.	20.25	3.5	38.50	9.5	58.75	6.0
£140 - £149 19s.	2.25	0.5	72.00	18.0	74.25	8.0
£150 - £159 19s.	-	-	21.50	5.0	21.50	2.0
Total	549.00	100.0	401.75	100.0	950.75	100.0
Average Cost	£107 11s.		£120 11s.		£114 1s.	

Fertiliser

Expenditure on fertiliser accounted for about 8 per cent of the total costs, averaging £9 8s. per acre. Fertiliser rates differed between the two areas, with a tendency for heavier applications per acre in Kincardineshire, but greater use was made of dung in the Northern area. In all cases, land receiving dung for the potato crop had been cropped with cereals the previous year. Table 18 indicates that heavier fertiliser dressings were used on land receiving no farmyard manure.

TABLE 18
FERTILISER AND F.Y.M. PER ACRE

FERTILISER	SOUTHERN AREA	NORTHERN AREA	TOTAL SAMPLE
Average cost of fertiliser/Acre	£9 9s.	£9 7s.	£9 8s.
Range in rate of application of fertiliser/Acre - cwt.	5.5 - 12	5 - 12.5	5 - 12.5
Range in cost of fertiliser/Acre	£5 10s.-£12 16s.	£5 14s.-£13 1s.	£5 10s.-£13 1s.
Av. no. of units N.P.K. derived from fertiliser/Acre	100:103:169	96:99:144	98:101:156
Total Acres - receiving F.Y.M.	56.50	180.75	237.25
Total Acres - not receiving F.Y.M.	492.50	221.00	713.50
Av. rate of application of fertiliser per acre on fields receiving F.Y.M. - cwt.	7.6	7.5	7.6
Av. rate of application of fertiliser per acre on fields not receiving F.Y.M. - cwt.	9.0	7.9	8.4

Ignoring the nutrient value of the dung, the average fertiliser dressing supplied 98 units of nitrogen, 101 units of phosphate, and 156 units of potash. These values bear a close relationship to the generally recommended N:P:K levels of 100:100:150 for maincrop potatoes. Nevertheless, wide individual variations were encountered in the quantity of fertiliser applied.

Seed

Seed was one of the most important items of cost, amounting on average to £22 5s. per acre or 19 per cent of the total cost.

The average seed rate for the sample was 26 cwt. per acre, with a range from 9 cwt. to 40 cwt. per acre. Farmers in the Northern area tended to use heavier seed rates for their best grades of seed, but in Kincardineshire several fields of A's were planted at nearly 40 cwt. per acre. Average seed rates and costs are shown in Table 19.

TABLE 19

SEED RATE AND SEED COSTS

SEED	SOUTHERN AREA	NORTHERN AREA	TOTAL SAMPLE
Rate/acre (cwt.)	27.9	24.2	26.0
Range in cwt planted/acre	9-40	10-40	9-40
Cost/ton (£)	£15.8	£18.5	£17.2
Range in seed costs per ton (£)	£8-24	£12-26.5	£8-26.5
Purchased - acres	65.50	76.50	142.00
Home-grown - acres	483.50	325.25	808.75

Since over 800 of the 950 acres sampled were planted with home-grown seed, the average cost per ton is largely based on growers' own estimates of the market value of the seed used. The lowest costs per ton are attributed to one or two cases where brock or otherwise

unsaleable tubers were planted. The total seed cost per acre depended therefore on the purchase price per ton (or estimated market value) and the planting rate per acre.

Operational Costs

Operational costs, including regular labour, tractor costs, casual labour and contract work, make up 40 per cent of the total costs per acre. Average regular labour and tractor costs involved in different field operations are shown in Table 20, and the average hours required for these operations are shown in Table 21.

TABLE 20

AVERAGE OPERATIONAL COSTS PER ACRE: REGULAR LABOUR AND TRACTOR COSTS

Operation	SOUTHERN AREA			NORTHERN AREA			TOTAL SAMPLE		
	Regular Labour	Tractor	Total	Regular Labour	Tractor	Total	Regular Labour	Tractor	Total
Spring Cultivations	£ s. 2: -	£ s. 1:11	£ s. 3:11	£ s. 3: 1	£ s. 2: 2	£ s. 5: 3	£ s. 2:10	£ s. 1:16	£ s. 4: 6
Planting	1:12	-:13	2: 5	1:16	-:13	2: 9	1:14	-:13	2: 7
Summer Cultivations	1:17	1: 2	2:19	1:17	1: 1	2:18	1:17	1: 2	2:19
Harvesting	4:14	2: 7	7: 1	6: -	2:14	8:14	5: 7	2:11	7:18
Dressing	8: 7	-: 5	8:12	9: 1	-: 3	9: 4	8:14	-: 4	8:18
Total	18:10	5:18	24: 8	21:15	6:13	28: 8	20: 2	6: 6	26: 8

TABLE 21

AVERAGE HOURS PER ACRE

Operation	SOUTHERN AREA			NORTHERN AREA			TOTAL SAMPLE		
	Regular Labour	Casual Labour	Tractor	Regular Labour	Casual Labour	Tractor	Regular Labour	Casual Labour	Tractor
Spring Cultivations	6.6	-	6.4	10.2	-	9.2	8.4	-	7.8
Planting	5.3	4.6	3.0	6.0	0.2	3.0	5.6	2.1	3.0
Summer Cultivations	6.2	0.9	4.9	6.3	2.2	4.6	6.2	1.6	4.8
Harvesting	16.4	41.9	10.4	20.1	41.2	12.4	18.2	41.5	11.4
Dressing	28.6	5.1	1.1	30.4	8.4	0.6	29.5	6.9	0.8
Total Hours	63.1	52.5	25.8	73.0	52.0	29.8	67.9	52.1	27.8

Spring Cultivations

Considerably more pre-planting cultivations were carried out on the Northern farms than on the Kincardineshire ones. As indicated previously (Table 18) more land received dung in the Northern area than in Kincardineshire and this might in part explain the higher pre-planting requirements. Ploughing depths ranged from 8 inches to 18 inches, averaging 10 inches in Kincardine and 11.3 inches in the Northern area. The ground was generally cultivated twice prior to planting in Kincardineshire, but in the Northern area an additional operation was frequently carried out, to give an average figure of 2.7 cultivations for the area. The average cost of spring cultivations for regular and tractor labour for the whole sample was £4 6s.

Planting

In the great majority of cases, tubers were planted in 28 inch drills, but some farmers used a drill width of 27 inches. Planting distances in the drill varied widely from 7 inches to 16 inches, with an average of 9.6 inches in Kincardine, and 11.6 inches in the Northern district. Although there was some regional difference, Table 22 indicates that little distinction was made in spacing for different grades of seed within each area.

TABLE 22

AVERAGE SPACING BETWEEN SETS IN INCHES

Spacing (Inches)	SOUTHERN AREA	NORTHERN AREA	TOTAL SAMPLE
Average Spacing	9.6	11.6	10.6
Average for F.S. and S.S.	9.8	11.3	10.6
Average for A's and Uncertified	9.6	11.8	10.7
Range	7-14	8-16	7-16

Of the 41 farms included in the sample, 33 employed their own machines for planting. In the Northern area, one farmer owning a planter also made use of a contract planter for part of his acreage, and one other farm relied wholly on a contractor to plant the crop.

In Kincardineshire five farms obtained a machine on loan, or hired a planter from a neighbour. In addition, two farmers employed

squads to plant the crop by hand. Table 23 shows the different acreages planted by various methods.

Two-row machines were most popular in the North, approximately one-half of these being automatic in action. In Kincardine, three-row planters were found most frequently, but only one-quarter of the planters were classed as automatic machines.

At £2 3s. and £2 5s. per acre, the contractors' rates for machine planting were quite attractive in comparison to squad rates which were £2 18s. and £5 13s. per acre in the two cases encountered. These figures are no more than general observations, however, since the numbers involved were so small.

TABLE 23
METHODS OF PLANTING - FARMS AND ACREAGE

METHOD	SOUTHERN AREA			NORTHERN AREA			TOTAL SAMPLE		
	No. of Farms	Acres	Per Cent of Total Acreage	No. of Farms	Acres	Per Cent of Total Acreage	No. of Farms	Acres	Per Cent of Total Acreage
Own Planter	14	434.00	79.0	19	360.75	90	33	794.75	83.5
Hired Planter	2	7.50	1.5	3	25.00	6	5	32.50	3.5
Contract	-	-	-	2	16.00	4	2	16.00	1.5
Squad	2	107.50	19.5	-	-	-	2	107.50	11.5
Total	18	549.00	100.0	24	401.75	100	42	950.75	100.0

NOTE: Two methods were used on one farm.

Methods of fertiliser placement, shown in Table 24, also varied between the two areas in the survey. Broadcasting on the flat before ridging was adopted by the majority of farmers in the North, but broadcasting on the ridge was more common in Kincardine. Only 17 per cent of the sample acreage was covered by placement machines. One farmer broadcast on the flat for part of his acreage, but used a side placement machine for the rest.

Perhaps the most surprising feature was the relatively large acreage receiving fertiliser broadcast on the flat - generally an inefficient method resulting in most of the nutrients being concentrated above the seed.

TABLE 24
FERTILISER PLACEMENT

METHOD	SOUTHERN AREA			NORTHERN AREA			TOTAL SAMPLE			
	No. of Crops	No. of Farms	Acreage	No. of Crops	No. of Farms	Acreage	No. of Crops	No. of Farms	Acreage	Per Cent of Total Acreage
Broadcast on flat	12	5	142.50	30	16	236.75	42	21	379.25	40
Broadcast on ridge	20	10	346.00	6	4	62.00	26	14	408.00	43
Placement	4	3	60.50	10	4	103.00	14	7	163.50	17
Total	36	18	549.00	46	24	401.75	82	42	950.75	100

NOTE: Two methods were used on one farm

Summer Cultivations

Kincardineshire farmers generally carried out four operations after planting, but in the Northern area the average was three summer cultivations. One farmer did no summer cultivations whatever, relying on a pre-emergence spray carried out on contract at a cost of £5 10s. per acre. Only four other farmers in the sample used sprays to control weed growth and, in total, less than 10 per cent of the acreage was treated. The average costs of chemical weed control treatments - all carried out by contractors - was £4 11s. per acre. (Contractors' costs for spraying include the cost of the spray. If spraying was carried out by the farmer the cost of the spray was included in sundries). Since the four farmers, other than the one using the pre-emergence spray also carried out inter-row cultivations, the total weed control bill on these farms was considerably higher than average.

All blight control measures were carried out by contract. Sprays or dusts were applied in some cases twice or three times. The average cost on the 25 fields treated was £2 5s. per acre, but the range was from 17s. to £5 9s. per acre. The number of farms employing chemical methods of weed or blight control is shown in Table 25. One farm in the Northern district, with a small acreage, cut down the haulm early to minimise the risk of blight infecting the tubers.

TABLE 25
WEED CONTROL AND BLIGHT CONTROL

OPERATION	SOUTHERN AREA				NORTHERN AREA				TOTAL SAMPLE			
	No. of Crops	No. of Farms	Acres	Per Cent of Total Acreage	No. of Crops	No. of Farms	Acres	Per Cent of Total Acreage	No. of Crops	No. of Farms	Acres	Per Cent of Total Acreage
Weed Spray	2	1	2.50	0.5	8	4	72.00	18.0	10	5	74.50	8.0
Blight Spray or Dust	3	2	19.00	3.0	22	11	209.50	52.0	25	13	228.50	24.0
Cut for Blight	-	-	-	-	2	1	11.00	2.5	2	1	11.00	1.0
No Control	31	15	527.50	96.5	14	7	109.25	27.5	45	22	636.75	67.0
Total	36	18	549.00	100.0	46	23	401.75	100.0	82	41	950.75	100.0

Also included in summer cultivations are operations such as roguing and haulm disposal. Roguing was normally carried out by the farmer and/or the grieve, but casual labour, trained in roguing, was also employed in some instances.

Details of methods of haulm disposal are shown in Table 26.

TABLE 26
HAULM DISPOSAL

METHOD	SOUTHERN AREA				NORTHERN AREA				TOTAL SAMPLE			
	No. of Crops	No. of Farms	Acres	Per Cent of Total Acreage	No. of Crops	No. of Farms	Acres	Per Cent of Total Acreage	No. of Crops	No. of Farms	Acres	Per Cent of Total Acreage
Mechanical	2	2	27.00	5	18	9	132.50	33	20	11	159.50	17
Chemical	12	9	237.00	43	5	3	36.00	9	17	12	273.00	29
Chemical and Mechanical	22	7	285.00	52	21	10	225.00	56	43	17	510.00	53
Died Down	-	-	-	-	2	2	8.25	2	2	2	8.25	1
Total	36	18	549.00	100	46	24	401.75	100	82	42	950.75	100

NOTE: Two methods were used on one farm

The mechanical disposal of haulms would appear to be the cheapest method (see Table 27) being approximately £2 per acre less than any method where a chemical is used. The use of a chemical together with a mechanical means of destruction cost, on average, less than a chemical method alone. The higher incidence of costs with chemical methods could be attributed largely to the use of contractors to apply the chemical sprays.

TABLE 27
AVERAGE HAULN DISPOSAL COSTS PER ACRE

METHOD	SOUTHERN AREA	NORTHERN AREA	TOTAL SAMPLE
	£ s.	£ s.	£ s.
Mechanical	-: 9	-:12	-:10
Chemical	2: 1	3: 5	2:13
Chemical and Mechanical	1:14	2:18	2: 6

Harvesting

Harvesting is the most expensive operational cost in potato growing. The cost of casual labour and contract work have to be added to the regular labour and tractor costs, and the whole operation possibly offers the greatest potential opportunity for effective savings in the cost of production of potatoes. Harvesting costs varied quite considerably between farms and between the two districts, costs in the Northern district averaging approximately £1 10s. more per acre than in Kincardineshire.

The methods of harvesting are detailed in Table 28 and it can be seen that 64.5 per cent of the whole sample was harvested by elevator digger, but a far higher proportion of farmers used this method of harvesting in Kincardineshire, than in the North. Conversely it can be seen that 44.5 per cent of the acreage was harvested by complete harvester in the Northern area, whereas only 13 per cent of the acreage was harvested by this method in Kincardineshire. The complete harvester requires more time per acre to deal with a given acreage, but during this operation fewer persons are needed. It may be that casual labour is more readily available in Kincardineshire during the lifting period and that because of this greater availability farmers have not yet found it necessary to change-over to complete harvesting methods.

TABLE 28
METHOD OF HARVESTING - FARMS AND ACREAGE

METHOD	SOUTHERN AREA			NORTHERN AREA			TOTAL SAMPLE		
	No. of Farms	Acres	Per Cent of Total Acreage	No. of Farms	Acres	Per Cent of Total Acreage	No. of Farms	Acres	Per Cent of Total Acreage
Harvester	3	71.00	13	10	178.00	44	13	249.00	26
Elevator	13	472.00	86	7	142.25	35	20	614.25	65
Spinner	-	-	-	4	18.50	5	4	18.50	2
Contract	2	6.00	1	4	63.00	16	6	69.00	7
Total	18	549.00	100	25	401.75	100	43	950.75	100

NOTE: Two methods were used on two farms

A comparison of harvesting costs per acre was made between complete harvesters and single-row elevator diggers. Twelve complete harvesters, all but one of which had been purchased new between 1960 and 1963 at an average cost of just over £750, each harvested an average of 20 acres, although the utilisation varied from 6 acres to 37 acres over the 1965 season.

On fourteen farms, single-row elevator diggers costing £200-£300 were used to lift an average of 32 acres per farm. The elevator digger requires a greater amount of casual labour for its operation, but annual depreciation costs are much lower. The average costs of the two harvesting systems are shown in Table 29.

TABLE 29
AVERAGE HARVESTING COSTS PER ACRE - COMPLETE HARVESTER
AND SINGLE-ROW ELEVATOR DIGGER

Machine	Single-row Harvester	Single-row Elevator Digger
Average Acreage Handled	20	32
Regular Labour Costs per Acre	£ s. 7:18	£ s. 3:19
Tractor Costs Per Acre	3:16	2: -
Casual Work per Acre	4:12	11: 8
Depreciation per Acre	7: 5	1:10
Total Costs per Acre	23:11	18:17

The cost per acre of the complete harvester will, however, fall more rapidly than that of the elevator digger as the acreage increases, due to the greater importance of the depreciation charge in the cost structure of the harvester. However, in some seasons, ground conditions will restrict the use of the complete harvester, and even when conditions are suitable, the harvester will take perhaps twice as long as the elevator digger to lift a given acreage. This led some farmers with harvesters to make use of casual labour for lifting by traditional methods at weekends, using the complete harvester during the remainder of the week.

Dressing

Considerable variations were found in the time taken to dress the potato crop. The time required per acre varies with the yield, and with the amount of diseased or damaged tubers present. Careful treatment to prevent or reduce damage is important at the grading stage, and most growers are prepared to spend time on the operation, to avoid the necessity of re-dressing in the event of complaint.

The average cost of dressing per acre was approximately £10 10s. and at a yield of 9 tons per acre, the cost is roughly 23s. per ton.

Casual and Contract Work

Casual and contract work play an important part in the production of potatoes in both areas. The details of casual labour and contract work employed for the main operations in potato production are given in Table 30. In Kincardineshire, over two-thirds of the farmers employed some casual labour at planting, but the cost for casual labour was not excessive, ranging from 10s. to £3 10s. per acre. In the Northern area only 2 farms employed casual labour at planting, but another 2 farms had their acreage planted by contractors. Casual labour (mostly trained in the techniques of roguing) was employed to rogue one-third of the total acreage.

Most farmers employed casual labour at harvesting and this labour consisted in the main of women and children. The cost of such labour at harvest ranged from £1 5s. per acre where a complete harvester was

used, to as much as £23 per acre when a squad was used for lifting. Only 3 farms in Kincardineshire used no casual labour at harvest and on 2 of these farms the potatoes were lifted by contractors. In the North every farm used some casual labour at harvest with the exception of two farms where contractors were hired. In all, over 90 per cent of the acreage was lifted with the help of at least some casual labour. Casual labour and contractors were also used extensively to dress the potatoes. Approximately one-third of the total crop was dressed partly by casual labour, another one-third was dressed by contract, and the remainder by regular staff only.

TABLE 30
CASUAL AND CONTRACT WORK

OPERATION	SOUTHERN AREA			Per Cent of Total acreage on which casual labour employed	NORTHERN AREA			Per Cent of Total acreage on which casual labour employed	TOTAL SAMPLE			Per Cent of Total acreage on which casual labour employed
	Acres				Acres				Acres			
	Casual	Contract	Farm Labour Only		Casual	Contract	Farm Labour Only		Casual	Contract	Farm Labour Only	
Planting	425.5	-	123.5	78	31.00	16.0	354.75	8	456.50	16.0	478.25	48
Roguing	155.5	-	393.5	28	160.00	-	241.75	40	315.50	-	635.25	33
Lifting	539.0	6.0	4.0	98	346.25	55.5	-	88	885.25	61.5	4.00	93
Dressing	110.0	221.5	217.5	20	187.25	56.0	158.50	47	297.25	277.5	376.00	31

Contractors were employed to carry out various operations besides those detailed above. Information on the type of work carried out by contractors and the acreage involved etc. is given in Table 31.

TABLE 31
CONTRACT WORK ON FARMS IN SAMPLE

OPERATION	SOUTHERN AREA				NORTHERN AREA				TOTAL SAMPLE			
	No. of Crops	No. of Farms	Acres	Per Cent of Total Acreage	No. of Crops	No. of Farms	Acres	Per Cent of Total Acreage	No. of Crops	No. of Farms	Acres	Per Cent of Total Acreage
Dunging	-	-	-	-	1	1	1.75	0.5	1	1	1.75	0.5
Plough or Rotovate	1	1	15.0	2.5	2	1	4.00	1.0	3	2	19.00	2.0
Planting	-	-	-	-	4	2	16.00	4.0	4	2	16.00	1.5
Weed Spray	2	1	2.5	0.5	8	4	72.00	18.0	10	5	74.50	8.0
Blight Spray	3	2	19.0	3.5	22	11	209.50	52.0	25	13	228.50	25.5
Haulm Spray	17	8	308.0	56.0	20	9	203.00	50.5	37	17	511.00	53.3
Haulm Pulveriser	6	1	17.5	3.0	-	-	-	-	6	1	17.50	2.0
Lifting	3	2	6.0	1.0	5	4	63.00	15.5	8	6	69.00	7.5
Dressing	8	6	221.5	40.0	6	4	59.00	14.5	14	10	280.50	30.0

Contractors were used on only one farm to cart and spread farm-yard manure and two farmers hired contractors to plough and rotovate the land for potatoes. Where weed spraying was carried out only 5 out of a total 23 farms employed contractors, but for spraying for the control of blight, on average, over one-quarter of the acreage was sprayed by contractors. Contract spraying for haulm disposal was carried out on over 50 per cent of the acreage involved, but only one farmer hired a contractor to pulverise the haulm. As can be seen in the Table, contractors were used to the greatest extent for haulm disposal, blight control and for dressing.

Several farmers hired machinery and in these cases the hire charges were included in the production cost data under contract work. The different types of machines hired and the acreages covered by them are shown in Table 32.

TABLE 32
MACHINES HIRED

MACHINE	SOUTHERN AREA			NORTHERN AREA			TOTAL SAMPLE		
	No. of Crops	No. of Farms	Acres	No. of Crops	No. of Farms	Acres	No. of Crops	No. of Farms	Acres
Planter	4	3	19.5	7	4	26.75	11	7	46.25
Tractor	1	1	12.0	-	-	-	1	1	12.00
Sprayer	-	-	-	1	1	9.00	1	1	9.00
Pulveriser	1	1	15.0	7	3	46.00	8	4	61.00
Digger	2	1	4.0	-	-	-	2	1	4.00

Planters were hired by 7 farmers in the sample, but the acreage involved totalled 46.25 acres only, the farmers with larger acreages tending to have their own machines. Machinery for haulm disposal was hired by 4 farmers and an elevator digger, a sprayer and a tractor were hired by one farmer.

Sundries

Included under the heading of sundries are such items as the annual P.M.B. contribution of £3 per acre, inspection fees, sprays bought by the farmer, straw to cover potatoes in pits and sheds and other miscellaneous items. In the total sample sundries amounted to £5 14s. per acre or 5 per cent of the total cost.

Specialised Equipment

The depreciation of specialised equipment such as planters, elevator diggers, harvesters etc. was calculated (see Appendix B) and the depreciation of specialised storage buildings was also included under this heading. Depreciation of specialised equipment and of buildings accounted for about 5 per cent of the total cost or £5 12s. per acre.

Storage

The majority of farmers in both Northern and Southern areas stored the crop in some form of building, either constructed specifically for the purpose of storing potatoes, or built as a multi-purpose shed, e.g. as potato store, implement shed, grain drier and grain store combined. Others utilised old stables or byres etc. converted into stores. The

methods of storage are indicated in Table 33. Nine farms had buildings described as potato sheds, while on 25 others, all or part of the crop was stored in converted buildings. The potatoes at one farm and from one field on another were bagged and sold straight from the field.

TABLE 33

METHOD OF STORAGE

METHOD	SOUTHERN AREA			NORTHERN AREA			TOTAL SAMPLE		
	No. of Farms	Acres	Per Cent of Total Acreage	No. of Farms	Acres	Per Cent of Total Acreage	No. of Farms	Acres	Per Cent of Total Acreage
Buildings	8	351.00	64	11	244.25	61	19	595.25	63
Pits	5	46.50	8	5	48.00	12	10	94.50	10
Buildings and Pits	5	151.50	28	6	89.50	22	11	241.00	25
Sold off Field	-	-	-	2	20.00	5	2	20.00	2
Total	18	549.00	100	24	401.75	100	42	950.75	100

NOTE: Two methods were used on one farm

Rent and Overhead Charges

The average rent (or rental value) per acre for the total sample was £5 6s. per acre, but there were wide variations from £3 to £9 per acre.

Since complete financial accounts were not available for farms in the survey, overhead costs were allocated on the basis of average figures, derived from a sample of financial accounts from farms in the area. The figures used (see Appendix B) were related to the number of acres devoted to the potato crop, the total labour cost per acre, and the number of tractor hours per acre. Calculated in this way, overhead costs accounted for 19 per cent of the total costs.

Output per Acre

The average returns per acre and the average yield per acre are detailed in Tables 34 and 35 respectively. Although the average yields per acre in the two areas were very similar at 8 tons 19 cwt.

in Kincardineshire and 9 tons 3 cwt. in the Northern area, the returns per acre showed a difference of over £20, being £123 17s. in Kincardineshire and £144 12s. in the North. The average price per ton of saleable potatoes was £13 17s. in Kincardineshire as against £16 1s. in the Northern area. The difference in receipts per acre may have occurred because a higher proportion of seed to ware was sold in the Northern area and also because of the varieties of potatoes grown, some varieties commanding a far higher market price than others. In Table 34 the returns for potatoes retained on the farm have been stated separately because these are estimated values. On average 16 per cent of the production was retained on the farm, either as seed for the 1966 crop, as stock feed, as perquisites, or consumed in the farmhouse.

TABLE 34
AVERAGE RETURNS PER ACRE

DESCRIPTION	SOUTHERN AREA		NORTHERN AREA		TOTAL SAMPLE	
	£	s.	£	s.	£	s.
Seed	43	6	65	6	54	6
Ware	57	7	57	9	57	8
Brock, chats, thirds	1	6	-	10	-	18
Retained	21	18	21	7	21	12
Total	123	17	144	12	134	4

TABLE 35
AVERAGE YIELD PER ACRE - TONS

DESCRIPTION	SOUTHERN AREA		NORTHERN AREA		TOTAL SAMPLE	
	Tons	Cwt.	Tons	Cwt.	Tons	Cwt.
Seed	3	15	4	8	4	1
Ware	4	1	3	17	3	19
Brock, chats, thirds	1	3	-	15	-	19
Waste	-	-	-	3	-	2
Total	8	19	9	3	9	1

The range in the returns per acre was quite considerable as shown in Table 36. One crop of potatoes in Kincardineshire realised only £33 16s. per acre whilst one crop in the Northern area realised £290 11s. In Kincardineshire 50 per cent of the crop fetched between £100 and £149 19s. an acre and only 25 per cent realised over £150 per acre. In the North, however, 37 per cent was sold at between £100 and £149 19s. per acre and 41 per cent was marketed at over £150 per acre. In the total sample, 50 per cent of the fields gave a return of less than £125 per acre and this would suggest that in these cases the fields were either unprofitable or leaving only a very small margin of profit. The range in yields per acre was also considerable (see Table 37), one field in Kincardineshire yielding only 3 tons 18½ cwt. whilst one in the Northern area yielded 15 tons 8½ cwt. Approximately 66 per cent of the fields yielded less than the 1965 average for Great Britain of 10.1 tons per acre, and approximately 38 per cent of the fields yielded less than the Scottish average of 8.3 tons per acre.

TABLE 36

RANGE OF RETURNS PER ACRE

RETURNS £ per acre	SOUTHERN AREA		NORTHERN AREA		TOTAL SAMPLE	
	Acres	Per Cent of Total Acreage	Acres	Per Cent of Total Acreage	Acres	Per Cent of Total Acreage
25 - 49.99	17.5	3.0	-	-	17.50	2.0
50 - 74.99	72.0	13.0	24.00	6.0	96.00	10.0
75 - 99.99	91.0	16.5	59.75	14.5	150.75	16.0
100 - 124.99	210.5	38.5	55.00	13.5	265.50	28.0
125 - 149.99	61.0	11.0	109.50	27.5	170.50	18.0
150 - 174.99	13.5	2.5	59.00	14.5	72.50	7.5
175 - 199.99	64.0	11.5	33.00	8.0	97.00	10.0
200 - 224.99	0.5	0.5	48.00	12.0	48.50	5.0
225 - 249.99	19.0	3.5	8.00	2.5	27.00	3.0
250 and over	-	-	5.50	1.5	5.50	0.5
Total	549.0	100.0	401.75	100.0	950.75	100.0

TABLE 37
RANGE OF YIELDS PER ACRE - TONS

TOTAL YIELDS Tons per acre	SOUTHERN AREA		NORTHERN AREA		TOTAL SAMPLE	
	Acres	Per Cent of Total Acreage	Acres	Per Cent of Total Acreage	Acres	Per Cent of Total Acreage
0 - 1.99	-	%	-	%	-	%
2 - 3.99	15.00	2.5	-	-	15.00	1.5
4 - 5.99	20.50	3.5	2.75	0.5	23.25	2.5
6 - 7.99	124.75	23.0	137.00	34.0	261.75	27.5
8 - 9.99	229.25	42.0	113.00	28.0	342.25	36.0
10 - 11.99	65.50	12.0	102.50	25.5	168.00	17.5
12 - 13.99	94.00	17.0	37.50	9.5	131.50	14.0
14 - 15.99	-	-	9.00	2.5	9.00	1.0
Total	549.00	100.0	401.75	100.0	950.75	100.0

Total Sales and Sale Outlets

The total output of potatoes in the sample is given in Table 38. A greater proportion of the output from the Northern Area was sold as seed than in Kincardineshire while a higher proportion of ware and other grades such as brock, chats and thirds were sold in Kincardineshire. Prices for seed and ware were on average higher in the Easter Ross area, as shown earlier in the report.

TABLE 38
TOTAL SALES AND RETENTIONS OF POTATOES ON FARMS IN THE SAMPLE

	SOUTHERN AREA			NORTHERN AREA			TOTAL SAMPLE		
	Tons	£	Average Price per ton or Value (nearest £)	Tons	£	Average Price per ton or Value (nearest £)	Tons	£	Average Price per ton or Value (nearest £)
<u>Sales:</u>									
Seed	1,827	26,546	15	1,593	29,052	18	3,420	55,598	16
Ware	1,974	28,386	14	1,371	20,854	15	3,345	49,240	15
Other	164	1,272	8	69	293	4	233	1,565	7
<u>Retained:</u>									
Seed	371	5,181	14	330	5,904	18	701	11,085	16
Stock Feed	570	1,667	3	254	821	3	824	2,488	3
House and Perquisites	21	284	14	44	716	16	65	1,000	15
Waste	-	-	-	120	-	-	120	-	-
Total	4,927	63,336	13	3,781	57,640	15	8,708	120,976	14

Tables 39 and 40 show the total amount of potatoes in the sample sold through the various outlets and it is of particular interest to note that only 30 per cent of ware in Kincardineshire was sold through the agency of the Potato Marketing Board whilst 69 per cent of ware was sold to the Board in the Northern area. The Potato Marketing Board introduced three buying programmes for the 1965 crop, one during September-October, the second in December-January, and the third in March. Prices paid in Scotland varied from £11 10s. to £19 per ton for most varieties, according to the buying programme and the delivery date. When a farmer offers potatoes to the Board a fee of ten shillings per ton is charged in order to prevent inflated offers, but when a contract is signed advance payments are made, the rates for the 1965 crop being £6 per ton for the first programme and £8 per ton for the second and third programmes. Most potatoes sold to the Board from farms in the sample realised approximately £14 per ton and it is surprising that no more of the output in Kincardineshire was sold to the Board since several farmers sold ware and even seed potatoes at £12 per ton or less to merchants. When prices are low, a farmer is ill-advised to sell potatoes at less than the guaranteed price, particularly when an assured market is available.

TABLE 39
SELLING OUTLETS FOR WARE POTATOES

AREA	Quantity of Ware Sold in tons				
	Merchants	P.M.B.	Retail and Others	Total	Per Cent to P.M.B.
Southern Area	1,377	597	-	1,974	30
Northern Area	365	943	63	1,371	69
Total Sample	1,742	1,540	63	3,345	46
	Value of Ware £				
Southern Area	19,622	8,764	-	28,386	31
Northern Area	5,877	13,899	1,078	20,854	67
Total Sample	25,499	22,663	1,078	49,240	46

TABLE 40
SELLING OUTLETS FOR SEED POTATOES

AREA	Quantity of Seed Sold in tons		
	Merchants	Local Growers etc.	Total
Southern Area	1,827	-	1,827
Northern Area	1,342	251	1,593
Total Sample	3,169	251	3,420
	Value of Seed £		
Southern Area	26,546	-	26,546
Northern Area	24,410	4,642	29,052
Total Sample	50,956	4,642	55,598

In two cases, some ware was sold direct to a retailer, but the quantities involved were relatively small. Another crop was damaged by fire and was paid for mainly through insurance claims. In the case of seed, some was sold direct to local growers or to farmers in England, but the greatest portion was sold to potato merchants specialising in this trade.

GROSS MARGIN AND PROFIT PER ACRE

The gross margin of a product can be defined as being the gross output of that product minus the variable costs. The gross margin is the amount available to cover fixed costs and to supply profit. Variable costs are those costs which apply specifically to the potato crop and which would be saved if the crop was not grown, whereas fixed costs include those items which cannot readily be allocated to any particular enterprise and which in the short run are unavoidable, even if the land were allowed to lie fallow. Table 41 presents data relating to the gross margins and profits per acre.

TABLE 41
AVERAGE GROSS MARGIN AND PROFIT PER ACRE

	SOUTHERN AREA	NORTHERN AREA	TOTAL SAMPLE
	£ s.	£ s.	£ s.
GROSS OUTPUT	123:17	144:12	134: 4
<u>Variable Costs</u>			
Seed	21:13	22:16	22: 5
Fertiliser	9: 9	9: 7	9: 8
Casual Labour	10:14	11:12	11: 3
Contract Work	7: -	8: 2	7:11
Sundries	5:19	5: 9	5:14
TOTAL VARIABLE COSTS	54:15	57: 6	56: 1
GROSS MARGIN	69: 2	87: 6	78: 3
<u>Fixed Costs</u>			
Regular Labour	18:10	21:15	20: 2
Tractor Costs	5:18	6:13	6: 6
Specialised Equipment	3:19	7: 5	5:12
Rent	4:14	5:18	5: 6
Overheads	19:17	22:16	21: 6
TOTAL FIXED COSTS	52:18	64: 7	58:12
PROFIT	16: 4	22:19	19:11

In this survey two fields showed a negative gross margin while, at the other end of the scale, three fields had gross margins of over £180 per acre. The range of gross margins can be seen in Table 42. As the average variable costs per acre were almost identical in both areas and as the average returns per acre were approximately £20 more in the Northern area than in Kincardineshire, the average gross margin per acre was also approximately £20 greater in the Northern area. The average gross margin for the whole sample was £78:3s. per acre. Fixed costs per acre amounted on average to approximately £58, with the result that

almost one-third of the crops in the sample did not provide a sufficient gross margin to cover the fixed costs.

TABLE 42
DISTRIBUTION OF ACREAGE ACCORDING TO GROSS MARGIN PER ACRE

GROSS MARGIN £ per Acre	SOUTHERN AREA		NORTHERN AREA		TOTAL SAMPLE	
	Acres	Per Cent of Total Acreage	Acres	Per Cent of Total Acreage	Acres	Per Cent of Total Acreage
(-) $\overline{10}$ (-) 0.01	48.00	8.5	-	-	48.00	5.0
0 - 19.99	42.75	8.0	44.50	11.0	87.25	9.5
20 - 39.99	129.25	23.5	50.50	12.5	179.75	19.0
40 - 59.99	79.50	14.5	50.75	12.5	130.25	13.5
60 - 79.99	95.50	17.5	29.00	7.5	124.50	13.0
80 - 99.99	66.00	12.0	84.50	21.0	150.50	16.0
100 - 119.99	4.50	1.0	38.50	9.5	43.00	4.5
120 - 139.99	63.00	11.5	55.50	14.0	118.50	12.5
140 - 159.99	1.00	-	18.00	4.5	19.00	2.0
160 - 179.99	0.50	-	25.00	6.0	25.50	2.5
180 and over	19.00	3.5	5.50	1.5	24.50	2.5
Total	549.00	100.0	401.75	100.0	950.75	100.0
Average Gross Margin Per Acre	£69: 2s.		£87: 6s.		£78: 3s.	

The range of profits per acre is given in Table 43. The average profit per acre for the total sample was £19:11s. and although the average gross margin per acre was £20 more in the Northern area than in Kincardineshire the average profit per acre differed by less than £7 because of the higher average fixed costs per acre in the North.

TABLE 43
DISTRIBUTION OF ACREAGE ACCORDING TO AVERAGE PROFIT PER ACRE

PROFIT OR LOSS £ per acre	SOUTHERN AREA		NORTHERN AREA		TOTAL SAMPLE	
	Acres	Per Cent of Total Acreage	Acres	Per Cent of Total Acreage	Acres	Per Cent of Total Acreage
(-) 60-(-)40.01	82.75	15.0	41.00	10.0	123.75	13.0
(-) 40-(-)20.01	100.25	18.5	45.00	11.0	145.25	15.5
(-) 20-(-) 0.01	98.50	18.0	13.00	3.5	111.50	11.5
0- 19.99	61.00	11.0	72.25	18.0	133.25	14.0
20- 39.99	80.50	14.5	108.00	27.0	188.50	20.0
40- 59.99	41.00	7.5	46.00	11.5	87.00	9.0
60- 79.99	64.50	11.5	35.00	8.5	99.50	10.5
80- 99.99	1.00	0.5	9.00	2.5	10.00	1.0
100 and over	19.50	3.5	32.50	8.0	52.00	5.5
Total	549.00	100.0	401.75	100.0	950.75	100.0
Average Profit Per Acre	£16: 4s.		£22:19s.		£19:11s.	

In Table 44 an attempt has been made to show the average profit per acre according to the class of seed produced. This indicates that the average profit per acre was considerably higher where Foundation Seed certificates were obtained. These figures must be interpreted with caution, however, because the variation in profits per acre within the various grades was very wide and the actual sample was too small to make valid comparisons.

TABLE 44
COSTS AND PROFITS OF FOUNDATION STOCK AND OTHER GRADES PER ACRE

	SOUTHERN AREA			NORTHERN AREA			TOTAL SAMPLE		
	Foundation Stock	Other Grades	ALL Grades	Foundation Stock	Other Grades	ALL Grades	Foundation Stock	Other Grades	ALL Grades
No. of Crops	No. 6	No. 30	No. 36	No. 17	No. 29	No. 46	No. 23	No. 59	No. 82
No. of Farms	4	14	18	10	13	23	14	27	41
Average Cost	£ s. 95: 1	£ s. 109:19	£ s. 107:10	£ s. 131: 6	£ s. 114: 6	£ s. 120:11	£ s. 113: 4	£ s. 112: 2	£ s. 114: -
Average Output	159:12	116:14	124: 1	172:19	128: 1	144:12	166: 6	122: 8	134: 6
Average Profit	64:11	6:15	16:11	41:13	13:15	24: 1	53: 2	10: 6	20: 6

Returns are influenced not only by the grade of seed planted, but also by the prevailing demand for the variety. In Table 45 some of the most common varieties encountered in the survey are ranked according to their average profitability. It should be stressed that, for each variety within this limited sample, there was a considerable range in profitability, and that the results outlined here will not necessarily apply on individual farms. Changes in the pattern of demand could also influence the order in which the varieties would appear in any one year. It should be noted that the Paracrinkle-Free, King Edward and Pentland Dell acreages included in the Table are mainly Foundation Stock.

TABLE 45
AVERAGE COSTS AND RETURNS FOR DIFFERENT POTATO VARIETIES PER ACRE

	VARIETY					
	King Edward Ordinary	Majestic	Kerr's Pink	Record	King Edward Paracrinkle-Free	Pentland Dell
No. of Crops	12	24	14	4	15	5
No. of farms	11	22	14	4	11	4
Average Acreage per field	12.0	20.1	4.1	10.2	9.9	7.5
Average Cost	£ s. 116: 3	£ s. 116:17	£ s. 113: 1	£ s. 110: 2	£ s. 124: -	£ s. 126:15
Average Output	112: -	127:11	137:12	137: 5	154:14	162:18
Average Profit	(-)4: 3	(+)10:14	(+)24:11	(+)27: 3	(+)30:14	(+)36: 3
Range in Profits (£)	(-)57 to(+)45	(-)54 to(+)128	(-)52 to(+)103	(-)40 to(+)88	(-)8 to(+)101	(-)55 to(+)157

SUMMARY

In the face of a fairly steady demand for potatoes, prices are influenced greatly by the total acreage grown and the yield per acre. The operations of the Potato Marketing Board in regulating the acreage planted and in prescribing riddle sizes, have undoubtedly helped to relate supply more closely to demand, thereby reducing price fluctuations between seasons. Yields remain unpredictable, however, and in years of surplus, returns to the producer may be inadequate.

In the survey carried out in 1965 in the North of Scotland, returns per acre averaged £134:4s. Variable costs per acre amounted to £56:1s. leaving a gross margin of £78: 3s. When fixed costs of £58:12s. were deducted, the average profit per acre was only £19:11s. There was, however, a very wide variation in the profitability of different crops.

One-third of all crops made losses, one-third had profits of under £40 per acre, and one-third had profits of over £40 per acre.

For the individual farmer, profit depends on the relationship between total costs and crop output. Every potato grower is faced with inescapable costs such as those for cultivations and seed, where worthwhile savings could be made only at the expense of output. Nevertheless, opportunities exist on many farms for reducing labour and machinery costs by better organisation of time-consuming tasks such as harvesting and dressing. The difficulty of finding suitable casual labour is becoming an important factor in many areas, where farmers are confronted with the choice of either investing capital in expensive machinery or going out of potatoes altogether. Once the decision has been made, and possibly £1,000 or more spent on potato handling equipment, the enterprise is burdened with heavy costs for depreciation which make the growing of small acreages uneconomic.

On the output side, it is essential to observe the principles of good husbandry in order to achieve higher yields of saleable potatoes per acre. Particular attention should be paid to the treatment of the tubers at all stages, especially during and after harvest. Proper storage conditions must also be provided to ensure that losses from rots and disease are kept to a minimum.

Contracts on a regular basis with established merchants are of value to the seed grower, particularly in years of surplus production. While the individual can do little to influence market prices, several seed growers found it advantageous

to explore outlets in England. Personal contact between seed and ware producer, perhaps including scrutiny of the crop growing in Scotland and England, can build up confidence, resulting in repeat orders for specific quantities of seed at an agreed price.

APPENDIX A

TABLE 1

DISTRIBUTION OF POTATO ACREAGE PLANTED BY REGISTERED PRODUCERS IN SCOTLAND ACCORDING TO ACREAGE

POTATO ACREAGE PLANTED	1956		1959		1962		1965	
	No. of Producers	Acres	No. of Producers	Acres	No. of Producers	Acres	No. of Producers	Acres
Nil	1,150	-	1,600	-	2,450	-	2,413	-
.01 - 9.99	10,122	29,729	9,601	28,325	8,098	23,133	6,202	18,727
10.00 - 19.99	1,720	23,084	1,632	22,110	1,435	19,610	1,452	19,936
20.00 - 29.99	733	17,311	731	17,526	694	16,695	651	15,508
30.00 - 39.99	433	14,556	407	13,672	408	13,855	426	14,332
40.00 - 59.99	393	18,568	392	18,615	390	18,298	477	22,625
60.00 - 74.99	109	7,166	109	7,262	125	8,234	133	8,760
75.00 - 199.99	123	12,717	151	16,089	157	16,954	179	18,410
200.00 - 499.99	15	4,350	31	8,700	34	9,586	31	9,168
500 and over	1	578	1	607	4	2,430	4	2,788
Total (registered producers)	14,799	128,059	14,655	132,906	13,795	128,795	11,968	130,254
Acreage Size-Group Unspecified		18,161		2,034		2,705		2,606
Total (growing potatoes)	13,649	146,220	13,055	134,940	11,345	131,500	9,555	132,860

APPENDIX A

TABLE 2

POTATO ACREAGES CERTIFIED FOR SEED (SCOTLAND)

SCOTLAND SEED CERTIFICATION	YEAR									
	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Total Potato Acreage	161,700	143,577	147,198	149,519	152,286	135,527	141,781	149,606	152,989	141,668
(a) Virus Tested	68	79	76	85	78	80	90	83	99	116
(b) Foundation Stock	1,850	2,284	2,715	3,507	3,419	2,888	2,955	3,144	4,954	7,302
(c) Stock Seed	4,747	4,580	5,236	5,199	5,313	4,068	3,560	3,090	3,573	3,594
Total (a + b + c)	6,665	6,943	8,027	8,791	8,810	7,036	6,605	6,317	8,626	11,012
Grade A	57,939	50,333	53,529	58,577	61,723	57,295	57,821	60,115	70,066	54,037
Grade H	13,533	15,439	10,910	8,374	8,445	6,206	6,925	9,398	5,138	7,758
Total (all grades certified)	78,137	72,715	72,466	75,742	78,978	70,537	71,351	75,830	83,830	72,807
3 better grades as % of total certified	9	10	11	12	11	10	9	8	10	15

APPENDIX A

TABLE 3

POTATO ACREAGE PLANTED BY REGISTERED PRODUCERS, BY COUNTY

AREA	YEAR			
	1956	1959	1962	1965
Aberdeen	10,140	9,630	8,680	9,350
Banff	1,950	1,860	1,870	2,150
Caithness	250	140	90	70
Inverness	1,170	970	850	810
Kincardine	7,380	7,010	6,280	6,480
Moray	3,800	3,570	3,780	3,550
Nairn	610	550	550	440
Ross	3,670	3,530	3,260	3,460
Sutherland	220	180	220	280
N.O.S.C.A. Mainland Area	29,190	27,440	25,580	26,590
Scotland	146,220	134,940	131,500	132,860
N.O.S.C.A. Mainland Area as % of Scottish Total	20	20	19	20

APPENDIX A

TABLE 4

POTATO ACREAGE CERTIFIED FOR SEED (NORTHERN IRELAND)

SEED CERTIFICATION	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
(a) Special Stock Seed	-	-	-	-	100	196	216	381	495	297
(b) Stock Seed	5,052	4,543	3,158	4,089	4,190	2,790	3,710	5,830	6,442	5,823
Total (a + b)	5,052	4,543	3,158	4,089	4,290	2,986	3,926	6,211	6,937	6,120
Grade A	28,774	23,413	22,440	24,446	24,431	19,706	19,558	23,285	22,626	14,245
Total (all grades)	33,826	27,956	25,598	28,535	28,721	22,692	23,484	29,496	29,563	20,365
2 better grades as % of total	15	16	12	14	15	13	17	21	23	30
Certified N. Ireland acreage as % of Scottish total or acreage	43	38	35	38	36	32	33	39	35	28

APPENDIX A

TABLE 5

(a) NORTHERN IRELAND EXPORTS OF POTATOES TO GREAT BRITAIN ('000 TONS)

Category \ Year	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
New	...	...	...	1	1	1	1	...	...	...
Ware	53	92	75	122	74	53	74	96	10	19
Seed	27	37	38	45	40	35	40	60	48	33
Total	80	129	113	168	115	89	115	156	58	52

(b) IRISH REPUBLIC EXPORTS OF POTATOES TO GREAT BRITAIN ('000 TONS)

Category \ Year	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
New	...	1	2	1	5	2	8	5	2	2
Ware	-	...	-	-	-	5	11	-	-	-
Seed	3	5	6	9	11	6	7	14	9	7
Total	3	6	8	10	16	13	26	19	11	9

... Less than 500 tons

Appendix B
Costings Method

Seed

Purchased seed has been charged at cost. Home grown seed has been charged at market value.

Fertilisers

Fertilisers have been charged at net cost (subsidy deducted). No allowance has been made for manurial residues. No charge has been made for dung applied, but the costs of carting and spreading the dung are included.

Casual Labour and Contract Work

Charged at the rates paid.

Regular Labour

Regular labour has been charged at the rates operating on the individual farms, including insurance and allowance for perquisites, holidays etc. Manual work of the farmer has been charged at the farm rate. Where no regular labour was employed, a charge of 6s. per hour was made for the farmer's manual work.

Tractor

Tractor work has been charged at 4s.6d. per hour for wheeled tractors, and 13s.6d. per hour for crawlers. These rates are estimated to cover fuel, depreciation and repairs.

Depreciation and Repairs

Charges to cover specialised equipment used for the potato crop have been made as follows:-

Implements	20 per cent of purchase price
Electrical equipment	15 per cent of purchase price
Potato storage sheds or conversions	5 per cent of purchase price

Rent

Rent has been charged at the rate paid by the tenant, or at an agreed notional figure in the case of the owner-occupier.

Overheads (Share of General Farm Expenses)

Overheads have been charged at the following rates:-

	s.	d.
Per Acre	10	6
Per £ labour	7	3
Per tractor hour	6	9