THE WEST OF SCOTLAND AGRICULTURAL COLLEGE

BARLEY GROWING
IN THE WEST OF SCOTLAND
1968 CROP

by

J. F. MACPHERSON

ECONOMICS DEPARTMENT
178 BOTHWELL STREET
GLASGOW, C.2

Report No. 129

JANUARY, 1970

REPORTS RECENTLY ISSUED BY THE ECONOMICS DEPARTMENT

TURNER R. & MURRAY R. D.—*TIMOTHY HAY.* A note on differing harvesting systems. **Farm Labour Studies No. 11.**

HUNT R. W. T.—*DAIRY FARMING IN THE WEST OF SCOTLAND, PAST, PRESENT AND FUTURE . . .* **Economics Department Report No. 126.**

CLARK J.—*STRUCTURE AND TRENDS IN FARMING IN THE WEST OF SCOTLAND.* **(Report prepared for visit by British Grassland Society to West of Scotland).**

MUNRO R. F.—*SOME ECONOMIC ASPECTS OF DAIRY FARMING IN THE WEST OF SCOTLAND* 1967/68. **Economics Department Report No. 127.**

C O N T E N T S

SUMMARY

Barley 1968 Crop

1. This report is based on 37 farm records of barley crops totalling 3084 acres.

2. The results are in two main groups:-

5 farms - seed barley important - 647 acres

32 farms - mainly feed, a little malting - 2437 acres

3. The average results per acre for the five seed and 32 feed are summarised below:-

	5 Seed	32 Feed
	£	
Crop Output	52.22	40.92
Variable Costs	9.41	10.09
Gross Margin	42.81	30.83
Estimated Fixed Costs	19.73	20.66
Estimated Management and Investment Income	23.08	10.17

Crop output includes the value of all grain sold, fed or kept for seed, also the value of all straw sold or used (but not burned or ploughed in) plus appropriate acreage deficiency payments and, where applicable, storage premiums and Home-Grown Cereals Authority forward contract payments.

4. As a result of fine weather in the west of Scotland, average yields per acre in the sample were above the national average. Adjusted to 16% moisture content they were 34.9 cwt. for the five seed barley crops and 31.8 cwt. for the 32 others.

5. Golden Promise and Ymer were the most commonly occurring varieties.

6. Average seed rate per acre was 1.40 cwt. for the five seed growing farms and 1.62 cwt. for the 32 others.

7. Fertiliser application per acre (including any top dressings) averaged 2.82 cwt. for the five seed growing farms and 2.58 cwt. for the 32 others giving an average application of plant nutrients as follows:-

Number of Farms	Units per Acre		
	Nitrogen	Phosphate	Potash
5 Seed	53	38	38
32 Feed	45	28	29

8. Over the group of 32 feed barley crops high gross margins per acre were associated with high yields per acre.

9. A further division of the 32 crops into three groups according to the acreage of all cereals on each farm, showed that average yield per acre decreased with increasing acreage. Average gross margin per acre, however, was lowest in the intermediate group due mainly to lower prices. (More grain was sold moist straight off the combine and a lower estimated value was placed on the grain kept on the farm.)

10. Combine harvesting - all cereals. The acres per foot of cut averaged 18.9 for the five seed growing farms and 13.3 for 25 of the others. The remaining seven had contract or hired combines.

11. Continuous barley growing year after year on a high proportion of the same farm fields was not common practice.

INTRODUCTION

The west of Scotland is not generally thought of as a barley growing area. Of the 5.2 million acres of agricultural land in the 11½ counties of the West College province (including west Perth), 3.8 million are rough grazing and 1.1 million grassland. Compared with this the relative importance of the 0.2 million acres of cereals, of which more than half are barley, would seem small. Yet, barley makes a worthwhile contribution to the economy of many of the farms on which it can be grown.

Although the acreage under cereals has declined slightly over the past decade, the barley acreage in the west province, in common with the national trend, continues to increase - from 19,000 acres in 1959 to 110,000 acres in 1968. In the same period there has been a more than corresponding decrease in the acreage of oats from 180,000 acres to 71,000 acres.

This study, which forms part of a larger one being carried out by the Economics Departments of the three Scottish Agricultural Colleges, examines some aspects of barley growing in the west of Scotland. This report is based on the records of 37 barley crops covering 3084 acres grown in 1968 in the following counties of the West College province.

County	Number
Argyll	1
Ayr	8
Clackmannan	3
Dumfries	7
Kirkcudbright	3
Lanark	2
West Perth	6
Renfrew	2
Stirling	1
Wigtown	4
Total	37

On five of the 37 farms the growing of seed barley was important. On the remaining 32 farms the crop was mainly feeding barley, either for use on the farm or for sale, although some barley was also sold for malting.

The weather in the west of Scotland in 1968 was generally favourable for barley growing. After a particularly fine summer the crop was in good condition and the moisture content at harvest time was estimated in most cases at from 18% to 22%. Yields (adjusted to 16% moisture content) averaged 34.9 cwt. per acre for the five seed crops and 31.8 cwt. per acre for the 32 feed crops.

Acknowledgement

Grateful acknowledgement is made of the help received from farmers who kept records and provided information about their barley crops.

Thanks are also due to colleagues in the Economics Department who assisted in the collection of data and preparation of this report.

SECTION I

THE SAMPLE

Acreage

The table below shows the distribution by recorded acreage of the 37 crops.

TABLE I

Distribution by Recorded Acreage

Acres	5 Seed	32 Feed	Total
	Number of Records		
Under 50	1	17	18
50 to 99	1	9	10
100 to 199	1	4	5
200 to 299	2	1	3
300 and over	-	1	1
Total	5	32	37

In all 3084 acres of barley were costed - 647 acres in the seed barley group and 2437 in the feed barley group.

Farm Type

The five farms in the smaller group were livestock and cropping farms with on average 43% of their land (crops and grass excluding any rough grazing) in cereals. Nearly 90% of this was in barley, most of which was included in the survey.

The larger group was made up of 11 livestock and cropping farms and 21 dairy farms. The 11 farms had 48% of their land in cereals. Nearly 80% of this was in barley, and virtually all was recorded. The 21 dairy farms had about a quarter of their land in cereals. Nearly 90% of this was in barley, and most of this was recorded in the survey.

Yield

Over Scotland as a whole the promise of high barley yields in 1968 was not realised and the yields actually achieved were slightly lower than the average of the previous five years.

Estimated Scottish Average Yield per Acre

1963-67	29.8 cwt.
1968	28.9 cwt.

The west and south-west of Scotland enjoyed a much better summer in 1968 than did the eastern part of the country. The main feature of the year's weather, apart from the great wind that blew with hurricane force during the night of 14th-15th January cutting a path from west to east across central Scotland, was the high frequency of east winds resulting in duller conditions in the eastern districts and sunnier weather in the west.

This was reflected in the yield and quality of the crop. Yields of barley in the west and south-west of the College province were generally higher than those in the eastern parts of the province. Indeed some farmers in the south-west considered the 1968 barley crop to be one of the best they had grown.

The average yield per acre adjusted to 16% moisture content was 34.9 cwt. for the five seed barley crops and 31.8 cwt. for the 32 others.

The range in yield per acre (adjusted to 16% moisture content) was from 31.5 cwt. to 37.3 cwt. for the five seed barley crops and from 24.2 cwt. to 41.7 cwt. for the 32 other crops.

Varieties

On some farms only one variety of barley was grown while on others there were as many as four different varieties. Golden Promise and Ymer were the most commonly occurring varieties. The acreages grown were as follows:-

Variety	Acres
Golden Promise	1214
Ymer	1082½
Zephyr	270½
Deba Abed	135
Sultan	128
Impala	74
Mari	73½
Tern	56½
Maris Baldric	19
GPF/65	17
Freja	9½
Senta	4½
	3084

Seed and Fertiliser

The average seeding rate for the five seed barley crops was 1.40 cwt. per acre (range 1.30 cwt. to 1.50 cwt.). For the 32 other costings the average was 1.62 cwt. per acre (range 1.22 cwt. to a very high 2.48 cwt.).

The average rate of applying fertiliser including any top dressing of nitrogen but excluding lime was 2.82 cwt. per acre (range 1.58 cwt. to 3.77 cwt.) for the five seed barley crops, and 2.58 cwt. per acre (range 0.47 cwt. to 4.00 cwt.) for the 32 feed barley crops.

This gave an average application of plant nutrients per acre as follows:-

TABLE II

Average Rate of Applying Fertiliser Nutrients

Number of Farms	Units per Acre		
	Nitrogen	Phosphate	Potash
5 Seed	53	38	38
32 Feed	45	28	29

Out of the total acreage of 3084 acres, 738 were undersown, 289 were top dressed with nitrogen, 242 were dunged and 513 were limed.

Place in Rotation

The table below shows that over half the 1968 barley acreage in the sample had been in barley in the previous year and that rather over a quarter was in grass.

TABLE III

1968 Barley Crop and Previous Year's Cropping

Previous Crop	5 Seed	32 Feed	37 Total	% of Total
	Acres			
Barley	423	1235	1658	54
Other Cereals	53	195	248	8
Grass	115	764	879	28
Potatoes, Roots etc.	56	243	299	10
Acreage Recorded	647	2437	3084	100

SECTION 2

LABOUR AND POWER

Developments in mechanisation have reduced the labour requirements of the barley crop. Certainly there are the rush periods particularly at seed time and harvest; but taken as a whole, considerable acreages can be managed by quite a small labour force.

A weighted per acre average over the 3084 acres is shown in Table IV below.

TABLE IV

Labour and Machinery Use on 37 Farms

Operation	Farm Staff*	Casual	Contract	Farm Tractor	Combine
	Hours per Acre				
Pre-harvest	4.78	0.02	0.04	4.56	-
Grain harvest	1.52	0.10	0.06	0.87	0.64+
Straw harvest	2.11	0.30	neg.	1.45	-
Drying and storage	0.62	neg.	N.A.	-	-
Total	9.03	0.42	0.10	6.88	0.64

*Includes farmer and wife and any unpaid family labour.

+The average combine hours per acre are from 28 self-propelled farm combines, 2 tractor drawn farm combines, 6 contract combines and 1 hired combine.

Pre-harvest operations include all the usual ploughing, harrowing sowing seed and fertiliser etc., with dung and lime spreading and top dressing where applicable. Chemical spraying for weed control was almost general practice. On only two crops was there no spraying at all.

The straw harvest - baling, carting and stacking bales - accounted for about a quarter of the man hours and a fifth of the tractor hours. The averages in the above table are expressed per acre of grain harvested - 3084 acres, but on only 2822 acres was the straw baled. The straw harvesting time expressed per acre actually baled (2822 acres) averaged 2.30 hours farm staff, 0.32 hours casual and 1.58 hours tractor. Of the 262 acres not baled, 160 were sold in the swath, 56 were burned and 46 were ploughed in.

In the majority of cases in the west, it is probably still worthwhile to bale the straw as it is either required on the farm or has a saleable value. Some may be sold in the swath, when the buyer is responsible for baling. The course to follow will depend chiefly on the value placed on the straw although the competing demands of other work and the availability of storage space may also have to be taken into account.

The selling price for baled straw was from about £4 per ton to £7 per ton depending on the time of sale. Straw in the swath was generally sold for about £2 per acre.

It should be noted that throughout this report any work of farmer and wife has been charged at the appropriate rate (See section on definitions and method.) and is included under the heading Farm Staff or Regular Labour. The same applies to any unpaid family labour.

The range in direct farm labour and power costs (excluding combine fuel, noted separately, and fuel for drying etc.) was from £2.81 per acre with large easily worked fields and where all the straw was sold in the swath or burned, to £9.65 per acre where fields were small and conditions difficult.

Contract and casual work varied from none at all to £6.8 per acre where all the combining and different sprayings were done by contract.

Table XI in the Appendix also gives a summary on labour and power.

SECTION 3

COSTS AND PROFITABILITY

Table V shows the average costs per acre for the five seed and the 32 feed barley crops. The seed and feed barley crops did not differ greatly in their over-all average costs per acre.

TABLE V

Average Costs Per Acre

	5 Seed		32 Feed	
	Quantity	£	Quantity	£
Variable Costs				
Seed Purchased	0.87 cwt.	2.32	1.22 cwt.	2.51
Home-grown	0.53 cwt.	0.74	0.40 cwt.	0.55
Total	1.40 cwt.	3.06	1.62 cwt.	3.06
Fertiliser		3.86		3.51
Lime		0.45		0.65
Sprays		0.86		0.51
Contract and Casual		0.29		1.48
Miscellaneous		0.89		0.88
Total Variable		9.41		10.09
Fixed Costs				
Rent		5.00		4.12
Farm labour	9.05 hrs	3.33	10.08 hrs	3.71
Farm tractor	6.41 hrs	1.63	7.81 hrs	1.88
*Depreciation		5.56		4.30
Sub total (A)		15.52		14.01
Estimated Overheads:				
per £ labour		1.49		1.49
per tractor equivalent hour		2.17		4.54
per acre		0.55		0.62
Sub total (B)		4.21		6.65
Total Fixed (A + B)		19.73		20.66
Total Fixed and Variable		29.14		30.75

*Depreciation on specialised implements, equipment and buildings.

Costs showed a considerable difference between individual farms. Variable costs i.e. costs directly incurred due to the growing of barley ranged from a very low £5.28 per acre (where very little fertiliser was applied) to £16.11 per acre where there was a considerable amount of contract work.

Fixed or common costs ranged from only £12.50 per acre (where depreciation expressed per acre was low due to low capital investment in grain equipment spread over a fairly large grain acreage and where overheads expressed per acre were also low) to a very high £36.95 per acre where the costs of all the separate items were high.

The effect of all this was that total costs over the whole sample ranged from £20.74 per acre to £45.60 per acre.

Table VI shows the average output, gross margin and management and investment income per acre. It should be noted that the weights of grain given in this table are as recorded and are not all adjusted to 16% moisture content as in the earlier section on yield.

TABLE VI

Average Output, Gross Margin and Estimated Management and Investment Income per Acre

	5 Seed		32 Feed	
Output from:	cwt.	£	cwt.	£
1. Grain (weights as recorded)				
(a) Sold for malting	0.78	0.90	2.29	2.53
feeding	11.19	11.13	8.43	8.42
seed	19.66	25.99	0.80	1.11
Sub total (A)	31.63	38.02	11.52	12.06
(b) Kept for feeding	3.42	3.76	20.87	20.17
seed	0.51	0.63	0.35	0.43
Sub-total (B)	3.93	4.39	21.22	20.60
Total Grain (A + B)	35.56	42.41	32.74	32.66
2. Straw:				
Sold	16.96	4.09	2.68	0.65
Kept	4.19	0.90	16.21	3.26
Total Straw	21.15	4.99	18.89	3.91
3. *Deficiency payments etc.		4.82		4.35
Total Crop Output (1 + 2 + 3)		52.22		40.92
Variable Costs (See Table V)		9.41		10.09
Gross Margin		42.81		30.83
Fixed Costs (See Table V)		19.73		20.66
Estimated Management and Investment Income		23.08		10.17

*Acreage deficiency payments, premiums, H.G.C.A. contracts.

Due to a somewhat higher average yield per acre coupled with the higher selling price of their seed barley, the five seed growers achieved a higher average output per acre than the 32 other growers and were left with a gross margin of £42.81 per acre compared with the £30.83 of the others.

The average management and investment income per acre was likewise considerably higher for the seed growers.

The range in output per acre was from £44.38 to £58.67 for the five seed crops and from £32.43 to £53.89 for the 32 feed barley crops. Gross margin per acre was from £35.71 to £48.22 for the five seed crops and from £18.26 to £45.24 for the 32 others. The remaining estimated management and investment income per acre ranged from £18.21 to £32.72 for the five seed crops and from (-) £2.40 to £20.62 for the 32 others.

In only two cases was the management and investment income a negative quantity.

Further details on costs, outputs, gross margin and management and investment income are given in the distribution tables in the Appendix.

SECTION 4

SOME ECONOMIC ASPECTS

Scale of Operation

A further grouping of the records from the 32 feed barley crops according to the total acreage of all cereals grown on each farm into 11 small (under 50 acres of cereals), 13 medium (50 to 99 acres of cereals) and 8 large (100 acres of cereals and over) is given in Tables VII and VIII.

TABLE VII

Average Costs Per Acre

Farms grouped according to total cereals acreage of each farm

	Group I	Group II	Group III
	Under 50 acres	50 to 99 acres	100 acres and over
Costs per Acre	11 farms	13 farms	8 farms
Variable	£		
Seed	3.03	3.34	2.65
Fertiliser	2.91	3.96	3.60
Miscellaneous (incl. lime)	2.13	2.11	1.82
Contract and casual	1.97	1.74	0.40
Total Variable Costs	10.04	11.15	8.47
Fixed Costs			
Rent	4.26	3.89	4.29
Farm labour and power	6.06	5.41	5.23
Depreciation	5.40	3.52	4.04
Sub-total (A)	15.72	12.82	13.56
Estimated overheads (B)	7.88	6.48	5.25
Total Fixed Costs (A + B)	23.60	19.30	18.81
Total Fixed and Variable Costs	33.64	30.45	27.28

The lower seed cost per acre in Group III reflects the greater use of home-grown seed. Growers in this group also relied less on contract and casual work.

Average fertiliser costs per acre varied between the groups and fertiliser use was probably influenced by the previous year's cropping. The percentages of the 1968 barley crop taken after grass were 49% for Group I, 24% for Group II and 31% for Group III.

Groups I and II in spite of contract and casual work still required more farm labour and power per acre than did the third group whose farms were geared to cereal production on a larger scale.

As one might expect the average depreciation when expressed per acre was highest for the group with the small acreages. The middle group had the lowest average depreciation per acre, about 10/- per acre less than the group with the larger acreages. This is probably due to there being a limit to the acreage that can be handled with a given amount of equipment. With further expansion in scale there tends to be more specialisation leading to increased capital investment in harvesting machinery and drying and storage facilities.

In a comparison of the three groups it is possibly better to ignore estimated overheads, item (B) in the fixed costs. These estimated overheads or share of general farm expenses are applied to the crop largely on the basis of labour and power used. In addition, as explained in the section on definitions and method, the rate of estimated overheads applied to dairy farms is higher than that which is applied to non-dairy farms. As ten farms in the first group, nine in the middle group and only two in the third group were dairy farms, this has also contributed to a higher overhead charge for the first two groups.

When the overheads are set aside so that a stricter comparison can be made, the costs were as follows:-

	Under 50 acres	50-99 acres	100 acres and over
Costs per Acre (excl. overheads)	£		
Variable Costs	10.04	11.15	8.47
Fixed Costs (excl. overheads)	15.72	12.82	13.56
Total Costs (excl. overheads)	25.76	23.97	22.03

Table VIII below compares crop outputs, gross margins and ends with the balance left to cover management and investment income and estimated overheads as the latter have been excluded from the fixed costs.

TABLE VIII

Average Output, Gross Margin and Balance to cover Management and Investment Income and Overheads

	Group I		Group II		Group III	
	Under 50 acres		50-99 acres		100 acres and over	
Crop Output	11 farms		13 farms		8 farms	
	cwt.	£	cwt.	£	cwt.	£
Grain (weights as recorded)						
Sold	3.31	4.04	12.07	11.61	21.95	23.82
Kept	30.84	30.42	21.08	19.72	8.23	8.53
Total Grain	34.15	34.46	33.15	31.33	30.18	32.35
Straw	21.74	4.32	16.50	3.45	18.84	4.08
Deficiency payments etc.		4.27		4.18		4.76
Total Crop Output		43.05		38.96		41.19
Variable Costs		10.04		11.15		8.47
Gross Margin		33.01		27.81		32.72
Fixed Costs (excl. overheads)		15.72		12.82		13.56
Balance		17.29		14.99		19.16

As acreage increased the average yield of grain per acre decreased. The 50 to 99 acres group had however the lowest crop output at £38.96 per acre. This was principally due to price differentials in the grain. More was sold moist straight off the combine and although both Group I and II had some grain stored moist in silos the estimated average price of grain kept was lower in Group II. Also proportionately more of the straw in the middle group was sold in the swath or burned.

Although on the above comparisons the group with the small acreages had the highest gross margin due to having the highest average yield, the large cereal growers in Group III were still left with the greatest balance.

Costs and Output

Although there was a considerable range in total cost per acre from the lowest of £20.74 to the highest of £45.60, the most frequent cost was around £25 to £30 per acre with the variable costs making up about £8 to £10 per acre and the fixed costs accounting for the remainder.

Output per acre varied from £32.43 to a high £58.76 on a seed barley farm with a crop yield well above average linked to the higher sale price of seed barley.

Yield and Gross Margin

If one assumes that costs generally will be around £25 to £30 per acre then it is to the output side that one must look for the greatest likelihood of increased profitability, namely to yield and related price. The importance of yield is brought out in the following table which shows the relationship of yield to gross margin. The gross margin (output less variable costs) is a convenient first stage to consider when making an economic assessment of the crop.

The 32 farms are distributed according to yield per acre - over 40.0 cwt., 35.1 cwt. to 40.0 cwt. etc.

TABLE IX

Relationship of Yield to Gross Margin

Results expressed per acre

Distribution of Farms	Yield	Average Yield (16%)	Average Output	Average Variable Costs	Average Gross Margin
No.	cwt.		£		
2	Over 40.0	41.7	51.97	8.49	43.49
7	35.1 to 40.0	37.1	46.57	10.58	35.99
10	30.1 to 35.0	32.1	40.02	10.55	29.47
12	25.1 to 30.0	27.4	36.65	9.95	26.69
1	25.0 and under	24.2	39.59	6.91	32.68

The single crop had a yield of just under 25 cwt. per acre. Nevertheless, due to very low variable costs and to a high output value because the grain (including a proportion of seed barley) was sold late in the season attracting storage premiums, the gross margin was £32.68 per acre. The returns in this case depended rather on the marketing of the crop. In most cases, however, a satisfactory yield is the first requirement for profitable barley growing.

Crop Disposal and Marketing

A summary of the disposal of the grain crop is given in the table below which relates to all the 37 costings.

TABLE X

Disposal of crop for 37 costed crops

% of Crop	Dried	Sold off Combine	Sold after storage before 1st January	Sold after storage after 1st January	Kept on Farm
Over 80	17	2	1	2	18
61-80	1	-	3	2	1
41-60	3	3	3	4	-
21-40	-	2	3	2	4
1-20	2	4	3	5	12
None	14	26	24	22	2
Total	37	37	37	37	37

On six farms (all dairy farms) the grain was stored moist in sealed tower silos and on two farms in butyl silos. Polythene bags were also occasionally used.

On six farms (livestock and cropping farms) the dried grain was stored in bins. Others adopted on the floor drying and storage methods, some adapting existing buildings and others having special sheds built.

Capital Investment

Of the 37 farms 13 had no investment in specialised grain storage buildings. For the remaining 24, capital investment in grain storage ranged from £2.25 per acre where adaptations were made chiefly to existing buildings to a very high sum of £55.33.

TABLE XI

Average Capital Cost per Acre

	5 Seed	32 Feed
	£	
Specialised machinery, combines etc.	19.20	17.18
Specialised buildings and fixtures	17.20	8.42
Total	36.40	25.60

The range for machinery was from £13.42 to £22.82 for the five seed, and from £5.64 (where the combine was hired) to £47.08 for the others.

The range for buildings was from nil (where the merchant dried and cleaned etc.) to £35.43 for the five seed and from nil to £55.33 for the others.

Total farm combine cutter bar length varied from 6 feet to 25 feet (two large combines) and the acres per foot of cut were from as low as 2.0 acres (where a small second hand combine was used on a very small acreage) to 41.7 acres where a combine in addition to harvesting a fairly large acreage of cereals on the farm was also used to do some contracting work on other farms.

The average number of acres per foot of cut worked out at 18.9 acres for the five seed crops and 13.3 acres for 25 of the 32 other crops. The remaining seven combines were contract or hired.

Other factors such as threshing capacity and separation area also affect the rate of work, but cutter bar length has been taken as a useful general guide.

Continuous Barley Growing

The growing of barley continuously year after year on a high proportion of the same farm fields is not common practice in the West College province.

Farm records were kept noting how much of the total 1968 barley acreage (costed or not) on each farm was in barley in 1967, and similarly how much of that without a break was in barley in 1966 and so on back to 1964. The results for the sample of 37 farms were as follows:-

Year	Acres
1968	3531
1967	1964
1966	1090
1965	625
1964	244

The figures for each successive year from 1964 to 1968 in the above table are cumulative and include those of the previous year.

In Table XII below the information is expressed in a different form to show the extent to which barley had been grown continuously on the same 1968 barley land by showing the acreages continuously in barley for five years, four years, etc., and expressing these as a percentage of the 1968 total of 3531 acres. The acreage of 3531 acres was the total barley acreage (costed or not) on the 37 farms. Other sections of this report deal with the 3084 acres for which cost records etc. were kept.

TABLE XII

Continuous Barley Cropping

Number of years continuously in barley	Year of first sowing	Acreage	% of 1968 Acreage
1st year	1968	1567	44
2 years	1967	874	25
3 years	1966	465	13
4 years	1965	381	11
5 years	1964	244	7
Total 1968 Barley Acreage		3531	100

Table XIII shows the distribution of farms according to the percentage of their 1968 barley land which was continuously in barley for four years or more.

TABLE XIII

Distribution of 37 farms according to percentage of barley land continuously in barley for four years or more

% of 1968 barley land continuously in barley	Number of farms recording barley grown continuously on at least some part of their 1968 barley land	
	1965	1964
Over 80	1	1
61 - 80	-	-
41 - 60	1	-
21 - 40	5	-
1 - 20	6	3
None	24	33
Total Number of Farms	37	37

One farm had a large proportion of its 1968 barley land and three farms a small proportion continuously in barley back to 1964.

Deficiency Payments etc.

For the 1968 barley crop the net acreage deficiency payment totalled £4 3 11d. comprising an advance payment of £3 0 0d. (The Home-Grown Cereals Authority levy of 11d. has been deducted.) made to growers around December 1968 - January 1969 and a final payment of £1 3 11d. made about September, 1969.

Depending on the time of sale, deductions or premiums per cwt. were also made as shown in Table XIV below.

TABLE XIV

Barley 1968 Crop Seasonal Adjustments

For each cwt. of barley sold and delivered in:-	Rate of deductions or premium per cwt.
July - October 1968	(-) 6d.
November 1968	(+) 4d.
December 1968	(+) 4d.
January 1969	(+) 6d.
February 1969	(+) 8d.
March 1969	(+) 10d.
April 1969	(+) 1s. 0d.
May/June 1969	(+) 1s. 2d.

On ten of the farms (livestock and cropping type) in the sample there was some form of forward contract with the Home-Grown Cereals Authority and the bonuses received on these ten contracts totalled in all £648 12s.

Over the sample as a whole the amounts received for acreage deficiency payments (net of any adjustment for early sales) and, where applicable,

storage premiums and H.G.C.A. forward contract payments ranged from £3.15 where a heavy yielding crop was all sold straight off the combine to £6.05 where the crop was sold later in the season and where there were quite sizeable H.G.C.A. forward contracts.

In 1939 barley was a rarely occurring cereal in the west. In that year, for example, Ayrshire and Dumfriesshire between them had only 50 acres. By 1959 this total had increased to 5610 acres and in 1968 there were over 38,000 acres. For the whole West College province there were nearly 110,000 acres of barley in 1968. This expansion has been at a greater rate in the west than for Scotland as a whole. Details of barley and oat acreages by county in the West College province are given in Appendix Tables VII and VIII.

In the period from 1959 to 1968 the net acreage cereal deficiency payments and guaranteed prices per cwt. for barley and oats were as in Table XV.

TABLE XV

Net Acreage Deficiency Payments and Guaranteed Prices

Cereal Year	Barley		Oats	
	Per acre	Per cwt.	Per acre	Per cwt.
	£ s. d.	s. d.	£ s. d.	s. d.
1959/60	9 4 8	29 -	5 10 2	27 5
60/61	10 8 6	28 9	7 8 10	27 2
61/62	8 10 -	27 7	7 3 1	27 5
62/63	8 15 -	27 7	6 12 1	27 5
63/64	7 4 -	26 8	7 6 7	27 5
64/65	6 16 1	26 8	7 8 10	27 5
65/66	3 11 2	25 4	6 12 -	27 5
66/67	4 10 10	25 4	6 11 4	27 5
67/68	4 8 1	24 9	9 3 7	27 5
68/69	4 3 11	25 2	8 15 5	27 10

It will be seen from the above table that the guaranteed prices for barley have in general been falling during the sixties, and yet the increase in the acreage of barley continues. It may be that technical developments have had more influence on this expansion of barley growing than Government pricing policies. Possibly too, the returns from barley growing relative to those from other forms of farming were more attractive, with the exception perhaps of intensive grassland dairying.

The technical developments have indeed been many and far-reaching. The production of high yielding varieties with shorter stiffer straw giving added resistance to lodging has encouraged an increased and more scientific use of fertilisers. By means of chemical sprays there is now better control of weeds, diseases and pests. Improvements in machinery have led to more efficient drilling, grain harvesting and straw handling, while systems of drying and storage have been developed to meet almost every condition and requirement.

The extent of these achievements may be appreciated when one considers that the market price per cwt. of barley is virtually the same now as it was ten years ago as Table XVI giving comparisons for barley and oats shows.

TABLE XVI

Average Market Price Per Cwt.

Cereal Year	Barley	Oats
	s. d.	s. d.
1959/60	20 7	20 11
60/61	19 7	16 11
61/62	19 8	19 2
62/63	19 7	19 7
63/64	20 5	19 5
64/65	20 6	19 8
65/66	21 3	21 -
66/67	21 -	21 8
67/68	20 7	19 1
68/69	20 11	20 10

DEFINITIONS AND METHOD

Seed

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

Fertilisers

Fertilisers and lime have been charged at net cost (i.e. subsidy has been deducted). No credit has been given for manurial residues. Similarly no charge has been made for any dung applied although carting and spreading costs are included.

Miscellaneous

Included here are the costs of fuel for self-propelled combine harvesters, all other fuels and power (e.g. oil for driers and electricity etc.) other than those used by tractors which are charged separately, also baler twine, bags, etc. Sprays where not shown separately are charged under miscellaneous.

Casual Labour and Contract Work

Charged at the rates paid.

Rent

Rent has been charged per acre at the rate paid by the tenant. For owner-occupiers it has been charged at a figure in line with the currently up-to-date rent which would be paid for a tenanted farm of similar size and type in the same locality.

Depreciation on Specialised Equipment, etc.

For implements, equipment and buildings used specially for the barley crop - combine drills, sprayers, combine harvesters, balers, grain drying equipment and storage bins (including moist grain silos), a straight charge

was made as follows:-

Implements and machines at 20% of net purchase price to farmer.
Fixtures and buildings at 10% of net purchase price to farmer.

It is realised that for older equipment which may, in some cases, be almost written off, this method gives a high depreciation charge. On the other hand repairs to older equipment are likely to be heavier and this method should leave a sufficient margin to cover such a contingency.

Where implements, equipment and buildings were used to deal with larger acreages of cereals than the barley being costed, the depreciation charge has been allocated on a proportional basis to give the correct charge against the barley crop.

Farm Labour

Regular labour has been charged at the actual rates paid on the individual farms including insurance, graduated pension payments, and allowances for perquisites and holidays, etc. Manual work of farmer and wife has been charged at the farm rate. Where there was no regular hired labour on a farm an estimated rate of 7s. 3d. per hour was charged for the farmer's manual work and 5s. 0d. per hour for the manual work of the farmer's wife.

Tractor

Tractor work has been charged at an estimated 4s. 9d. per hour for wheeled tractors and 13s. 6d. for crawler tractors. This charge covers fuel, depreciation and repairs.

Overheads (Share of General Farm Expenses)

These overhead expenses are difficult to estimate, since neither the complete financial accounts for the farms nor information as to the sharing of the overheads between the different enterprises on the farm are available. The overhead figures which have been used are based on a general average obtained from a sample of financial accounts of Scottish farms, and this is applied to the crop costings in proportion to the labour costs, to the number of tractor hours and to the acreage used for the crop. The result of this is to give an overhead charge based on a national (Scottish) average instead of on the figures for each individual farm.

Overheads have been charged at the following rates:-

	Dairy Farms	Other Farms
Per acre	13s. 0d.	11s. 0d.
Per £ labour	7s. 6d.	8s. 3d.
Per tractor hour	14s. 0d.	6s. 9d.

Thus the total charge for a man with a tractor working for an hour (assuming 7s. 3d. for the man) will be as follows:-

	Dairy Farms		Other Farms
Man	7s. 3d.		7s. 3d.
Overhead $\frac{7/6}{20/-} \times \frac{7/3}{1}$	2s. 9d.	$\frac{8/3}{20/-} \times \frac{7/3}{1}$	3s. 0d.
Tractor	4s. 9d.		4s. 9d.
Overhead	14s. 0d.		6s. 9d.
Total	28s. 9d.		21s. 9d.

These overhead charges per acre, per £ labour and per tractor hour, cover the share of general farm expenses which it is estimated should be borne by the barley crop:-

1. The share of the farm bill for wages, fuel, light and power, and for tractor depreciation and repairs which cannot be allocated to any particular crop or department.

2. A share of car running expenses and depreciation.

3. A share of miscellaneous farm expenses.

4. A share of repairs to buildings, fences and drains.

5. Shares of implement repairs, rates, insurance and depreciation on tenant's fixtures and normal farm implements.

Averages, Weighted and Unweighted

Averages throughout the report are unweighted except in Table IV on page 6 and in Appendix Tables XI and XII where they are weighted.

Unweighted averages are obtained by adding together the average per acre figures for each farm in a given group and dividing this total by the number of farms in the group.

Weighted averages are obtained by adding together the total figures for the farms in a group and dividing by the total number of acres in the group. This is equivalent to considering all the farms in a group as forming one large farm and dividing by the total acreage of the group.

APPENDIX TABLES

TABLE I

VARIABLE COSTS

Variable Costs £ per acre	Distribution	
	5 Seed	32 Feed
5.10 - 7.00	-	3
7.10 - 9.00	2	10
9.10 - 11.00	2	10
11.10 - 13.00	1	2
13.10 - 15.00	-	4
Over 15.00	-	3
Total	5	32
Range	£7.34 to £11.43	£5.28 to £16.11

TABLE II

FIXED COSTS

Fixed Costs £ per acre	Distribution	
	5 Seed	32 Feed
10.10 - 15.00	-	5
15.10 - 20.00	3	12
20.10 - 25.00	1	8
25.10 - 30.00	1	5
30.10 - 35.00	-	1
Over 35.00	-	1
Total	5	32
Range	£15.50 to £26.95	£12.50 to £36.95

TABLE III

TOTAL COSTS

Total Costs £ per acre	Distribution	
	5 Seed	32 Feed
20.10 - 25.00	1	5
25.10 - 30.00	2	14
30.10 - 35.00	1	4
35.10 - 40.00	1	6
Over 40.00	-	3
Total	5	32
Range	£24.84 to £38.38	£20.74 to £45.60

TABLE IV

TOTAL OUTPUT

Total Output £ per acre	Distribution	
	5 Seed	32 Feed
30.10 - 35.00	-	3
35.10 - 40.00	-	15
40.10 - 45.00	1	6
45.10 - 50.00	1	6
50.10 - 55.00	1	2
55.10 - 60.00	2	-
Total	5	32
Range	£44.38 to £58.67	£32.43 to £53.89

TABLE V

GROSS MARGIN

Gross Margin £ per acre	Distribution	
	5 Seed	32 Feed
Under 20.00	-	1
20.10 - 25.00	-	5
25.10 - 30.00	-	10
30.00 - 35.00	-	9
35.10 - 40.00	1	3
40.10 - 45.00	2	3
45.10 - 50.00	2	1
Total	5	32
Range	£35.71 to £48.22	£18.26 to £45.24

TABLE VI

MANAGEMENT AND INVESTMENT INCOME

M. & I.I. £ per acre	Distribution	
	5 Seed	32 Feed
0.00 & under	-	2
0.10 - 5.00	-	3
5.10 - 10.00	-	11
10.10 - 15.00	-	9
15.10 - 20.00	1	5
20.10 - 25.00	3	2
25.10 - 30.00	-	-
Over 30.00	1	-
Total	5	32
Range	£18.21 to £32.72	(-) £2.40 to £20.62

TABLE VII

BARLEY ACREAGES - 4TH JUNE RETURNS

	1939	1959	1965	1966	1967	1968
Argyll	611	209	612	1017	1352	1622½
Ayr	34	1365	10464	13526	15872¼	18412½
Bute	6	15	485	829	1135	1399
Clackmannan	65	743	1855	2186	2193½	2370¼
Dumfries	16	4245	17872	20641	19770½	19700
Dunbarton	2	104	1416	1873	1791	2218½
Kirkcudbright	24	1840	7775	10103	10380¾	10222¾
Lanark	64	1436	8848	10711	10787¾	11842¾
West Perth	137½	3270¼	11451	14668	13740¼	16335
Renfrew	2	791	3368	4190	4239	4657
Stirling	417	1661	6292	8319	7310½	8379½
Wigtown	35	3333	12903	14414	13723½	12580
West College Province	1413½	19012¼	83341	102477	102296	109739¾
Scotland	99597	228465	558522	670716	653622¾	711416¼
Guaranteed Price per cwt.		29/-d	25/4d	25/4d	24/9d	25/2d
Average Market Price:-						
Calendar Year	7/7d	20/10d	20/11d	21/2d	21/-d	20/6d
Cereal Year	13/10d	20/7d	21/3d	21/-d	20/7d	20/11d

TABLE VIII

OAT ACREAGES - 4TH JUNE RETURNS

	1939	1959	1965	1966	1967	1968
Argyll	13037	12064	8782	7970	7121¼	6102¾
Ayr	30366	29303	17218	13798	11887	9279½
Bute	3839	3698	2196	1737	1443¾	1202½
Clackmannan	2714	2158	1206	1185	1342½	1033
Dumfries	27692	28772	17231	14775	14514½	12425¾
Dunbarton	5369	4613	2269	1629	1481½	1172¾
Kirkcudbright	17348	17824	11174	8829	8040¼	7063
Lanark	31328	27001	15858	13232	12051¼	9120¾
West Perth	18501½	15165¾	10300	9716	10738¼	8380
Renfrew	6758	5855	2563	1613	1632¼	1130¼
Stirling	15687	14227	10137	9279	9638	7938
Wigtown	22007	19624	8644	7083	7152	6256¾
West College Province	194646½	180304¾	107578	90846	87042½	71105
Scotland	777057	720352	432872	398504	407535¾	345745
Guaranteed Price per cwt.		27/5d	27/5d	27/5d	27/5d	27/10d
Average Market Price:-						
Calendar Year	6/3d	20/10d	19/11d	21/5d	21/-d	19/5d
Cereal Year	11/1d	20/11d	21/-d	21/8d	19/1d	20/10d

The figures in Tables IX and X are from 5 seed barley costings on 647 acres and 32 feed barley costings on 2437 acres. The averages for Tables IX and X are unweighted. In Tables XI and XII the averages are weighted and relate to the total of 37 costings on 3084 acres.

TABLE IX

SUMMARY OF AVERAGE COSTS PER ACRE

Items of Cost	5 Seed		32 Feed	
	Hours	£	Hours	£
Regular labour	9.05	3.33	10.08	3.71
Casual and gang	0.82	0.29	0.61	0.17
Power: tractor	6.41	1.63	7.81	1.88
Contract services		-		1.31
Machinery depreciation		5.56		4.30
Other fuel (or power)		0.60		0.29
Materials: seed		3.06		3.06
fertilisers and lime etc.		4.31		4.16
sundries		1.15		1.10
Rent		5.00		4.12
Share of general farm expenses		4.21		6.65
Total Cost		29.14		30.75

TABLE X

SUMMARY OF AVERAGE YIELDS AND RETURNS

	5 Seed			32 Feed		
	Yield	Per Acre	Per Ton	Yield	Per Acre	Per Ton
	cwt.	£	£	cwt.	£	£
Grain sold:						
malting	0.78	0.90	23.08	2.29	2.53	22.10
feeding	11.19	11.13	19.90	8.43	8.42	19.98
seed	19.66	25.99	26.44	0.80	1.11	27.76
Grain kept:						
feeding	3.42	3.76	21.98	20.87	20.17	19.32
seed	0.51	0.63	24.70	0.35	0.43	24.58
Total Grain	35.56	42.41	23.86	32.74	32.66	19.96
Straw sold	16.96	4.09	4.82	2.68	0.65	4.86
Straw kept	4.19	0.90	4.30	16.21	3.26	4.02
Total Straw	21.15	4.99	4.72	18.89	3.91	4.14
Acreage payments, premiums, H.G.C.A. contracts		4.82			4.35	
Total		52.22			40.92	

TABLE XI

SUMMARY OF AVERAGE LABOUR AND POWER USED PER ACRE

Operation	Averages for 37 Barley Costings				
	Farm Staff*	Casual	Contract	Farm Tractor	Combine
	Hours per Acre				
Pre-harvest	4.78	0.02	0.04	4.56	-
Grain harvest	1.52	0.10	0.06	0.87	0.64+
Straw harvest	2.11	0.30	neg.	1.45	-
Drying and storage	0.62	neg.	N.A.	-	-
Total	9.03	0.42	0.10	6.88	0.64

*Includes farmer and wife and any unpaid labour.

+The average combine hours per acre are from 28 self-propelled farm combines, 2 tractor drawn farm combines, 6 contract combines and 1 combine hired from a neighbour.

Operation	Averages for 37 Barley Costings				
	Farm Staff*	Casual	Contract	Farm Tractor	Combine
	£ per Acre				
Pre-harvest	1.74	0.01	0.05	1.13	-
Grain harvest	0.57	0.03	0.34	0.20	+
Straw harvest	0.77	0.10	neg.	0.34	-
Drying and storage	0.23	neg.	0.05	-	-
Total	3.31	0.14	0.44	1.67	-

*Includes value of work of farmer and wife and of any unpaid labour.

+The costs of the farm combines are included under machinery depreciation with combine fuel noted separately for the self-propelled farm combines and tractor hours for the tractor drawn combines averaged under farm tractor. The costs of the contract and hired combines are averaged under contract charges.

TABLE XII

SUMMARY OF AVERAGE QUANTITIES OF MATERIALS ETC. USED PER ACRE

Material	37 Costings		
			Overall Average per Acre
Seed:			
Purchased			1.04 cwt.
Home-grown			0.53 cwt.
	Area dressed only		
	Acres	Average per Acre	
Farmyard manure	242	11.05 tons	0.88 tons
Straights - Nitrogen	289	1.80 cwt.	0.17 cwt.
Compounds	3084	2.58 cwt.	2.58 cwt.
Lime	513	1.68 tons	5.59 cwt.