# WYE COLLEGE MAIZE UNIT

(grant-aided by the Home Grown Cereals Authority)

# ECONOMICS OF GRAIN MAIZE PRODUCTION

A Report of a Survey of 21 Farms in

East Kent and East Suffolk

by J. D. Sykes

School of Rural Economics & Related Studies
WYE COLLEGE
1971

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August 1971

## INTRODUCTION

It is not yet possible to make a full evaluation of the economics of grain maize production and the present report is no more than an interim statement. The scale of maize growing in 1970 was far too limited to provide the breadth of information needed for a proper perspective of the potentialities and problems of the crop. This is likely to be the position until production has spread to new areas and until a number of seasons' experience has been gained.

Plans are in hand, however, to expand the extent of the studies currently being undertaken at Wye College. It is hoped that some fifty growers will supply information for the 1971 crop, as compared with twenty-one in 1970. (One farm provided two sets of records in 1970, giving a total of 22 sets in all).

The survey began, in 1969 when seven members of Canterbury Maize Growers collaborated in a pilot scheme with the Economics Department of the College. Month by month they provided reports on economic matters, such as the amounts and cost of fertilizers, seed and sprays used. Details of cultivations, labour and machinery use, and contract services were also logged. Agronomic aspects were also recorded and this has provided valuable information, on varying patterns of crop growth, weather effects, incidence of pests and diseases, etc. Apart from throwing light on the reasons for apparently good or poor economic returns, these details are also needed for computer simulation studies into rotational and break-crop aspects of maize.

## CONTRASTS IN GRAIN MAIZE PRODUCTION IN EAST KENT AND EAST SUFFOLK

Records for 1970 were obtained from a group of fourteen East Suffolk growers (members of Framlingham Farmers' Ltd.), in addition to eight records for East Kent from seven members of Canterbury Maize Growers Ltd. There are many interesting contrasts between the two groups. In East Kent production tends to be centred on well drained, free working, loamy soils on the chalk. East Kent also enjoys some climatic advantages, mainly in respect of warmth, though both areas suffer from cold East winds in Spring and may experience drought in summer. In East Suffolk, most growers' farms are located on the Boulder clay, except for those on the sandlands along the coastal strip. Both groups, but especially the latter, were adversely affected by the 1970 summer's extreme drought. Two sandland farms produced yields averaging only 12 cwt per acre of grain maize. It appears likely that equally poor yields, would have been produced by alternative crops. Barley yields as low as 5 cwt to 7 cwt per acre were experienced in the area.

Other important differences have a bearing on economic performance in the two areas. In East Kent, for example, the growers are organised in a tightly knit group. They work in fairly close conjunction with the Maize Unit at Wye College and they follow an agreed specified programme of fertilising, seeding, spraying and so on. The degree of co-operative working is very considerable. It not only involves the joint use of planting and harvesting equipment but it spreads over into arrangements for the handling, drying and marketing of grain. Some difficulties and inflexibilities result, but they appear to be more than off-set by the advantages of close technical supervision and collaboration between growers. There are also economies deriving from co-operative trading and operations.

East Kent growers began the 1970 crop with these advantages and with the extensive and fairly fully analysed experience of the 1969 crop. On these grounds their performance should have been good. In the event

some results were disappointing, as Table 1 shows :-

Table 1 Grain Maize Yields in East Kent

cwt per acre

| Farm No. | 1969 | 1970 |
|---|---|---|
| 1 | 44.8 | 50.0* |
| 2 | 44.7 | 26.5 |
| 3 | 43.7 | 40.5 |
| 4 | 34.3 | 13.6 |
| 5 | 33.8 | 34.2 |
| 6 | 33.7 | 48.6 |
| 7 | 15.6 | 37.2 |
| Simple Averages | 37.8 | 35.8 |

The East Suffolk growers, on the other hand, had a minimum of expertise in maize growing. They were somewhat more loosely organized and certainly less well provided with technical advice than the Kent growers. However, they have a well founded arable tradition and the growers tend to be very enterprising. Several had interesting ideas on such things as cultivations, fertilizer use and methods of drying, some of which they were able to put into practice.

The motives for grain maize production vary interestingly between the two areas. In East Kent, growers have essentially been looking for some years for a cash crop alternative to Barley, the price for which seems to be invariably poor because of Kent's 'surplus' position.** In Suffolk, on the other hand, attention has tended to focus on developing more certain and lucrative break-crops than beans. (The difficulties of achieving a wheat entry after maize on heavy land in a difficult season is, of course, well appreciated in Suffolk). In addition, in this area with its many intensive livestock units, the potentially higher energy output per acre of maize appears attractive in comparison with barley.

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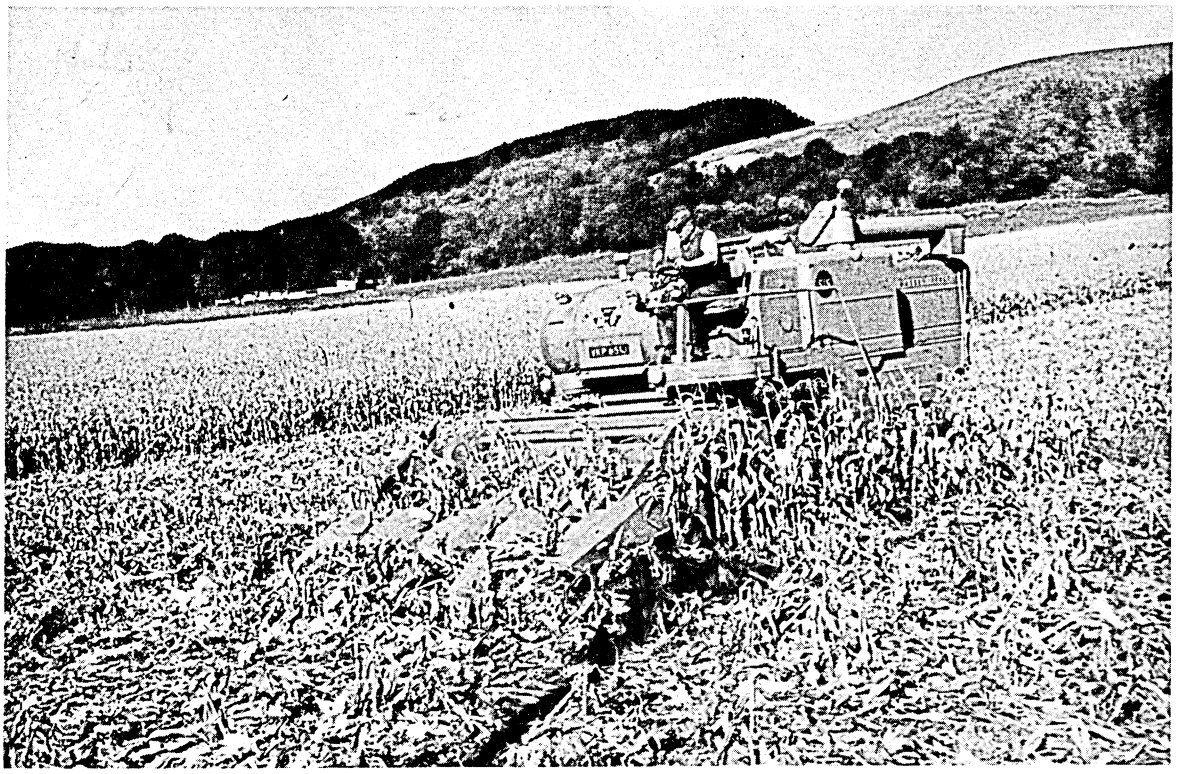
* Two records, from one farm, averaged.

** This is explained more fully in 'Cereals in the United Kingdom: Production, Marketing and Utilisation'. D.K. Britton. (Associate authors, B.E. Cracknell and I.M.T. Stewart). Pergamon Press, 1969.



Combining Grain Maize on the Wye College Farm

The picture shows Anjou 210 being harvested with a four row header attachment in October 1970. The crop, grown on a good chalky loam soil, yielded rather more than 50 cwt. of dried grain per acre and returned an Output of approximately £82 per acre.

There was a Gross Margin of almost £45 per acre after the payment of all Variable Costs, including Tractor and Machinery Variables.

The stover or trash was chopped up using a forage harvester and subsequently ploughed-in. The field was then sown to Winter Wheat.

## FACTORS AFFECTING YIELD

The analysis of information from the limited number of records for the 1969 crop in East Kent demonstrated that two factors were vital for profitability. These were the needs for a high yield of dry grain per acre and for a close control of costs. The results for 1970 provide ample confirmation of the importance of these requirements. They also underline the need for new growers to appreciate these vital issues before they commit themselves to growing the crop. Unless these points are widely understood many new growers risk wasting considerable effort and money. They may also mislead themselves, and others, as to the viability of the crop.

In several ways the experience of growers in East Suffolk who grew grain maize for the first time in 1970, highlights the difficulties of production for newcomers. There were some delays in starting, some difficulties over supplies and equipment and a rather uncertain approach to production in some cases. Several growers experienced agonizing hold-ups and shortfalls on vital operations such as drilling and combining.

The results for the first year of grain maize production in East Suffolk must be regarded as disappointing, the simple average yields per acre being 26.3 cwt (c.f. East Kent at 35.8 cwt.). The following table compares the proportion of the farms in the two regions which fall into each of five yield groups :-

Table 2 Grain Maize Yields in East Kent and East Suffolk 1970: Percentages of Farms in Different Yield Groups

| Cwt per acre | Under 15 % | 15-25 % | 25-35 % | 35-45 % | Over 45 % | All % |
|---|---|---|---|---|---|---|
| East Kent | 13 | - | 29 | 29 | 29 | 100 |
| East Suffolk | 14 | 21 | 36 | 29 | - | 100 |

It will be seen that 58% of growers in East Kent exceeded 35 cwts per acre while only 29% in East Suffolk did so. Given a better knowledge of the particular requirements of the crop and more favourable growing conditions, there would appear to be no reason why considerably improved results should not be achieved in future.

Drilling was far from satisfactory. Owing to a late start, the work tended to be rushed and the performance of the drilling machines sometimes left much to be desired. Not infrequently seed rates fell considerably below recommendations. Some plantings were too shallow and this subsequently seriously worsened the effects of the drought.

Bird damage was partly to blame for loss of plants. Preventive measures are important in the early stages of growth and, although a variety of measures were initially employed, effective control was not achieved until stringing the fields with black nylon thread was adopted.

There were also quite serious losses at harvest time, amounting in some cases to 15 to 20 per cent of the potential yield. This reflected problems of mechanization and plant growth habits. Very appreciable losses may occur, for example, if the combine is unable to harvest the cobs because of their position in relation to the stalk or because of lodging. This problem is related in turn to weather conditions, variety and disease incidence.

Losses are also apt to occur as a result of delays, mechanical breakdowns and problems of organizing co-operative harvesting. Whilst the heavy capital cost of harvesting equipment makes co-operative combining a very real advantage, there is no doubt that, in general, combining performance fell considerably short of the ideal in East Suffolk in 1970. It is interesting that similar troubles were experienced to fully the same extent in East Kent in 1969. A determined and largely successful effort was made to avoid them in 1970.

## COSTS OF PRODUCTION

The data collected related to 108 acres of grain maize in East Kent and to 156 acres in East Suffolk, a total of 264 acres. A variety of systems of grain handling* were adopted and the final results comprise 22 records overall distributed as shown in Table 3 :-

Table 3 Systems of Grain Maize Handling

Number of Records

| | E. Kent | E. Suffolk | Total |
|---|---|---|---|
| Farm Dried | 1 | 5 | 6 |
| Contract Dried | 6 | 6 | 12 |
| Propionic Acid Treated | 1 | 3 | 4 |
| Total | 8 | 14 | 22 |

Owing to the variety of methods employed to produce the crop, it is neither possible nor appropriate to study the results narrowly following the conventional 'gross margin-variable cost' approach. Thus in the following analyses, all machinery variable costs have been taken into account in order to establish a meaningful basis for comparison between the different systems of grain maize handling.

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* "Grain handling" refers to the method of treating the grain before storage or marketing. Differences in costs between different handling methods are likely to be greater than between other variations in production technique.

The broad pattern of results is given in Table 4 on a weighted average basis :-

Table 4 Grain Maize : Costs & Returns per Acre, 1970

| | E. Kent | E. Suffolk | Overall |
|---|---|---|---|
| No. of Records | 8 | 14 | 22 |
| Yield per Acre | 34.5 cwt | 24.4 cwt | 32.0 cwt |
| | £ | £ | £ |
| Output | 55.30 | 40.30 | 46.40 |
| Input | | | |
| (a) Seed, Fertilizers, Sprays, etc. | 17.40 | 19.10 | 18.40 |
| (b) Contract and machinery variable costs | 17.80 | 13.20 | 15.10 |
| All Variable Costs including Machinery | 35.20 | 32.30 | 33.50 |
| Gross Margin less Machinery Variables | 20.10 | 8.00 | 12.90 |

Considerable variations occurred in respect of the 'margin' (Gross Margin less All Machinery Variables), remaining to growers. The highest 'margin' was nearly £45 per acre; one quarter of the growers achieved margins of £30 and over.

It will be noted in Table 4 that, in addition to extending the definition of Variable Costs to include all machinery variables, such as fuel, repairs and other running costs, inputs have been divided into two groups : (a) purchased materials, (b) services. The aim of this division is to throw light on the difference between systems and areas.

It is evident from the above analysis that the East Suffolk grower on average spent somewhat greater amounts on purchased materials than the

East Kent grower but rather less on services. The latter is partly a consequence of a lesser dependence on contract drying services and partly a reflection of lower yields and a lower charge for drying. The high per acre expenditure on materials relates mainly to heavier herbicide and fertilizer applications, together with relatively larger purchases of propionic acid and of fuel for drying. There are grounds for the view that fertilizer usage was excessive. Herbicide applications, too, were not always effective and a good number of growers did not get value for money. This was probably to a considerable extent related to the dry season, but some growers did attempt to produce maize under conditions which were far from favourable. In some cases the land was excessively weedy, in other cases no alternative crop seemed likely to succeed and the land could therefore be 'spared' for maize. Past experience has shown very clearly, however, that maize cannot succeed under 'marginal' conditions and that the costs of failure are likely to be considerable. It may not generally be appreciated that the costs of production are perhaps three to four times as high as the conventional cereal crop. In order to achieve the high margin of which grain maize is capable, it is essential for the crop to be grown on fertile and reasonably clean sites. The highest standards of management are also most worthwhile. In practice this means taking considerable pains to check bird damage, to ensure a sufficient plant population and to minimize losses in harvesting, etc.

## THE CONTROL OF COSTS

It has already been indicated that grain maize production involves quite high costs and steps to control these are important if good per acre 'margins' are to be achieved. Savings in costs of the order of £3 to £5 per acre are quite significant and attainable. This is a major field for exploitation in the search for higher margins, and second only to the achievement of high dry grain yields per acre.

The scope for economy largely appears to centre on a group or co-operative basis for production. This, in the first place, enables seed, fertilizer and sprays to be obtained at competitive prices. Secondly, it can provide a very effective means for channelling information to growers on the best cultural methods, seed and fertilizer application rates, etc. There is considerable evidence that growers in East Kent were more conscious of the opportunities and necessity for cost control than were those in East Suffolk. By and large, the latter showed the more usual and perhaps natural grower pre-occupation with technical and husbandry matters.

Details of the costs of materials and contract services are given in Table 5. The principal differences relate to lower seed and drying costs in East Suffolk and to lower drilling and combining charges in East Kent.

Table 5 Cost of Materials and Contract Services in 1970

| | East Kent | East Suffolk |
|---|---|---|
| | £ | £ |
| Seed per lb. | 0.12½ | 0.07½ |
| Atrazine per lb. | 1.23 | 1.25 |
| Drilling per acre | 1.75 | 2.00 |
| Combining per acre | 6.50 | 7.00 |
| Drying per wet ton | 4.00 | 3.25 |
| Haulage per wet ton | 0.85 | 0.87½ |

The overall cost of services per acre in East Suffolk was lower than in Kent (Table 4). To a large extent this was a result of lower grain yields, the lower drying charge, lower initial moisture content of the grain and the greater extent of farm drying. The broad details are given in Tables 3 and 6. Fuller particulars are set out in Appendix I.

Table 6 Variable Costs per Acre for Various Grain Maize Handling Systems

| | Farm Dried | Contract Dried | | Propionic Acid Treated |
|---|---|---|---|---|
| | | E. Kent | E. Suffolk | |
| No. Records | 6 | 6 | 6 | 4 |
| Yield per Acre | 28.6 cwt | 33.1 cwt | 24.7 cwt | (32 cwt) * |
| | £ | £ | £ | £ |
| Growing | 18.70 | 18.80 | 21.20 | 19.20 |
| Harvesting, Drying, Storage, etc. | 10.50 | 18.20 | 14.30 | 13.30 |
| All Variable Costs | 29.20 | 37.00 | 35.50 | 32.50 |
| Gross Margin less Machinery Variables | 17.60 | 13.60 | 4.60 | (4.30)* |

* Estimated dry yield approximately 25 cwt, valued at £30 per ton.

## SYSTEMS OF GRAIN MAIZE HANDLING

Attention is focussed in Table 6 on the differences in costs of grain maize handling systems. However, it can be seen that, while the costs of growing the crop varied somewhat, they were of the order of £19 per acre on average, including machinery variable costs. Much greater differences occurred in respect of Harvesting, Drying and Storage Costs. The lowest average costs per acre were for farm drying followed by propionic acid treated grain.

There is some difficulty in making valid comparisons owing to the differences in yields of dry grain. However, the available evidence substantiates the view that Farm Drying is the least expensive system. This is also the case if the analysis is extended to include charges for labour and depreciation of machinery and equipment. (Appendix I, Table D).

The effects of the varying levels of yields between the groups are largely discounted in the following table, which shows variable costs per ton of dry grain :-

Table 7 Harvesting, Drying and Storage Variable Costs per ton Dry Grain Maize

| | £ | |
|---|---|---|
| Farm Dried | 7.40 | |
| Propionic Acid Treated | 10.60 | (Dry Ton Equivalent) |
| Contract Dried - East Kent | 11.40 | |
| Contract Dried - East Suffolk | 11.40 | |

The range of costs is rather narrower than for the per acre results.

The lowest costs of production were achieved on the six farms using their own driers. Their total variable costs approximated to £29 per acre, or £20 per ton, on average. Propionic Acid treated grain also cost the equivalent of £20 per ton. Contract Dried Grain, on the other hand, cost £22 per ton on average in East Kent and, due to low yields, nearly £29 per ton in East Suffolk. While the survey has thrown some light on the

comparative efficiency of the different systems of grain handling, it should be noted that the samples are very small and that variations in the weather, in disease incidence and in yields in general, could produce a somewhat different picture in future.

The influence of yield on costs has already been indicated. Nevertheless, it is perhaps worthwhile to draw attention to two further aspects of the cost relationships. In the first place the implications of the high 'fixed' costs of growing the crop should be noted (some £18 to £20 per acre in 1970 for seed, fertilizer, herbicides, etc). Although these are usually considered to be 'variable cost' inputs, they obviously become relatively highly fixed once the grower engages in production. It is true he may save a £ here or there, or spend more than budgeted on herbicides. But the point is that up to the time of harvest the criterion for success is not merely a low cost per acre, but rather harvestable yield. In other words, with a certain level of expenditure, one grower will achieve 45 cwt of maize to the acre while his neighbour, four or five fields away, with exactly the same outlay up to harvest, will have grown only 25 cwt. The former has grown his crop for £8.50 per ton, the latter for £17.00. The essential difference between the growers may, perhaps over simply, be attributed to 'management' and to some extent luck. In more specific terms, however, one is talking about timeliness, about the adequacy of cultivations and fertilization and attention to important points of detail, such as the prevention of bird damage.

A second important aspect of costs is that grain drying, handling and storage charges are well worthy of attention. Although they vary proportionately with yield and are thereby 'cost limited', that is not to say they are necessarily acceptable. Ways and means must be found, if possible, of achieving economies and this seems to be a very suitable field for individual growers to investigate. Agricultural engineers and plant breeders also have important roles to fulfil.

It has to be stressed that drying almost certainly presents the greatest technical bottleneck in grain maize production. It is important that this is recognised by would-be growers. The problem originates to no small extent from the fact that combine header attachments are very efficient. Under good working conditions and high yields very high hourly rates of off-take of grain are probable. The result may well be that the drying unit is overwhelmed unless it is of high capacity and/or can be operated round the clock if necessary. The high moisture content of newly combined grain puts very heavy loads on drying equipment and two, even three stage drying may be necessary. Alternatively, it may be necessary for some grain to be treated with propionic acid. The wet grain from the combine can only be handled satisfactorily for a few hours and some drying is therefore necessary as soon as possible. Rates of drying have to be carefully regulated in order to avoid such damage as splitting or discolouration.

It is perhaps worth mentioning that it appears possible for the moisture content of wet grain to vary widely with variety. Thus, Anjou 210 grown in East Kent in 1970 had an average moisture content 3 to 4 per cent greater than that for Kelvedon 59A harvested in East Suffolk. Factors like these may have an appreciable effect on costs. They may also have an organisational significance relating, for example, to the dates when harvesting can be undertaken, and determining the rate of throughput of the driers and so on.

## PROFITABILITY

The high price for cereals in the autumn of 1970 resulted in very satisfactory margins for grain maize growers achieving good yields. The grain was sold with little difficulty and several purchasers commented very favourably on the quality of the product. This was an improvement on 1969 when some adverse comments were heard as a result of some grain having been overheated during the drying process. In both areas the price realised was between £32-£33 per ton.

Particulars are given in Table 8 of the relationship between yield and profitability.

Table 8 The Relationship between Yield & Margin per Acre

| Cwt per acre | Under 25 | 25-35 | Over 35 |
|---|---|---|---|
| Average Yield | 15.6cwt | 28.5cwt | 42.0cwt |
| | £ | £ | £ |
| Growing Costs | 19.90 | 20.00 | 18.70 |
| Harvesting, Drying and Storage | 11.00 | 15.50 | 15.30 |
| All Variable Costs | 30.90 | 35.50 | 34.00 |
| Gross Margin less Machinery Variable Costs | (-) 5.70 | 10.90 | 33.50 |

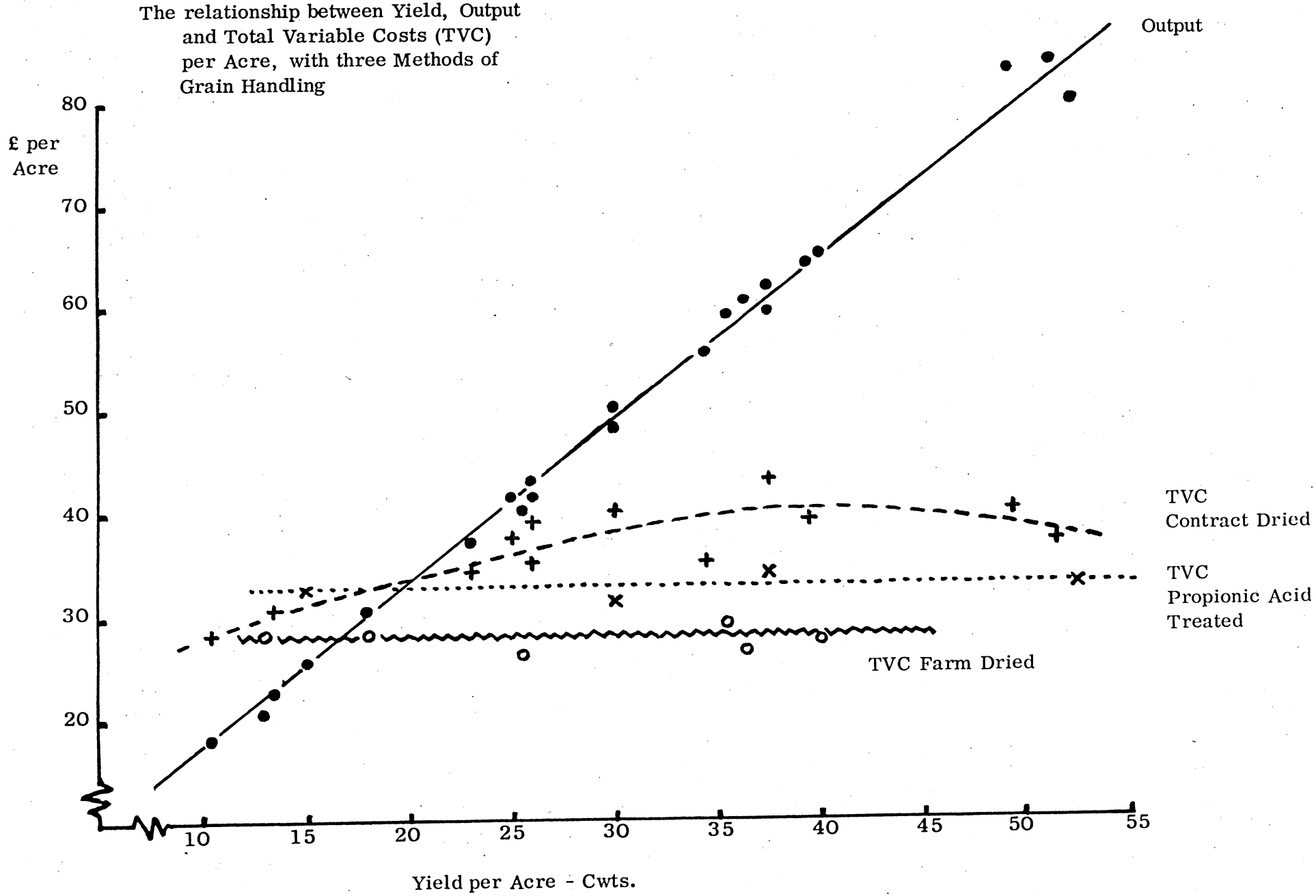
Nine growers with yields over 35 cwt, achieved an average margin of £33.50 per acre. At the other extreme, for six growers with yields of less than 25 cwt per acre, Variable Costs exceeded Output by nearly £6.00 per acre.

Figure 1 has been produced to throw more light on the matter of profitability. It shows the range of costs as related to yield together with the effects of the different methods of grain handling. There is, in fact, a remarkably stable level of costs over a wide yield range whatever the system of grain handling employed. Similar results were obtained in 1969.

Figure 1 is also useful for the light it throws on breakeven yields. This is the point at which the value of grain produced is just sufficient to cover all the variable costs, as defined. In 1970, for example, given a selling price of about £32.50 per ton, the breakeven yield for farm dried grain was about 18 cwt per acre. For contract dried grain, however, a yield of about 21 cwt was required to cover all variable costs.

Figure 1 GRAIN MAIZE PRODUCTION 1970

The relationship between Yield, Output and Total Variable Costs (TVC) per Acre, with three Methods of Grain Handling



## FUTURE PROSPECTS

The results for 1970 show that two in five growers produced more than 35 cwt of grain maize per acre and achieved 'margins' averaging £33.50 per acre. Although this is not the whole story, it is indicative of the possibilities. It leaves out, of course, important considerations relating to the break-crop and cleaning value of grain maize. Similarly, it does not take account of the benefits or disadvantages of the seasonal pattern of labour requirements of the crop.

The future role of the grain maize crop is very much related to trends in the prices and productivity of alternative crops. Will it be possible in future to improve yields of barley and beans more easily than maize? How will changes in livestock husbandry and the demand for livestock products influence the prices of grains? Already there has been one foretaste of the future. In 1970 the high prices for cereals meant that there were no Cereal Deficiency Payments for barley. This removed one of the factors formerly discriminating against grain maize in favour of barley production.

Looking to the future, perhaps the most important immediate considerations relate to questions of reliability of yield and to high productivity. Costs are rising swiftly and selling prices may well be weaker. Growers must therefore, pay great attention to the basic husbandry aspects of production which largely determine yield. Studies to date have indicated that there is a place for grain maize in the more favoured districts. Yet each case studied has shown the need for attention to details of husbandry. Owing to the high costs, production cannot be justified under unfavourable soil or climatic conditions. Land must be reasonably clean and in good heart. Cultivations, and planting especially, must be thoroughly undertaken. The choice of variety, too, calls for careful selection to suit farm, harvesting and drying conditions.

In the hands of the more committed and professional grower, profitability is likely to be good. In the most favoured districts margins may well approximate to those of wheat. Throughout much of southern England grain maize seems very likely to be able to compare favourably with barley as a cash crop. Furthermore, in comparison with field beans, it may prove to be a more reliable yielding crop.

The next few seasons will have their ups and downs. Mistakes will be made and sometimes at considerable cost. Yet progress will also be achieved and we may look forward to a flow of information from experimental workers. A much needed increase in competitive pricing of inputs should also follow, as more commercial interests appreciate the opportunities for developing the market. Last but not least growers can contribute towards improvement through their continued willingness to record and communicate much needed information on the economic and agronomic aspects of production.

In the last analysis the success or otherwise of the crop may well depend upon the speedy and precise evaluation of this information. At this stage there is still much to be learned, but the results of the leading growers are very encouraging. Likewise, there are clear warnings of the penalties to be incurred where standards of production fall short of the optimum.

APPENDIX I

## STATISTICAL TABLES

### Table A The Effect of Yield on Returns from Grain Maize Production

East Kent and East Suffolk 1970

| Yield Level | 7 Highest | 7 Next Highest |
|---|---|---|
| Average yield per acre | 41.1 cwt | 29.5 cwt |
| Average acreage per farm | 12.6 | 10.3 |
| | £ | £ |
| Output | 68.40 | 48.30 |
| Inputs | | |
| Seed | 3.30 | 2.90 |
| Fertilizer | 7.90 | 10.00 |
| Sprays | 3.90 | 4.90 |
| Fuel, Stores, etc. | 3.30 | 1.00 |
| Total Materials | 18.40 | 18.80 |
| Contract and Hire | | |
| Planting/Combining | 7.50 | 8.00 |
| Drying/Haulage | 5.80 | 7.00 |
| Sub-Total | 13.30 | 15.00 |
| Other Machinery Variables | 2.10 | 1.70 |
| Total Services | 15.40 | 16.70 |
| All Variable Costs including Machinery | 33.80 | 35.50 |
| Gross Margin less machinery variables | 32.60 | 12.80 |

Table B Labour Inputs for Grain Maize Production (1970)

| Grain Handling System | Man Hours per Acre | | |
|---|---|---|---|
| | Pre-Harvest | Harvest and Post Harvest | Total |
| Propionic Acid | 7.0 | 4.1 | 11.1 |
| Farm Dried | 5.2 | 4.0 | 9.2 |
| Contract Dried: | | | |
| East Kent | 5.1 | 2.5 | 7.6 |
| East Suffolk | 5.7 | 1.7 | 7.3 |
| All Systems | 5.6 | 3.0 | 8.6 |

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Table C Tractor Inputs for Grain Maize Production (1970)

| Grain Handling System | Tractor Hours per Acre | | |
|---|---|---|---|
| | Pre-Harvest | Harvest and Post Harvest | Total |
| Propionic Acid | 5.6 | 3.5 | 9.1 |
| Farm Dried | 5.0 | 2.1 | 7.1 |
| Contract Dried: | | | |
| East Kent | 4.2 | 1.8 | 6.0 |
| East Suffolk | 5.4 | 1.7 | 7.1 |
| All Systems | 5.0 | 2.1 | 7.1 |

Table D Direct Costs of Production per Acre by Grain Handling System (1970)

| System: | Propionic Acid | Farm Dried | Contract Dried | |
|---|---|---|---|---|
| | | | E. Kent | E. Suffolk |
| | £/acre | £/acre | £/acre | £/acre |
| Purchased Materials | 22.30 | 18.70 | 16.10 | 17.70 |
| Contract and Hire | 7.20 | 8.00 | 19.20 | 15.90 |
| Other machinery Variables | 3.00 | 2.50 | 1.70 | 1.90 |
| All Variable Costs | 32.50 | 29.20 | 37.00 | 35.50 |
| Labour | 5.50 | 4.70 | 3.80 | 3.70 |
| Machinery Fixed Costs | 2.90 | 4.60 | 2.20 | 2.30 |
| Total Direct Costs | 40.90 | 38.50 | 43.00 | 41.50 |
| Total Direct Costs per ton Dry Grain Produced | 33.00 | 26.80 | 26.60 | 34.00 |

Table E Direct Costs of Production per Acre by Yield Group (1970)

| Cwt per Acre: | Under 25 | 25 to 35 | Over 35 | All Growers |
|---|---|---|---|---|
| No. Growers | 6 | 7 | 9 | 22 |
| Variable Costs | £/acre | £/Acre | £/acre | £/acre |
| Pre-Harvest | 19.90 | 20.00 | 18.70 | 19.40 |
| Harvest & Post Harvest | 11.00 | 15.50 | 15.20 | 14.10 |
| All Variable Costs | 30.90 | 35.50 | 33.90 | 33.50 |
| Labour | 3.50 | 4.20 | 5.10 | 4.30 |
| Machinery Fixed Costs | 2.30 | 2.60 | 4.00 | 3.00 |
| Total Direct Costs | 36.70 | 42.30 | 43.00 | 40.80 |
| Total Direct Costs per ton Dry Grain Produced | 48.60 | 29.60 | 20.40 | 29.60 |

APPENDIX II

## WYE COLLEGE MAIZE UNIT

(grant-aided by the Home-Grown Cereals Authority)

Work on the technical aspects of growing maize for grain has continued at Wye since 1965. The early years were primarily concerned with techniques of establishing and growing a good crop and with obtaining reliable estimates of field yields over several seasons using maize harvesting machinery. Later there was a need for special work on harvesting methods, and systems of drying and storage for grain that comes off the combine at about 35% moisture content. During the last 2 - 3 years the main feature of maize growing has been the establishment of groups of growers in counties in the south-east from Suffolk to Devon. The farmers pioneering this crop are gauging how maize fits into arable cropping, and gaining experience in the sharing of harvesting and drying equipment. This latter phase has enabled economic studies of maize growing to be started and, although this report concentrates on groups in Kent and Suffolk, the work has since been extended to cover other areas such as Essex and Hampshire as well.

In 1970 the Home-Grown Cereals Authority provided support for the Wye College Maize Unit to be set up. This enabled the staff members in the College who were studying different aspects of maize to co-ordinate their work closely and extend the scope of experiments and economic studies. In addition a Maize Agronomist has been appointed and experiments are being carried out at other sites in East Anglia.

The Unit has the following staff :

AGRONOMY

| | |
|---|---|
| G. M. Milbourn, M.Sc., Ph.D. | Lecturer in Crop Production |
| G.E.D. Tiley, B.Sc., Ph.D. | Appointed by Home-Grown Cereals Authority. |
| | Department of Agriculture |

ECONOMICS

| | |
|---|---|
| J.D. Sykes, B.Sc., N.D.A., Dip. Agric. Econ. (Oxon) | Senior Lecturer in Agricultural Economics |
| | School of Rural Economics |

HARVESTING AND DRYING

| | |
|---|---|
| R.D. Bell, B.Sc.Eng., M.I.Mech.E., F.I.Agr.E. | Lecturer in Farm Mechanisation Department of Agriculture |

ORGANISATION OF GROWING GROUPS

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|---|---|
| F.P.H. Huntington, B.Sc. | Manager of Wye College Farm |

Recent experience in growing maize for grain has been brought together in the booklet "Maize for Grain - A Grower's Handbook" by G.M. Milbourn (1971), which can be obtained from the publishers (price 40p):

Home-Grown Cereals Authority,
Haymarket House
Oxendon Street
London, S.W.1.