Agricultural Enterprise Studies
in England and Wales
Report No. 34

WYE COLLEGE
UNIVERSITY OF LONDON

DESSERT APPLES AND PEARS: 1973 AND AFTER

Studies in the Economics of Fruit Farming
Report No. 13

R. R. W. Folley and B. B. Beattie

FARM BUSINESS UNIT
SCHOOL OF RURAL ECONOMICS AND RELATED STUDIES

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Mr. John Rendell, Mr. W.C. Housden and Mr. Hugh Elsom carried out the fieldwork from Bristol, Cambridge and Wye respectively. The text was prepared by Mrs. M.J. Copland and printed by Mr. T. Humphries in the School of Rural Economics.

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AGRICULTURAL ENTERPRISE STUDIES IN ENGLAND AND WALES

University departments of Agricultural Economics in England and Wales have for many years undertaken economic studies of crop and livestock enterprises. In this work the departments receive financial and technical support from the Ministry of Agriculture, Fisheries and Food.

A recent development is that departments in different regions of the country are now conducting joint studies into those enterprises in which they have a particular interest. This community of interest is being recognised by issuing enterprise reports in a common series entitled "Agricultural Enterprise Studies in England and Wales", although the publications will continue to be prepared and published by individual departments.

Titles of recent publications in this series and the addresses of the University departments are given at the end of this report.

Authors' note. Metrication: at the risk of appearing not to move with the times, many quantities have been expressed first and foremost in the hitherto conventional units of measurement. This has been done for ease of comparison with the 1972-73 data, which is a prime requirement for the 1973-74 results.

CONTENTS

I. INTRODUCTION

This is the third economic study based on English apple and pear orchard enterprises to be carried out on a national scale with the intention of documenting the present state of the industry. The two previous studies have highlighted the variations in fruit-growing practice and cost structure both within and between three different regions of England; while collateral work has shown how specialized producers, producers with other horticultural interests and fruit-growing farmers tend to form separable groups and to have their own conception of how to produce apples and pears.

Distinct from field and other annual crops, fruit production involves a long production cycle. Adjustment to changes external to the industry can thus appear relatively slow. For example, five to six years must elapse before a decision to increase output can take effect: here the decision can be quick but the period to fruition is long. By contrast, a decision to reduce output (by grubbing-up trees) can be given immediate effect but the actual decision may have been in the making for several years. A long decision-making period and a slow-acting result must in principle be a handicap to growers at a time of rapid social and economic change: but on the other hand growers are relatively untroubled by inner promptings to make appropriate acreage adjustments each year to the expected state of the market.

It is also well-known that in western Europe generally and in the United Kingdom particularly, the difficulty growers have in making the 'right' decisions is only made worse by the uncertainty surrounding any proposed course of action. Both long- and short-term weather cycles have been identified and Nature may be either a neutral, a helpful or an opposing influence in relation to growers' intentions. The world over, then, long-term trends are more noticeable than year-to-year fluctuations in orchard acreage. In England and Wales, for example, the dessert apple orchard area reached a peak in 1957, after twenty-five years of annual net increases. Since then the trend has been downward. It is thought that initially the removal of entire acreages (unprofitable enterprises) was the cause. More recently, successful growers have been reducing their acreage as a long term (i.e. policy) measure.

For the present purpose, however, the year-to-year variations are important because, being severe, they affect inputs, outputs and profits; and hence a balanced view can only be acquired with a number of years' experience. For example, in the recent past a light crop (i.e. low yield) has had the most profound economic effect, leading to a high average profit per acre but also to an immense range in profitability (including financial losses). Within the range of possibilities a reference to the size of crop - light, normal or heavy - will convey a certain general understanding. Even so, significant aspects of the individual growers' situation may well be obscured. Each grower's relative position is determined each year by his unique combination of yield, cost and price, so that only a distribution (in the statistical sense) of incomes could give a clear picture.

Conditions in each year of an enterprise survey are briefly described in the next section.

The 1969/70 Crop Study

The crop in 1969/70 was considered to be of normal size and good quality, following four years of lighter crops. Yields in 1969, however, were not normal on all farms; some growers had a good crop while there were some growers with no crop at all. The financial results obtained from the sample of growers in 1969/70 were therefore variable, including high profits as well as high losses.

The main facts emerging from the 1969/70 study were that costs, excluding interest on capital, exceeded revenue on about 35 per cent of enterprises. In south-east England yields were relatively light as well as variable from farm to farm, and Kent did not show up well in a regional comparison with East Anglia and the West Midlands. Unit costs of production, unlike yields, tended towards an average value in that year.

The 1972/73 Crop Study

In contrast to the 1969/70 crop the 1972/73 crop was exceptionally low - particularly for Cox's Orange Pippin - and this factor, plus a number of other influences, resulted in very high prices and a

consequent high profit year for those growers that had a fair crop. Profit levels for this crop did indicate the viability of English fruit-growing under the existing conditions.

As with the 1969/70 figures, the 1972/73 figures provided further evidence of the variations in apple and pear growing practice. The variation between growers' "variable costs" - i.e. raw materials and casual labour - was greater than the variation in yield and at least as great as that in labour use and in overhead or fixed costs. The individual variations of factors such as yield and average cost per bushel had deviations up to 50 per cent of the mean. We may suppose that growers were practising cost control effectively so far as they could on the farm, but this did not extend to marketing. Almost every grower sorted, graded and packed his fruit and although this was shown to be the costliest operation on the farm marketing cost was one of the least variable quantities. No correlation existed between the amount spent on marketing and the subsequent sale price.

Comparing results on specialised and on mixed farms gave the surprising result that Management and Investment Income per acre (MII) was the same for both types of farm. While the yields and returns to the specialist producer were higher than the mixed producer's, his costs were much higher also.

The other important finding of the 1972/73 study was the poor showing of the smallest class of enterprise, those of 10 to 20 acres. On this class of enterprise the highest contributing factor to poor performance was low yields per acre compared with the larger orchards. Market prices were almost on a par with the larger orchards', as were costs. MII for all larger orchards (over 21 acres) was nearly three times that of the smaller orchards.

The difference between the 1969/70 and the 1972/73 crop year is vividly reflected in the returns. The sale value of the crop in these two years was respectively £1.38 and £2.85 a bushel; and the total costs were £1.26 and £2.33 a bushel, leaving producers a MII of £0.12 and £0.52 a bushel respectively.

The 1973/74 Crop Study

The 1973 crop was of more normal size. There was a good crop of Cox's Orange Pippin and its quality was generally good; but fruit size varied between varieties and areas. Parts of Kent and Sussex experienced storms which caused loss and damage to fruit. Table 1 shows the differences in crop level in 1969/70, 1972/73 and 1973/74 compared with the 1969/70-1973/74 average.

Table 1

Gross Production of Dessert Apples in England and Wales

(thousand tons)

Variety	1969/70-1973/74 5 year average	1969/70	1972/73	1973/74
Cox's Orange Pippin	149.8	148.4	86.6	166.8
Worcester Pearmain	45.2	48.1	43.8	42.0
All others:				
Early	20.0	21.0	19.1	20.6
Mid-season	31.2	32.4	26.8	29.5
Late	26.5	36.9	21.2	25.7
Total:	272.7	286.8	197.5	284.6

Source: Fruit Intelligence.

II. OVERALL RESULTS OF THE 1973 CROP

II.1 The Survey

As in the previous year, enterprises having either less than ten acres of apples and pears jointly, or a high proportion of young non-bearing trees, or too large a proportion of culinary varieties were excluded from the survey. The growers participating were originally randomly selected in 1971 from a list of commercial producers of apples and pears provided by the Ministry of Agriculture, Fisheries and Food. In essence, 1973 was the second year of the 1972 survey, but, for various reasons, the number of participants in 1973 was 33 compared with 43 in the previous year. Table 2 shows the contribution of each region in 1973.

Table 2

Usable Returns, 1973 Crop

Region	number surveyed	number realised
Bristol	5	5
Cambridge	15	13
Wye	23	15
Total	43	33

The usual reservations relating to surveys of this type must be borne in mind when considering the published results. The total number of enterprises is less than in the previous year, which then represented about three per cent of all growers in the area covered. It is possible that some loss of representativeness may be introduced by using the same sample a second time, but this would only be important, if at all, when assessing the national situation on the basis of the sample results.

More to be deplored is the time lag which creeps in between growers' experience of a crop and the availability of all the required accounts for research, and thereafter the further delay before the

research results can be published. Inflation having been rife since 1973 the results are more than usually out of date.

II.2 Overall Results

The total (bearing plus non-bearing) acreage costed was 2,060 acres, the mean size of enterprise being 62 acres (25 ha). Enterprises ranged in size from 10 acres to nearly 400 acres. Table 3 shows the production, costs and returns for the mean enterprise and Figure 1 the relative size of these quantities. Production per acre and per enterprise were both very variable, the lower and upper limits of the latter being 2,000 bushels and 100,000 bushels, with a mean value of 17,475 bushels (327 tonnes)*.

Mean yield per acre, at 282 bushels an acre (13.4 tonnes per ha), was higher than in 1969 and better than expected in view of the unfavourable spring weather.

The market value of the growers' crop averaged £33,294 per enterprise, equivalent to £537 per acre (£1342 per ha). Unfortunately, this figure cannot have a lot of meaning - it does not apply to any recognized point along the distribution chain, for example, because it is simply the average value within the sample of enterprises for fruit sold in the market (for which a market value is obtained) and fruit sold ex-packhouse (for which the packhouse's gross value is obtained).

Table 3

Production, Costs and Returns per Enterprise, 1973 Crop

Size of enterprise	acres	62
Production	bushels	17,475
Growers' gross returns	£	33,294
Marketing costs	£	8,990
Variable-type production costs	£	5,828
Fixed-type production costs	£	12,276
Management and Investment Income	£	6,200
Yield	bushels per acre tonnes per ha	282 13.4

* Calculated on a weighted average bushel weight (of apples and pears in due proportion) of 41 lbs.

Figure 1

Percentage Share of Costs and M.I.I.

27	Marketing costs
17	Variable-type costs
37	Fixed-type production costs
19	Management and Investment Income

Marketing costs, as reported, amounted to £8,990 per enterprise or £145 per acre. This then left producers with an average of £24,304 per farm, or £392 per acre available to meet all other expenses. Variable-type costs such as spray materials, herbicides, fertilisers, casual labour and others were, on average, £5,828 per farm or £94 per acre, leaving a crop gross margin of £18,476 per farm or £298 per acre. Fixed production costs including regular and unpaid labour, power and machinery and business expenses, amounted to £12,276 per farm or £198 per acre. The M.I.I. for the sample of apple and pear producers in England in 1973/74 was therefore estimated from this survey to be £6,200 per farm or £100 per acre. Figure 1 illustrates the percentage distribution of costs and returns to English apple and pear growing as calculated from this survey.

The extreme financial variability over the whole sample however is indicated in Table 4 which shows the ranges alongside the mean values per acre and per bushel. Figure 2 depicts the distribution of M.I.I. (A) and the distribution of cost of production (B). In some cost items there is a difference of over 20 times between the lowest and highest figure. This variability from farm to farm featured in the previous two enterprise surveys and shows no sign of becoming less.

It seems clear that all growers are not of the same mind about apple- and pear-growing and devise their own ways of overcoming recognised handicaps on their holdings. One result thereof is the big range in expenditure per acre.

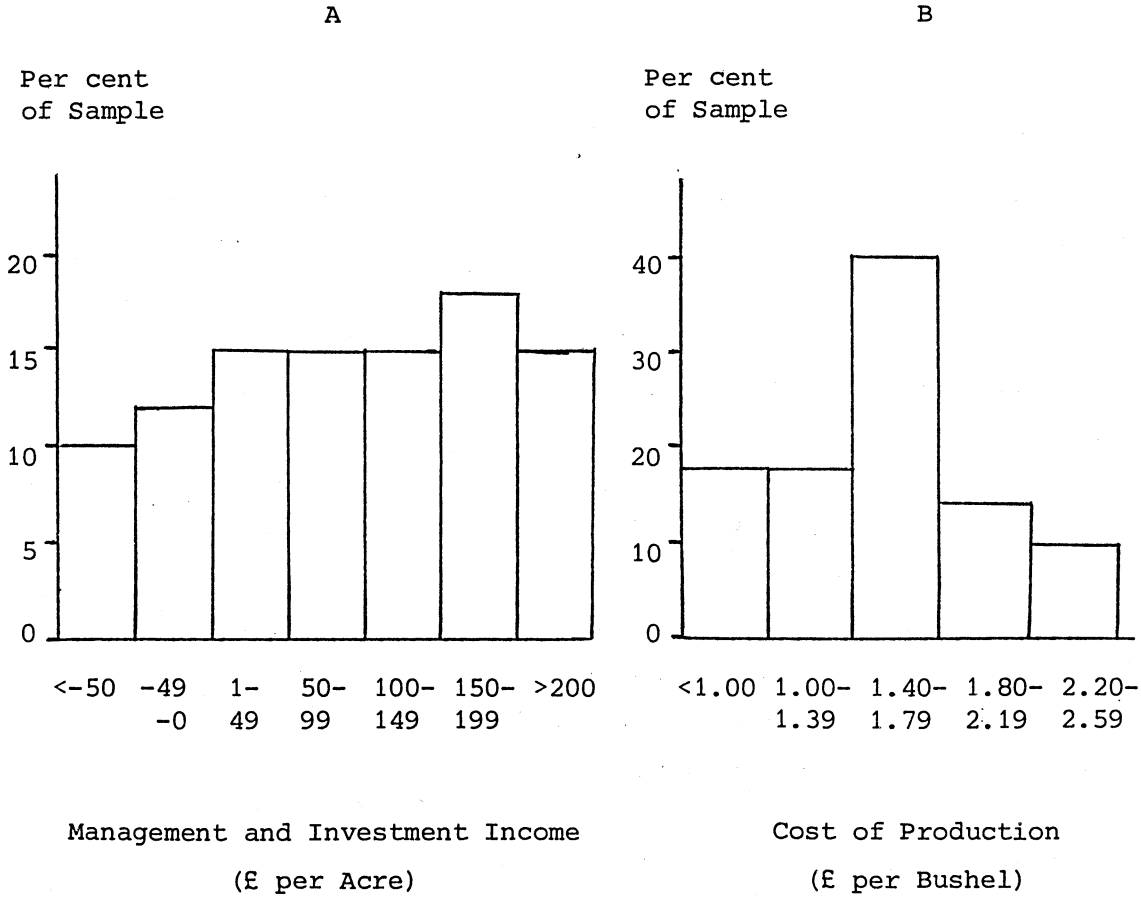
Table 4

Variability of Cost Structure, 33 Enterprises, 1973 Crop

Classification	£ per acre Range	£ per acre Mean	£ per bushel Range	£ per bushel Mean
Growers' gross returns	974-180	537	2.35-1.20	1.81
Marketing costs	377- 23	145	0.89-0.15	0.51
Crop net output	813-156	392	1.92-0.35	1.30
Variable-type production costs	193- 43	94	2.35-0.11	0.34
Crop gross margin	734- 46	298	1.84-0.20	0.96
Fixed-type production costs	479- 71	198	1.16-0.21	0.66
Management and Investment Income	396-(-)190	100	1.14-(-)0.86	0.30

Figure 2

Distribution of Management and Investment Income (A) and Cost of Production (B)



On a unit basis, the Gross Return to the grower from the sale of his fruit was £1.81 per bushel. Of this amount marketing expenses took £0.51 per bushel, and spray materials, herbicides, fertilizers and the like a further £0.34. Fixed-type costs for labour, energy and business expenses were about twice variable-type costs at £0.66. Management and Investment Income was £0.30 per bushel.

Taken as a proportion of all costs, marketing accounted for one-third, variable-type costs about one-fifth and fixed-type costs a little under half. Costs were 81 per cent of returns.

As stated in the previous report, it is not intended to carry out a detailed statistical analysis of the data in this two-year study. For the purposes of practical usefulness, presentation of the data in tables and graphs should provide the information likely to be required. A more detailed analytical and long-term analysis of English dessert apple production is currently (1975) being undertaken, using data for the national crop.

II.3 Regional Results

Enterprise results according to region can be seen in Table 5, and Figure 3 shows the composition of costs and the share of M.I.I. for each region.

Table 5

Summary of Financial Results by Region 1973 Crop

Regional Centre	Bristol	Cambridge	Wye	Bristol	Cambridge	Wye
	£ per acre			£ per bushel		
Growers' gross returns	411	511	567	1.89	1.87	1.74
Marketing costs	117	155	145	0.53	0.58	0.43
Crop net output	294	396	422	1.36	1.29	1.31
Variable-type production costs	81	97	96	0.39	0.36	0.30
Crop gross margin	213	299	326	0.97	0.93	1.01
Fixed-type production costs	116	224	202	0.51	0.78	0.64
Management and Investment Income	97	75	124	0.46	0.15	0.37
Number of enterprises	5	13	15			
Mean size of enterprise (acres)	66	40	50			
Mean yield per acre (bushels)	209	286	297			

Figure 3

Percentage Share of Costs and M.I.I. by Region

	Bristol	Cambridge	Wye
Marketing costs	28	28	25
Variable-type costs	20	18	17
Fixed-type production costs	28	40	36
Management and Investment Income	24	14	22

The three regions specified differ somewhat in climate, in location advantage and in type and size of apple and pear enterprise. The sampling procedure has given rise to a roughly similar size of enterprise in each region - between 50 and 65 acres, whereas in practice size differences are more significant. In 1970 the mean size of dessert apple and pear enterprises exceeding 10 acres in the three regions was as under:

Cambridge 28 acres; Bristol 40 acres; Wye 50 acres.

As was the case in the 1972-crop survey the mean yield per acre was highest in the south-east of the country. Yields in all three regions were considerably higher than in the previous year, being doubled in the case of the Cambridge sample, up by three-quarters in the case of Wye and by two-thirds in the case of Bristol. The averages for the Wye and Cambridge regions were reasonably comparable, with the same proportion - about one in eight growers - reporting less than 200 bushels an acre. For the Bristol sample this proportion was two out of five and although the representation is small, not one enterprise reached the average yield of the other two regions.

The south-east sample has now had the highest average yield in two years out of the three covered by these economic studies. At the same time it is pertinent to record that even in the Wye sample in 1973 there was a difference of 500 bushels an acre between the highest and the lowest yield recorded - 633 bushels an acre (30 tonnes per ha) and 130 bushels (6 tonnes) respectively.

Production costs. The 1973 figures confirmed that the relatively large orchards of the Bristol province were, on the whole, most economically run. Both variable and fixed costs per acre were lower than for the other two samples, and - yield being lower than elsewhere - expenditure on marketing was lower too.

The high fixed costs for the Cambridge sample denote a greater representation of relatively small and highly-capitalised enterprises.

Table 5 shows greater consonance between the regional averages than might be expected in view of the enormous range in individual results to which attention has been drawn previously. It seems likely, therefore, that individuality extends to all three regions and does not have particular effect in any one.

By the other measure of cost, cost per bushel, the Bristol sample grew the cheapest fruit at the orchard gate stage, but there are indications that the Wye sample produced the lowest-cost fruit after marketing - possibly because of a greater variety in method, not necessarily because a standard job was done more efficiently.

Gross Returns and M.I.I. In contrast to the cost situation on the holdings the market situation confined price to narrow limits. Average price per bushel was one of the least variable of all the physical and financial quantities calculated. After some compensating reductions in the 'marketing cost' item, the Crop Net Output figure was most consistent of all. That is to say, the growers in each regional sample received virtually the same net price home, and so their profitability was determined jointly by yield and level of expenditure.

In contrast to 1972-73, average sale prices north and south of the river Thames showed little difference, the apparent premium for Essex and Suffolk fruit being only 13p a bushel instead of the 63p of 1972-73. Hinton* (1974) has pointed to a certain relationship between size of crop and co-operatives' marketing performance, and the present figures substantiate the suggestion that the independents' crop is more keenly sought, and its price bid up, when the national crop is small than when it is large. By comparison with the previous year the Cambridge sample's prices for 1973-74 were lower and more variable.

*Hinton, W.L. (1974) Private and Co-operative Enterprise in Apple and Pear Marketing in Britain. Dept. of Land Economy, Univ. of Cambridge.

The overall result was a M.I.I. advantageous to the west Midlands on a unit basis, to Kent and Sussex on an acreage basis. On the strength of these figures the south-east is justified as the main fruit-growing area because it gave low-cost fruit and a fair profit to the producer. Samples in each area - and the period of costing, of course - are two small to permit more positive comment.

The comparative regional unit cost, not evident at a glance in Table 5, is shown below (Table 6) alongside comparative figures for the 1972 crop.

Table 6

Mean Cost per Bushel (p), Three Regions: 1973 and 1972

	1973			1972		
Region:	Bristol	Cambridge	Wye	Bristol	Cambridge	Wye
Variable-type costs	39	36	30	69	54	40
Fixed-type costs	51	78	64	103	126	91
Total, before marketing	90	114	94	172	180	131
Marketing cost	53	58	43	64	69	63
Total cost	143	172	137	236	249	194

Note: 'Marketing' is not necessarily comparable in all regions.

II.4 Results by Size of Enterprise

As a further analysis of the results, the enterprises in the study were grouped into three sizes: small, 10 to 20 acres; medium, 21 to 50 acres; and large, exceeding 50 acres; - as in 1972. Results are presented in Table 7 and Figure 4.

In one respect the results for 1973/74 markedly differed from those of the previous year. In 1972/73, a low-crop year, there was a high proportion of crop failures on the small enterprises: on five of thirteen such enterprises, marketed yield was less than 100 bushels per acre. It was thought, nevertheless, that these small enterprises

tended to be particularly well located and if they could hold their own against large enterprises would do so through a higher average yield per acre.

In 1973/74, a normal production year, the small enterprises in the sample yielded an average of 367 bushels an acre - about 30 per cent more than that of the group of 'large' enterprises. It may well be that in their effort to redress the failure in 1972 the small growers concerned were paying less attention to quality than the larger growers - who, on the whole, were selling in the most competitive market.

Table 7

Summary of Financial Results by Size of Enterprise 1973/74

Size-group (acres)	£ per acre			£ per bushel		
	10-20	21-50	51 over	10-20	21-50	51 over
Growers gross returns	573	515	531	1.55	1.70	1.96
Marketing costs	135	155	144	0.36	0.51	0.53
Crop net output	438	360	387	1.19	1.19	1.43
Variable-type production costs	88	102	92	0.24	0.34	0.34
Crop gross margin	350	258	295	0.95	0.85	1.09
Fixed-type production costs	252	170	181	0.68	0.56	0.66
Management and Investment Income	98	88	115	0.27	0.29	0.43
Number of enterprises	9	10	14			
Mean size of enterprise (acres)	14	40	110			
Mean yield per acre (bushels)	367	300	267			

Enterprises in the "small" category had the lowest marketing costs on an acreage basis and also on a bushelage basis. Although the maximum saving was £20 an acre, this was equivalent to 17p per bushel.

Figure 4

Percentage Share of Costs and M.I.I. by Size of Enterprise

	10-20 acres	21-50 acres	51 over acres
Marketing costs	24	30	27
Variable-type costs	15	20	17
Fixed-type production costs	44	33	34
Management and Investment Income	17	17	22

Size vs. Location. For the year in question, and bearing in mind that the regional effect, although concealed, contributes to the apparent 'size' effect through the Bristol-based results, it would seem that size of enterprise - as differentiated in the study - had less influence than location upon profitability per acre in 1973-74. For anything like equivalent total income for all growers, of course, M.I.I. per acre would need to increase in inverse proportion to acreage and this is patently not possible. The economic vulnerability of small enterprises is a popular talking-point, and on the figures presented seems justified in respect of a number of holdings having less than fiften acres.

All the small enterprises were handicapped by high fixed costs, which are compounded of labour and machinery costs and the expenses of just being in business. Labour is a particularly difficult factor to make highly productive on a small area. Business expenses cannot be reduced much without cutting down on items that contribute to the grower's standard of living. A small-scale independent grower who has buyers waiting for his crop is probably in a better position than a small-scale cooperator, other things being equal, because his marketing costs are less. In general, for items other than fixed costs the group of small enterprises is shown to be the equal of the two groups of larger enterprises.

The higher yields on smaller enterprises more than compensated for the lower prices received and resulted in their gross returns per acre being higher than for the two samples of larger enterprises. This advantage was continued both in marketing costs, leading to the highest crop net output, and in variable costs, leading to the highest crop

gross margin of any size group. By the final stage, however, with fixed costs deducted, the "large" size group had become pre-eminent.

When valued on a unit of production basis there was little difference between the M.I.I. for small and medium enterprises but the large enterprises proved superior. The latter also recorded higher values per bushel at all stages, indicating that the lower marketed yield may be at least partly due to higher quality, sought both on the tree and in the market - and which in 1973/74 seems to have been a policy giving the highest price.

The economic strength of the group of largest growers is seen to be their relatively high average price for the crop - a policy often consciously pursued by (a) long-term storage and (b) offering only well-coloured fruit. Yield is probably depressed a little in consequence, but quality more than compensates.

Table 8, below, is the companion table to Table 6 with size-group substituted for regional group:

Table 8

Mean Cost per Bushel (p), Three Size-Groups: 1973 and 1972

Size of Enterprise (acres)	1973			1972		
	10-20	21-50	over 50	10-20	21-50	over 50
Variable-type costs	24	34	34	47	42	42
Fixed costs	68	56	66	118	88	101
Total, before marketing	92	90	100	165	130	143
Marketing costs	36	51	53	61	64	72
Total cost	128	141	153	226	194	215

Note: 'Marketing' is not necessarily comparable for the three groups.

III. DISCUSSION OF THE RESULTS

III.1 Income Instability

One small dividend from two consecutive years' results is a knowledge of how the growers' income changed from one year to the next, i.e. from 1972 to 1973. The mean M.I.I. was higher for 1973 (£100 an acre) than for 1972 (£75 an acre), but, as foreshadowed in the Introduction, individual experience was more varied - i.e.:

for 25 growers the 1973 crop was more profitable;
for 8 growers the 1972 crop was more profitable.

Although for three growers out of four 1973-74 was a more profitable year than 1972-73, the degree of change in income (whether improvement or not) varied enormously. For example, the absolute difference between M.I.I. per acre in 1973 and in 1972 and the absolute improvement in M.I.I. of enterprises more profitable in 1973 than in 1972 was distributed as in Table 9.

Table 9

Distribution of Change (+ or -) and of Improvement (+) in M.I.I., 1973 over 1972

Change		Improvement	
M.I.I. (£)	No. of enterprises	M.I.I. (£)	No. of enterprises
0-49	9	0-49	5
50-99	11	50-99	9
100-199	5	100-199	4
200-299	5	200-299	4
300 and over	3	300 and over	3

Thus, the most frequent experience (11 enterprises) was of a change of £50-99 an acre, but two growers out of five experienced a swing of at least £100 an acre in M.I.I. notwithstanding the large element of compensation in price in 1972 for the lack of volume of fruit.

Behind the £25 an acre average improvement in M.I.I., then, there is an individual change of far greater magnitude. Roughly equal numbers of growers among those benefitting gained more than £100 an acre or less than £100 an acre.

Overall, the extent of the swings is probably most serious in its obverse - i.e. that in 1972 M.I.I. was correspondingly reduced - and could be again at any time in the future. Given the extent of year-to-year changes in enterprise yield operative around 1973, the only notion of a 'normal' profit that growers can have is the mid-point of the oscillations experienced. Income instability is thus a reality. So long as yields continue to change substantially from year to year growers will tend to feel they are not in control of their enterprise, and the more likely they are to respond to the uncertainty by trying to reduce the risk in production. Theory has it that in such circumstances growers will refrain from some of the expenditure intended to increase their profit and consequently their yields, output and profit are less than those technically possible.

III.2 Factors Contributing to Variation in Costs and Returns

It has often been said, apropos management advice in agriculture, that each farm is unique. The same must be no less true of fruit farms. Surely, less uncertainty and less variation would be generally welcomed; in which case it is appropriate to ask how much of the observed variation is due to the micro-location of orchards and how much to each grower's own actions. In the latter there must be included the grower's reaction to the effects of location, for different growers will react to the same circumstances in different ways.

Contributing factors to this basic diversity are differing rates of technical progress and the differences in the problems of growing the crop caused by climate, soil type, topography, availability of labour, and the incidence of pests and diseases.

The better to appreciate the circumstances on the holding, the growers participating in enterprise surveys have been asked at different times about their use of spray materials for pest and disease control, of herbicides, of fertilizers and of other operational inputs,

as well as particulars about irrigation, frost protection and the utilization of packhouses and gas stores.

The majority of growers in the present sample did not have irrigation, and on the farms where it was installed both fixed and portable systems were in use. Growers who were contemplating installing irrigation were looking for less labour intensive methods and showed interest in the more recent innovation of trickle or drip irrigation.

Control of pests and diseases features more largely in some enterprises than in others, but when the large number of factors which are considered to influence the level of pest and diseases in a crop are taken into account, the variation can, in part, be understood. The new higher-density planting of trees with its associated pruning methods also has an effect on the incidence of disease and the level of production. Trees growing into each other make it more difficult for sprays to penetrate but on the other hand with hedgerow systems less of the spray material is wasted. Experience has shown that it should not be necessary to increase the amount of spray material with an increase in tree numbers. Trees grown under the intensive system may be more susceptible to attack by woolly aphid and by the perennial canker fungus than free-standing trees on vigorous rootstocks.

Growers also tend to think differently about the use of fertilizers whether in relation to fruit-setting or to general physiological vigour. On good fruit land fruit trees show little immediate response in yield to changed rates of fertilizer application; and on poorer land any benefit may be suppressed by other limiting factors. There is no definite information about the response of apple trees to fertilizer application that could be used to explain the operative yields in terms of the extent of fertilizer use in the enterprises surveyed.

The operations of pruning, harvesting, fruit sorting, grading and packing have by tradition been specialized tasks in the apple and pear industry. Over the past decade or so the increasing cost of farm labour and the decrease in numbers of skilled orchard workers have influenced growers to save labour wherever possible, but there still remains a substantial difference in man-hours per acre between the specialised

fruit farm and the orchard enterprise on a mixed farm. Mechanical handling and the utilization of pruning platforms and pneumatic pruners are examples of labour-saving techniques. Whether the specialized holding or the sizeable farm enterprise is in the better position to benefit from further mechanization is a debatable point, in which the ability to finance further labour saving investment must be taken into account.

Long after the event, it became known how world-wide was the influence of weather upon fruit yields at this period: 1971 to 1975 was a chequered period in English fruit-growing, with Cox averaging less than 10 tonnes per ha in 1972 and again in 1974. Collateral research has shown that the lower average yield is mainly due to the dismal performance of a proportion of enterprises consisting of orchards which attain a long-term normal yield in a good year and fail completely in a bad year. Such orchards have both a low average yield and excessive year-to-year changes.

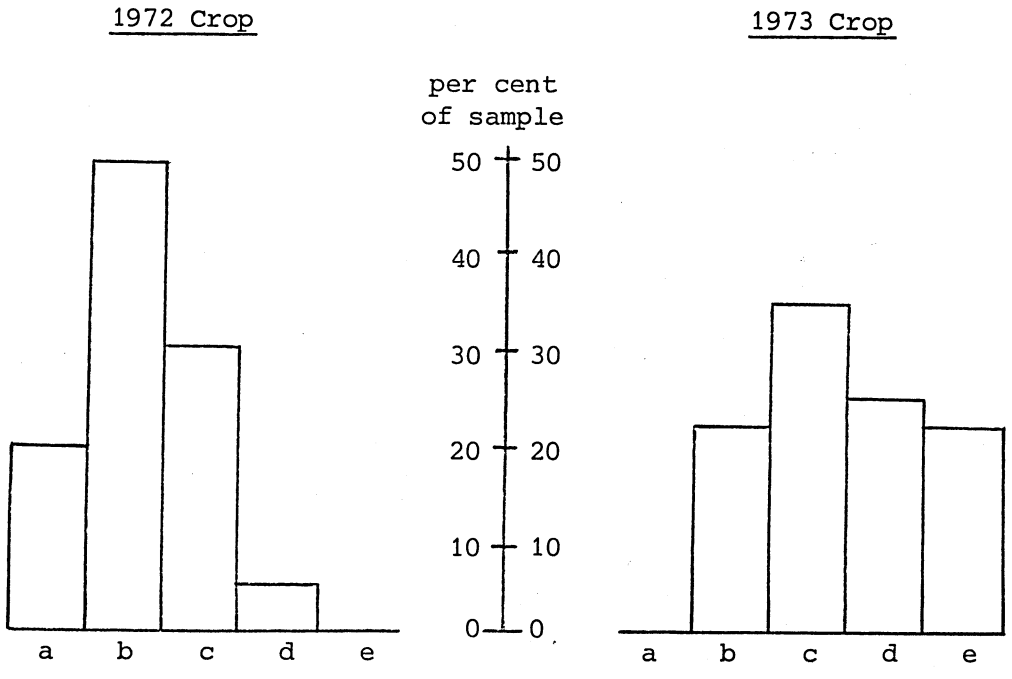
The distribution of yield per acre among the sample of growers in 1973, compared with that in 1972, is shown in Figure 5. In both years about 30 per cent of enterprises had yields close to but below the average, and about 20 per cent registered a yield less than half the average. It is the relative frequency of a very low yield (less than 200 bushels an acre) which gives rise to the chronically poor yield figures for the U.K. - an arithmetical effect which tends to detract from the good performance of a majority of English growers.

As mentioned in the 1972-crop report, non-specialized growers are often able to trim their costs to suit their yields, so that their unit costs are not out of line. The 30 per cent of growers with somewhat below-average yields may be predominantly in this situation. The other 20 per cent are less likely to find satisfaction in cost cutting, although it might be the only policy open to them if money is short.

Low-input fruit-growing may produce dessert apples at the same unit cost as high-input fruit-growing, but it can rarely be as profitable: the margin per unit may be adequate, but there is an insufficiency of units. Low-input growers are not universally popular in the industry, but low-cost, low-income production is obviously

Figure 5

Distribution of yield per acre, 1972 and 1973



a = below 100 bushels per acre
b = 100 to 199 bushels per acre
c = 200 to 299 bushels per acre
d = 300 to 399 bushels per acre
e = 400 or over bushels per acre

preferable to high-cost, low-income production down to the level at which income is unacceptably low. From the nation's point of view low-cost, high-income enterprises are best. When not all enterprises can meet this criterion, tolerances in cost and in income arise. As neither cost nor income are directly related to yield, but yield is the most commonly-used parameter, it seems that only extremely low yields (in effect, wasted resources) can be interpreted as non-viability.

While what can be called the intensity of production of an enterprise is one variable factor leading to differences in income, the composition of enterprises is another variable factor. The enterprises in question had varying proportions of (a) Cox and (b) pears.

Cox was the cause of many growers' downfall in 1972. At the average price after marketing of £2.19 a bushel, one hundred bushels

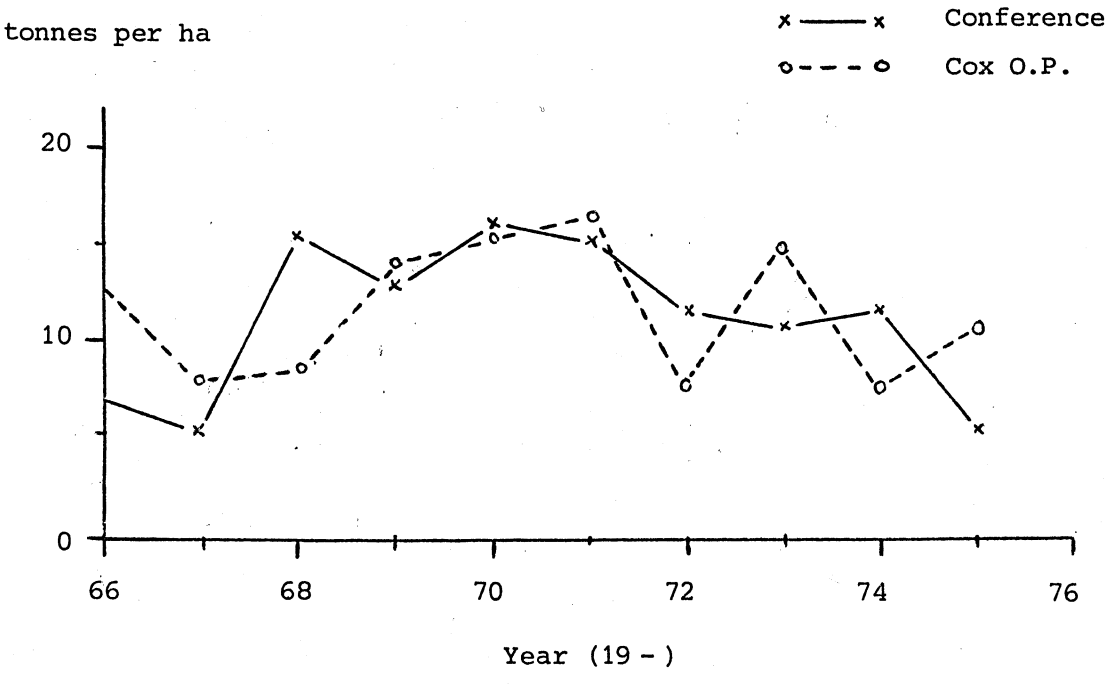
an acre would be necessary to meet minimal farm-based cost of £219 an acre. Twenty per cent of growers had a yield of less than the required amount.

The enterprise records did not allow any estimate to be made of the profitability of blocks of pears as an adjunct to dessert apples. Over E. and W. as a whole, however, pears - Conference that is - have frequently provided a useful counterweight to Cox. Apple and pear yields by no means move in unison, as Figure 6 shows. In the last ten years Conference has more frequently made up for the absence of Cox than added to an over-sufficiency of Cox.

Where this typical performance is realised on the same farm, the pear acreage would have a mild under-writing effect on the dessert apple enterprise.

Figure 6

Estimated Yield, in tonnes per ha, Cox's Orange Pippin Apple and Conference Pear, 1966-1975



III.3 Economies of Scale

Just now the concept of the advantages of size in business is substantially reconsidered. The belief that sheer size of firm makes

for efficiency in production is no longer inviolate. Nevertheless, in a business like fruit-growing, where the giant firm has not emerged and would be handicapped by its surface extent if it had, the larger firm has opportunities for operating at lower unit cost than the small firm. These opportunities may either be a focal point in the management of a large farm or lost in other ways if the big-business philosophy entails added fixed costs.

For analytical purposes the general theory of the economies of scale in business has to be considered as (a) the economies of a large-scale plant and (b) the economies of business growth. Applied to fruit-growing, the large-scale plant (i.e. a very large acreage) has nothing to recommend it from the point of view of relative efficiency, but the economies of growth argument is more pertinent. It breaks down into the possibilities of (i) increasing output from existing plant and (ii) increasing plant capacity. For all sorts of firms, (i) above is the classical way of slowly improving business performance and efficiency and is exemplified in fruit-growing by increasing yield per acre. Generally speaking, a grower who wishes to increase his income over a period of years has to increase his bearing area. By so doing he will not necessarily become a more <u>efficient</u> producer, but with constant efficiency and a bigger business he will increase his income.

Without an expanding market, of course, fruit-growers along with other businessmen become more concerned with maintaining output and cutting costs. The conventional industrial way of doing so is to rationalise (i.e. combine for) distribution. Farmers and growers are not so much involved in distribution and growers in particular have two potential means of scaling-down capacity on the farm. Both small-scale grubbing and advanced removal for replacement in theory allow growers to make controlled reductions in the level of output. These are not yet widely practised because (a) yield fluctuations and crop variability make excess capacity difficult to track down - so-called 'guide lines' are non-existent, (b) individually operated they would have little effect and (c) consequently growers have no confidence in them.

It follows from the above that in practice fruit enterprises are relatively inflexible: growers have no compelling reason to alter their chosen size (because efficiency does not depend on size) and are not under pressure (from larger firms) to do so. This is the explanation of the relative structural stability of fruit-growing industries.

The size-of-enterprise results reported for 1973-74 are thus not likely to be a transient phenomenon and are now given a fuller treatment than on p.13. The contrasting relationships between size (i.e. area) and cost per acre and cost per bushel are shown in Figure 7.

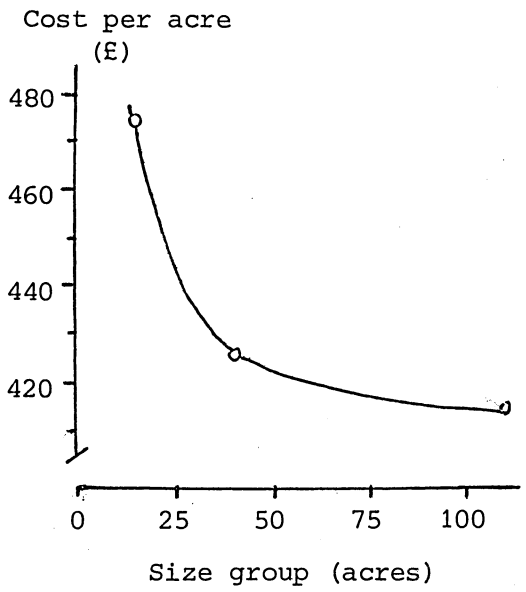
Cost per acre. The expected relationship can be seen in Figure 7, diagram (a). Here is evidence that costs per acre were reduced as area of enterprise increased, simply because there are some costs which are independent of area. The so-called variable costs do not, in principle, vary with size of enterprise, and in practice a number of so-called business costs also (e.g. levies, insurance, rent and rates) are incurred on an acreage basis and do not handicap the small enterprise relative to the large; but small enterprises (in this instance of 10 to 15 acres) are known to be at a disadvantage in labour use. Their relative disadvantage must therefore tend to increase with each rise in the hourly cost of labour.

On the typical fruit farm, some 20 to 25 per cent of man-hours each year will be spent on pruning and almost as much on harvesting. Other things being equal, then, for 40 to 45 per cent of their time regular workers are not being assisted by machinery, and the shorter travel on the small enterprise should theoretically give it an advantage in doing the same job as on larger enterprises. Many growers with small acreages would claim to be doing a better job. To give each tree closer attention is the small grower's tactic for compensating for his smallness, however. Since he has a lesser acreage to cover he can prune and pick more carefully, in the belief that doing so is the best way of using his time. And because lack of area prevents him increasing his physical accomplishment, his belief is doubtless correct. The choice between quality and quantity of work has been made for him, in favour of quality.

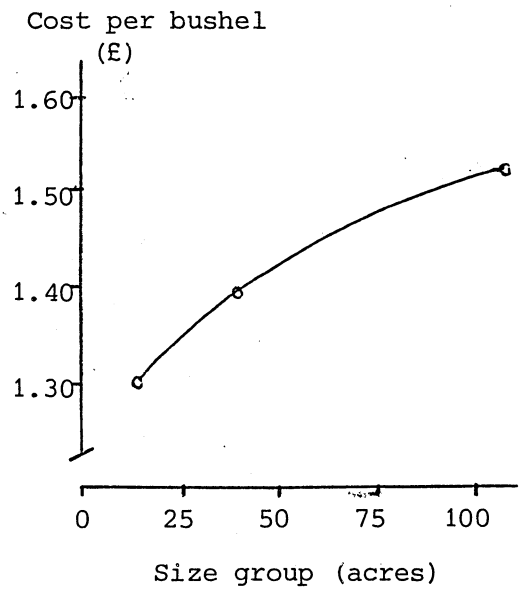
Figure 7

Some Cost Relationships in the Enterprise Data

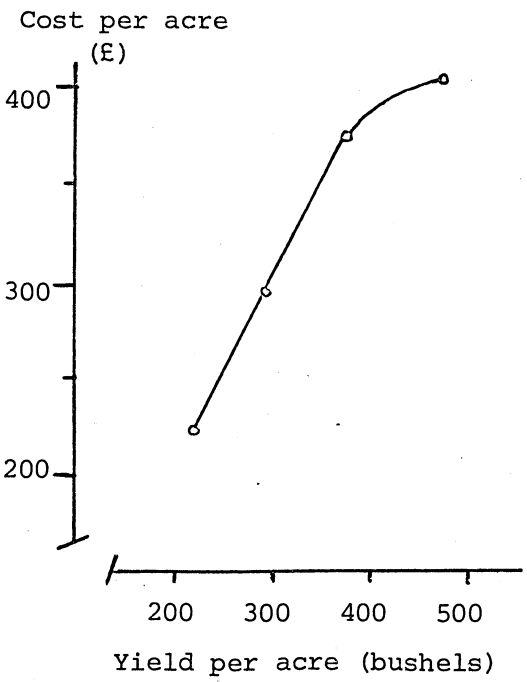
a. Average cost per acre and size.



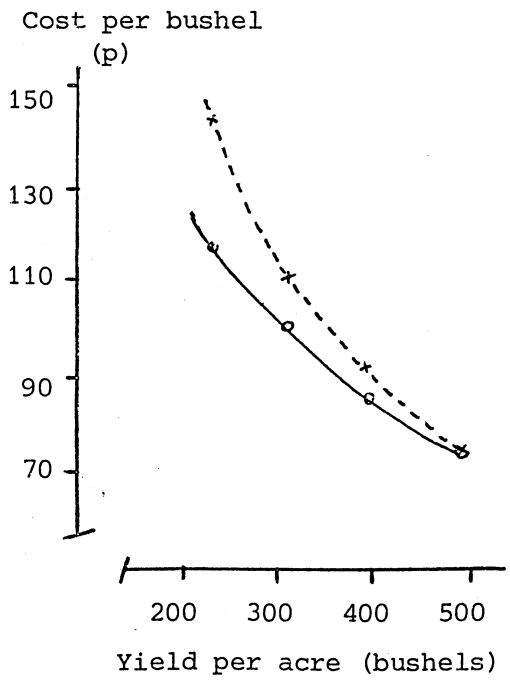
b. Average cost per bushel and size.



c. Average yield and cost per acre.



d. Average yield and cost per bushel.



In the other half of his work he is working with machines and it is here that the small grower's disadvantage is probably the greatest. Short rows, small orchards and inferior utilization all tend to reduce machine performance and hence the productivity of labour.

Given the trees' response to work inputs as in 1973, small enterprises as a group overcame their handicaps remarkably well, due to the extreme measures some proprietors took to pay for no more labour than was strictly necessary, notably by employing only casual labour. This remedy, however, may not be available to growers located away from the main fruit areas, and does not redeem an enterprise too small to pay the proprietor's wages.

Some estimates of the comparative productivity of labour in the three size-groups of enterprises are given in Table 10.

Table 10

Comparative Productivity of Labour

on Three Sizes of Enterprise, 1973 Crop

Category of enterprise:	Small	Medium	Large
Regular labour cost per acre (£)	130	75	93
Tons produced per £ of all labour	6.12	5.94	5.12
Net output per man-year, all labour (£)	3298	3247	4268

The fact that Net output per man-year is about the same for the group of small enterprises as it is for the medium-sized group means that production organizatio n is about equally efficient in the two groups. However, the difference in scale will mean higher incomes for the growers with the larger acreages. It would seem therefore that many small growers, if they wish to keep abreast of the general rise in earnings, need to expand their bearing acreage.

Within the EEC, fruit-growing enterprises of less than 5 ha (12.5 acres) abound and in 1973-74 gave an average total income (i.e. including the value of his manual work) for the proprietor in the range £1,750 to £2,250. When total income is judged in relation to

the standard agricultural wage for full-time work, as in The Netherlands, the progressive deterioration in the rewards as size diminishes can be seen (Table 11). Notwithstanding the pressure resulting from a decade of low prices for apples and pears, enterprise size in The Netherlands has been slow to change.

Table 11

Comparative Productivity of Labour and Efficiency of Production, Three Sizes of Enterprise, The Netherlands, 1973*

Enterprise size group (acres)	7.5 to 15	15 to 22.5	22.5 and over
Regular man-years per 100 acres	14.4	11.8	9.9
Value of fruit output per acre† (£)	726	723	612
Profit as percentage of costs	(-) 29	(-) 21	(-) 14

† converted to Dfl. 5.5 to £1.

Cost per bushel. The relationship between cost per packed bushel and size of enterprise is shown in Figure 7, diagram (b). Contrary to the expectation from diagram (a) and the financial results in Table 7, the small enterprises grew the cheapest fruit nor the dearest. In fact, the unit cost curve is the opposite of the area cost curve. Yield per acre was decisive in cost per unit in 1973 among these three groups. The smallest enterprises' yield was 37 per cent higher than that of the largest enterprises for a cost per acre only 13 per cent higher; their unit cost was consequently 17 per cent lower.

On paper, therefore, the economies of scale argument is apparently defeated. The small enterprises are shown to have been highly productive in 1973: but from the policy point of view their continued success will depend upon finding a way of keeping up yield while cutting out profitably the periods of unproductive work that occur on the holding.

In this instance the scale argument is much qualified by a difference in attitude between the largest and the smallest firms.

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* L. van Noort (1975) Rentabiliteit van het gespecialiseerde fruitteelbedrijf. Oogstyaar 1973-74 Med: & Over: No. 130. L.E.I. Den Haag.

The preference of large growers who have a reputation to keep up for high-quality production has already been noted. To this end they are prepared to reduce a crop both on the tree and at the packing shed in the interest of a maximum marketing margin per unit. Facing relatively high deductions for marketing, unless their fruit initially commands a high price, their net price will be relatively low. Storage thus has a far higher place in their marketing programme. In fact, several distinct 'markets' or types of outlet for home-grown apples and pears can be recognised.

Input-output ratio. The relation between input and output in a single firm is at the heart of the economic approach to production. A firm's output from its existing plant and equipment is considered to be variable and related to the input (of labour, materials, power and so on). Increased output needs increased input, and vice versa. However, if, when increasing output the firm is moving out of a condition of gross under-utilization of its productive capacity, additional output will be obtained for less input than usual, so that increasing returns per unit of input are experienced. Once output approaches or has recently passed the designed level of output, the relation between additional output and additional input will be steady - described by economists as constant returns per unit of input. Thereafter, should still more output be required from the same plant and equipment, relatively more input will be required to produce a given quantity of output - i.e. decreasing returns have set in.

Not many fruit growers would think the input-output analysis appropriate to their fruit enterprise, because output is usually determined by other things than input. Take the sample's results as a whole, however, and it can be seen that constant returns describes very well the input-output situation on this small segment of the whole industry. Figure 7, diagram (c) shows how, over most of the range of yield experienced, average yield was in a constant (straight-line) relationship with expenditure per acre on production (i.e. not marketing). In fact there is close correspondence between marketed yield in bushels and £ expenditure per acre. Only when yield exceeds 400 bushels an acre do increasing returns seem to apply. This change in the curve could be due to growers in the best locations having a higher yield capacity which they exploit by additional expenditure.

The co-ordinates in Figure 7(c) are as under:

Expenditure (£)	Yield (bushels)	Expenditure (£)	Yield (bushels)
219 (13)	237	367 (5)	388
296 (8)	313	401 (6)	488

(number of enterprises in parentheses)

Unit cost and yield. The change in cost per unit relative to yield per acre is the last relationship derived from the production data obtained; see Figure 7(d). The yield/cost curve in fruit-growing is one of the better-known and is conventionally used to demonstrate how on the single farm unit cost increases as yield declines, and vice versa.

As with Figure 7(c) previously, it is confirmed here that as between different farms, the relationship does not have the same significance (as might be expected if there are constant returns to additional input). Growers' ability to cut their costs, or otherwise to match their costs to their average yield means that over the sample as a whole, growers whose yield was less than half that of the highest-yield group had a unit cost only 50 per cent the higher instead of 100 per cent as worked out for the single farm.

Diagram (d) makes it plain that, on average, growers with lower yield have difficulty in matching the cost figure of growers with higher yield. The four co-ordinates in Figure 7(d) are as under:

Yield (bushels)	Cost (p)	Yield (bushels)	Cost (p)
237	114	388	80
313	97	488	73

The above four points are joined by the solid line. The broken line joins the theoretical points for a single farm, assuming a yield of 488 bushels an acre, variable costs of £122 an acre and fixed costs of £234 an acre.

III.4 Is 'Quality' Production Worthwhile?

Making a simple interpretation of the results, it would seem that 'quality production' as evident in a higher price succeeded both in 1972-3 and 1973-4 in spite of the contrasting market situation in the two years. One contributing factor not considered so far is storage, and its effect on average price. Cox had a very long marketing season in 1973-74 and was sold all through April and into May, 1974. As an hypothesis, if the group of "large" growers sold three-quarters of their crop at an average 'stored' price and one-quarter at the October-November price, and the "small" growers did the opposite, the large growers' average price would have been 14 per cent the higher. The observed difference in the actual results is 26 per cent (£1.96 compared with £1.55 a bushel), a figure which allows doubt to creep in about the worth of actual quality premiums: the higher price could have been due largely to the relatively scarcity of English apples late in the season - that is, a "standard" apple might have earned the same premium, and large growers are entitled to wonder whether, say, to have sold 12 per cent more fruit or a 12 per cent (26 - 14) higher price was more more worth having.*

While some retailers are anxious to retain their reputation for offering high-quality produce, the long-term trend in western Europe seems to be toward the popularity of the "good commercial" apple as known in North America. The Extra-Fancy grade is a thing of the past and to judge by some French research, the effort to grow and market a "quality" product of guaranteed eating quality (qualité gustative garantie) will have to be at growers' expense.** Middle-class French housewives apparently think the extra cost excessive when price is already high, for a premium of 20 to 25 per cent is necessary to cover the extra costs involved. As quality in Golden Delicious is associated with size and colour of the fruits, growers have to discard 25 to 30 per cent of the crop on the tree. To compensate them for their extra trouble it is said that growers deserve £22 a ton more at the packhouse and £31 a ton (1.4p a lb.) more at retail than the going price.

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* There is no apparent advantage either way:
100 units @ £1.96 = £196.
112 units @ £1.76 = £197.

** La Vente de Pommes de Qualité gustative garantie. Arboriculture Fruitière. Jan: 1974.

Traced back to the farm, 'quality' production, as defined, lifts the man-hours per ha from 735 to 908 (mainly for increased casual work in summer) and cuts a 50-tonne per ha crop to 35 tonnes per ha. Consequent costs compared with 'normal' production in 1972 is as follows (Table 12):

Table 12

The Economics of 'Quality' Production: a French Example

Item	Normal production (£ per ton)	'Quality' production (£ per ton)
Manual labour	9.94	18.21
Materials	4.36	5.81
Tractor and implements	2.78	3.88
Financing, teneral expenses etc.	6.37	8.46
Total, at packhouse	23.45	36.36
Grading and packing	36.22	45.41
Total, ex packhouse	59.67	81.77

The added cost after the 'quality' crop has been picked is due to the care in handling and presentation it receives. It is said that a 'quarantie' is not sufficient in itself; such fruit has to be obviously superior in all other respects too.

III.5 Marketing and Prices

In 1973-74 the cost of marketing was again both the least variable and the highest of the itemized costs for a majority of growers. There was a minority - 12 per cent - of growers who chose to avoid marketing costs and sold at the farm. Further discussion under this heading consists of a factual section on Variety Prices and Returns and a section on Demand and Supply Response.

Variety Prices and Returns. As in the previous year, growers' recorded average prices for the same variety were very variable, even for varieties

with a short marketing season. Apart from pricing at different stages of marketing, growers' results from comparable outlets were dissimilar, but whether imperfections in the 'market' or differences in quality of sample had more to do with the variability is impossible to say.

There is thus the same difficulty as in 1972 of reporting growers' experience of prices. The MAFF, in its weekly statement, resorts to a 'most usual' price, thereby tending to divert attention from the range of prices reported; but it would seem that the range can partly describe the value of some growers' entire crops as well as the value of the different qualities of other growers' crops.

Mean prices for leading varieties in the 1973 crop are shown in Table 13. The figures quoted are overall averages and include prices in wholesale markets, at a packhouse, at retail or at the farmgate. They are thus only useful for comparison one with another in the same year and for the same variety in 1973 and in 1972.

Table 13

Growers' Sale Prices by Variety, 1973 Crop (£ per bushel)

Apples	Mean	Range	Pears	Mean	Range
Early Varieties					
George Cave	1.82	0.86-2.89	Conference	2.36	1.63-2.82
Discovery	2.80	2.14-3.26	Comice	3.20	2.35-4.00
T.E. Worcester	1.63	0.75-2.14			
Mid-Season Varieties					
Worcester Pearmain	1.43	1.00-1.83			
Egremont Russet	1.44	1.01-1.80			
Stored Variety					
Cox's Orange Pippin	1.77	1.00-2.70			

It would seem that early apples, which perhaps benefit from an over-run of summer prices, were not overdone in 1973 and provided a useful start to the season.

Mid-season varieties, Worcester Pearmain and Egremont Russet, for example, were lower in price than in 1972. The price of Cox was lower, too, but only by some 38 per cent in face of a crop twice as large. The 1973 price of Cox is important for growers, for it appears there was some elasticity in the demand for Cox, meaning that growers would earn more by producing more. Relative to the average price in 1973, the 1972 price was lower than expected, suggesting consumers were resisting paying higher prices. On the basis of the price in 1972, the 1973 price was higher than expected, suggesting that consumers appreciated the lower price and were prepared to increase their purchases appropriately. As regards the value of the growers' crops, the market value of the fruit on the farms contributing two years' results, and marketed in the same way in each year, was 34 per cent higher in 1973-4 than in 1972-3, comparative values being £537 and £401 per acre.

Individual grower's experiences were again highly variable and it cannot be said that there was any common experience over the two years. Income instability can now be seen to originate in revenue, for within the sample reductions exceeding 20 per cent (compared with 1972) were about as frequent as increases exceeding 100 per cent or any intermediate experience.

Comparative returns per acre by variety from sales in wholesale markets from the same sub-sample of farms in 1973 as in 1972 are shown in Table 14. Again, because the highest individual figure if often twenty times higher than the lowest, the results are published as a range within which 'most frequent' values fall.

General statements or recommendations are inappropriate in a situation of such mixed and in part contrasting experience. Perhaps the only safe general observation is that there is not a profitable future for trees which do not burgeon under any circumstances and which suffer unduly in adverse circumstances. Within the sample for 1972 and 1973 there are two such enterprises - neither of them a substantial business - which made a loss in both years. Excluding these two enterprises, eleven (23 per cent) showed a financial loss in one year or the other. Something like three growers out of four had yields in both years high enough to give them a profit.

Table 14

Comparative Returns ex Market (£ per acre) by Variety, 1972 and 1973

Apples	1972	1973	Pears	1972	1973
Early varieties					
George Cave	0-100	100-200	Conference	450-550	300-400
Discovery	400-500	700-900	Comice	600-700	600-700
T.E. Worcester	200-300	300-400			
Mid-season varieties					
Worcs. Pearmain	400-500	100-200			
Egremont Russet	400-500	100-200			
Lord Lambourne	1400-1500	400-500			
Stored varieties					
Cox's O.P.	450-550	600-800			
Laxton's Superb	550-650	500-600			

With the recorded experience of the 1969 crop also, three years' results are available for analysis. The basic data for Cox's Orange Pippin are as in Table 15.

Table 15

Three years' results, marketing of Cox, all at 1973-4 value of money

	1969	1972	1973
Grower's price per ton after marketing (£)	65	115	68
Weight of national crop ('000 tons)	138.5	82.2	158.6
Estimate of growers' Net Returns (£m)	9.0	9.4	10.8

There is evidence in the reports that since 1969-70 marketing costs have not increased at the same rate as other costs. The survey method of research does not allow likely causes to be pin-pointed: the interesting fact is that growers' efforts to pare marketing costs are beginning to show. It is known that packhouses have been striving hard to improve their efficiency. In addition, private stores are

being used more extensively for out-of-season storage, more direct distribution is perhaps tending to increase growers' gross returns, and of course retail sales from the farm are on the increase. The net results is that although the cost of full treatment for fruit is only marginally reduced in constant money terms the financial burden on the whole industry of marketing is less than it was.

The following statement of comparative real cost of marketing dessert apples and pears for the growers concerned has been based on a careful comparison of costs for similar services in the three years in question. It refers to marketing costs on farms predominantly consigning to wholesale markets (Table 16). The data relating to growers selling on the tree or marketing through co-operatives are not included.

Table 16

A Comparison of Marketing Costs, 1969, 1972 and 1973

(£ per bushel)

	1969	1972	1973
Average sale price	1.38	2.77	1.88
Average price after marketing	0.82	1.99	1.28
Marketing cost	0.56	0.78	0.60
of which, market-based	0.22	0.44	0.30
farm-based	0.34	0.34	0.30
1973-equivalent cost	0.76	0.88	0.60
Proportion of sale price realised after marketing	59.4	71.8	68.0

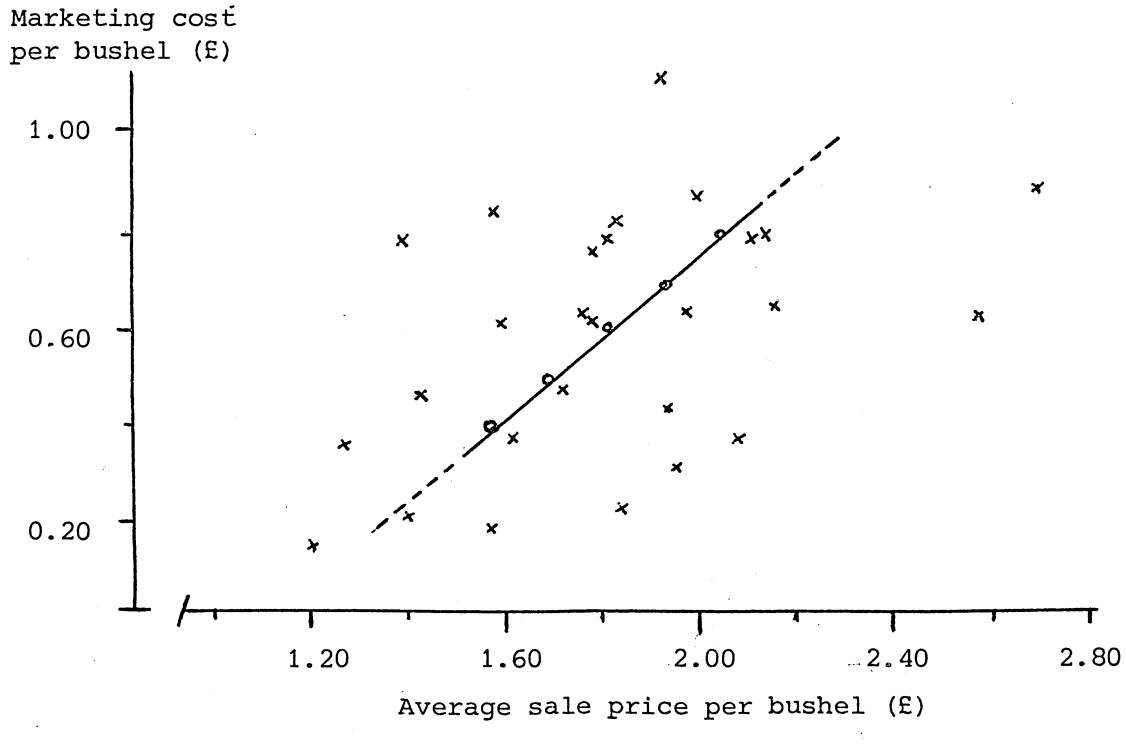
With memories of 1974 and 1975 in mind, growers may have forgotten earlier years, but there are all the signs that prior to 1974 growers who were free to do so were finding ways of alleviating the cost of marketing. There is still controversy about what constitutes 'good marketing', and a comparison between years when the size of crop and ruling prices were different is full of pitfalls. To save on marketing is not necessarily always the best policy - there is no knowing whether different course of action would have shown better results in 1973. On the evidence of Table 15, however, some growers at least improved their position as legatees of the distribution system: they had reduced the real cost of the operation and they had retained a higher proportion of the sale price: both are useful criteria of efficiency in marketing.

Yet another aspect of marketing from this mixed group of farms deserves comment. In 1972, in a sellers' market, it was perhaps understandable that, according to their opportunities and inclinations, some growers should have 'cut corners' and economized on marketing without sacrificing sale value. The situation was not very different in 1973, indicating that the former style of fruit trading still continues although not in the limelight. Within the sample, non-co-operators obviously made a lot of decisions for themselves, with the result that only in the most general way was sale price related to marketing cost.

If growers, or intermediaries, are to spend heavily on marketing, the rational criterion of such expenditure is that it shall earn more than its cost. That is, as expenditure increases the margin of sale price over marketing cost should increase. Applied to the 1973 crop on the farms in question, a line relating sale price and marketing cost would appear as in Figure 8: i.e., rising from left to right at an angle exceeding 45^{o}. If this line be accepted as the norm around which growers' results should cluster, Figure 8 will demonstrate how UN-representative it is of the actual situation.

Figure 8

Growers' Sale Price in relation to Marketing Cost



About half the growers were apparently getting less than the assumed added value from their marketing expenditure, and half were getting a high sale price relative to marketing cost. In practice, at any sale price marketing costs varied by at least 50p a bushel, and for any given marketing cost sale price varied by at least 60p a bushel. More than anything, perhaps, these results show the range in opportunity, not the range in efficiency. It cannot be claimed that the reported costs are 100 per cent accurate, but after allowing for any possible occasional error, the abiding picture is one of a series of individual relationships, with only a minimal tendency for these growers to be doing identical work and receiving identical prices.

Demand and Supply Response. The 'normal' crop referred to from time to time is not the long-term crop which the existing orchards are physiologically capable of sustaining: it is the crop which is most frequently experienced. This occurs when crops are about usual size and buyers and sellers can most easily accommodate each other. An abnormal situation is caused by either a short crop or a bumper crop; when buyers and sellers adjust themselves to the market situation by forming a price that causes producers' net returns to depart from the 'normal' level.

Ever since 1947 this subject of Supply Response by producers - or how they react to changes in market prices and net returns - has been a cornerstone of domestic agricultural policy. National output of farm products has been carefully monitored through the Farm Management Survey and in its time the February Price Review was used to bring about production 'adjustments' on farms. More to the point, farmers were given clear indications of how government would like to see output change from year to year. Growers, on the other hand, received no such guidance. Policy statements about horticultural output have been infrequent and nearly always cautionary. In fact, while 'expansion' has been a favourite concept in the farming sector, 'efficiency' notions crept into the later provisions of the Horticulture Improvement Scheme.

So growers' knowledge of demand and trends in demand tend to have been short-term and limited to personal experience or the experience of immediate contacts such as salesmen or their friends. Neither wholesalers nor retailers, as a body, have contributed much formal

knowledge and it is not surprising that the Advisory Council for Agriculture and Horticulture became intrigued by the demand-and-supply response in horticulture, but could not find any market signals (as distinct from seasonal prices) to which growers invariably responded.* In the instance of orchard fruit yearly output is too variable to make trend estimation feasible; growers' intentions are modified by weather influences and by other, non-market factors such as shortage of labour.

To revert to Table 15, the three years' results cannot offer much help towards understanding the demand situation. In fact, the separate years' results do not conform to a normal demand curve and lead to the deduction that demand shifted between 1969 and 1973. The shift was in growers' favour, because consumers' expenditure had increased in real terms over the period. The price of Cox at its 1972 crop level was a deterrent to consumption, but at more normal prices effective demand had increased. It would therefore seem that regular production will be more to be desired in future than had been previously thought.

In economic parlance demand has been inelastic at high prices, inelastic at the lowest prices, and relatively elastic (very probably a quality factor) within the range of what consumers consider normal prices. Yet, although bearing acreage has been relatively steady for the past fifteen years both cyclical and year-to-year crop fluctuations have been recorded; it is partly by chance that growers produce the 'right' size of crop.

Both (a) the level of crop and (b) irregularity in cropping are deserving of further comment.

III.6 Designed Level of Production

British consumers have learned over the years to adapt to the operative level of production of English apples and pears and have had less opportunity than, say, French or Dutch consumers to express their demand at the going price of apples when there are enough for everyone. Within the original EEC demand was over-estimated and the

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* Report on Supply/Demand Relationships in Horticultural Products. Agricultural Advisory Council, London. 1975.

going price has been uneconomic for growers. In fact, the contrast between producers' interests and consumers' interests is well illustrated by conditions in England and in France. In brief, English growers could expect (up to 1973, at least) to make highest profits when British consumers were checked (by price) from buying all the apples they would like. In France, consumers experienced a plethora of apples, but at the cost of the growers' profits.

According to the 1969 and 1972 results, 85,000 tons of Cox would have given growers higher aggregate net returns than 140,000 tons, and as the smaller crop would have cost less to harvest, growers' aggregate profit would have been higher too with the smaller crop. The 1973 results suggest that demand having increased, the maximum-profit crop was then considerably larger than in 1969. If it could be proved that in the future growers would lose money on short crops, irregularity in production would be tackled more vigorously by more growers. This is the next topic to be discussed.

Irregularity of production. Irregularity, apparently, had not financially handicapped growers as a whole up to 1974 (although it had led to inequalities in profitability on farms) because the several crops represented oscillations about a sub-normal average yield, the 'on' years approaching 'normal' and the 'off' years being well below it. The same degree of oscillation about a normal level of yield would probably have entailed physical surpluses in the 'on' years.

Assuming alternation in yield, it is shown in principle in Figure 9 how the highest average net returns over a period of years would be realised (in the absence of complementary imports and of any withdrawal scheme) by an average crop which was more notably light in 'off' years than heavy in 'on' years.

It is assumed here that the line DD represents the level of demand at which growers' net returns would be maximized. When the annual crop fluctuates about this level (Situation A) average returns for a period will be relatively low - at the level of R_1R_1 - because the alternate large crop is excessive and net returns are consequently depressed. If the annual crop should never attain the maximizing level (Situation B), obviously the average returns (R_2R_2) will be

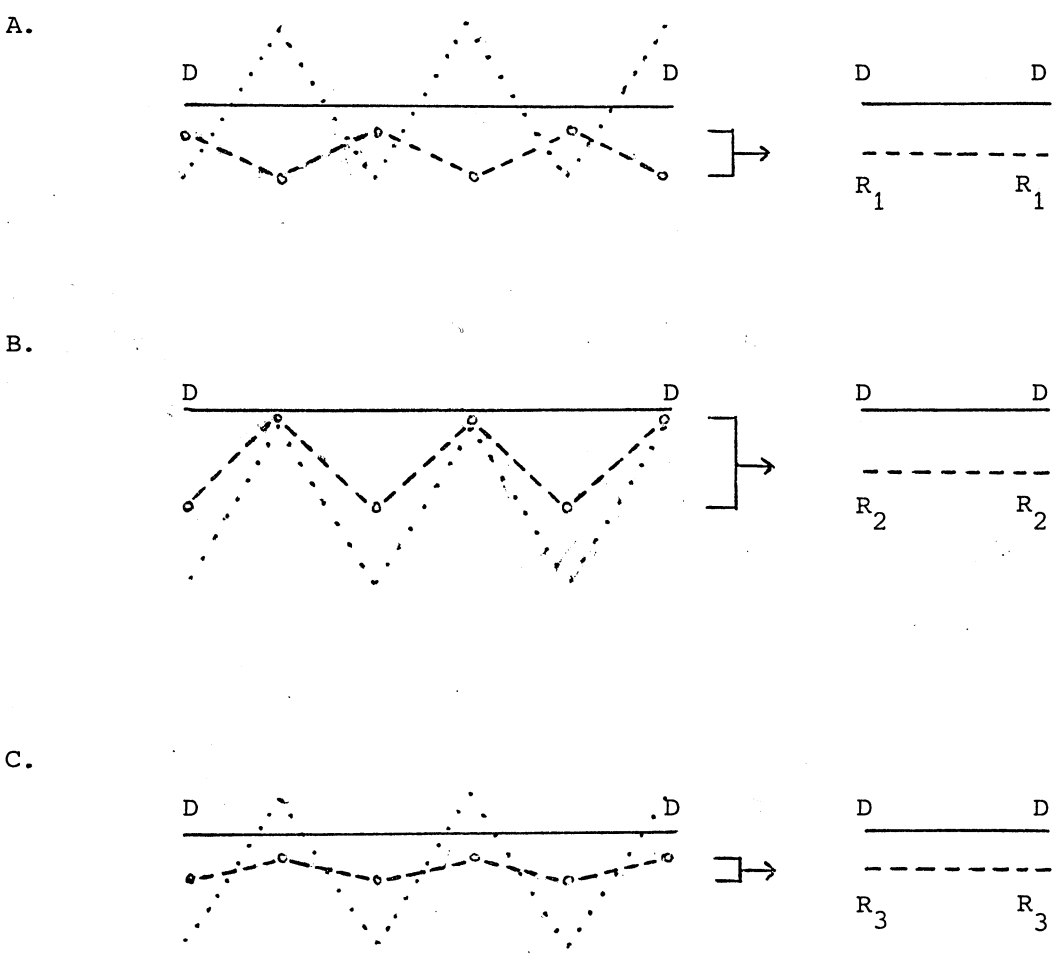
Figure 9

Three Short-term States of Supply

A = fluctuations about the optimum demand.

B = failure to reach the optimum demand.

C = good approximation to the optimum demand.



..... fluctuating annual crop

low also, because the short crop is too short and does not generate adequate aggregate net returns. Between the two previous situations is an indeterminate one, Situation C, wherein the fluctuations in crop from year to year are the same as before, but the 'on' crop is less excessive than in Situation A and the 'off' crop not so short as in Situation B, with the consequence that the average returns, R_3R_3 are higher than before.

For practical purposes the demand for English dessert apples is too much of an unknown quantity for either DD or R_3R_3 as above, to be estimated: but if the variation in crop each year is a matter of chance, it is only over the average level of crop that growers have control. In this event growers will be better off if the departures from average yield increase average prices over a period more than they increase unit costs. The alternative - departures which depress prices more than they reduce costs - would not be welcome.

Since 1970 the 'on' crops have possibly been close to, but not above the maximum net returns position, but the extent of the downward fluctuations in this period has reduced growers' average net returns. The same mischance has tended to draw more attention to consumers' interests, for they could complain that growers were failing in alternate years to provide an adequate supply.

In theory growers can do best for themselves and at the same time allow consumers no reasonable ground for complaint, if they will produce to the upper limit of supply at which demand ceases to be elastic, for they will then maximise revenue. In practice, with the variation in crops to consider, it will be good policy for growers to try to relate their maximum output to the top level of elastic demand: shorter crops will then suffer a little from elasticity but the markedly short crop will benefit from inelasticity.

The theoretical argument is pursued instancing (a) supply management and (b) a switch of variety as two measures which are within growers' capacity to apply to the market situation.

Supply management draws upon the distinction between quantity produced and quantity marketed. It is much less of a novelty now than

it was once, and obviously the more effectively growers can cut off at source (e.g. by leaving apples on the tree temporarily) the occasional quantity of fruit which, if marketed, would depress the price, the more confidently they could raise their long-term average output. But once supply restraint became necessary each year, this would be a sign of over-capacity - i.e., that growers were using too many resources and supply restraint would not then be an appropriate corrective. It is probable that without over-capacity, supply restraint could achieve more than could intervention purchases and a lower level of market prices.

Switch of cultivar. English growers' experiences in the last five years cannot be separated from the very variable performance of their main cultivar, Cox's Orange Pippin. In western Europe generally Cox has recently proved less reliable than the cultivar supposedly less well-adapted to northern Europe, Golden Delicious. The consequence is that U.K. dessert apple production since 1971 has been the most variable among five EEC countries (see Table 17).

Table 17

Index of and Variation in Apple Crops, EEC countries, 1971-1975

(1973 = 100)

	1971	1972	1973	1974	1975	Standard deviation
in Northern Europe						
Netherlands	113	87	100	86	89	22.5
Belgium	117	112	100	84	87	29.3
W. Germany	109	67	100	69	114	43.7
E. and W.	106	72	100	74	87	30.3
in Southern Europe						
Italy	83	91	100	92	99	13.8
France	92	85	100	79	91	15.8

Source: Mitteilungen für den Obstbau.

According to these crop estimates, English growers' experience is not necessarily a feature of their northerly location, for variation in both the Netherlands and Belgium has been less than in E. and W. and incidentally no greater than that in France. Only English growers have persevered with a cultivar which other professional growers in northern Europe have rejected and which, were it produced under the same penalties for failure as face growers in the North-western states of the U.S.A., would not last more than two or three seasons.

It can be shown from the preceding figures that Cox's shortcomings have been expensive for English growers apart from the delayed effects of losing a part of the home market as a result. Assume, as an hypothesis, that English growers had actually been able to set out 60 per cent of present Cox acreage with a "popular" cultivar, code name 'Sovereign', and had grown only 40 per cent Cox in recognition of its premium status. Further suppose that 'Sovereign' was a more reliable cropper and in 1972 and again in 1974 had yielded a 50 per cent higher crop per acre than Cox actually did. Both producers and consumers could well have benefitted. Producers could have made more money and consumers could have had more apples. A comparison of results for the actual and the calculated alternate strategy is given in Table 18.

Thus, it is conjectured that a recognisably English apple lacking the special appeal of Cox but more reliable and easier to grow and handle, providing one-third of the home-grown supply, would have earned £6.3m more for growers than their actual apple crop over the five-year period. To form an idea of how much of this would be extra profit the costs of handling the additional 80,000 tons have to be deducted from the net returns. Allowing the cost of packages and the marginal cost for picking and for work and other services in the packhouse, additional costs are put at £2m*, leaving growers an additional profit of £4.3m over the five-year period.

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* made up of:

£13.50 a ton for grading and packing
£10.00 a ton for packages
£0.50 a ton for storing (60,000 tons)

£24.00 - rounded up to £25 a ton

additional note: the demand curves on which the prices used were based are shown in Appendix II.

Table 18

Two Strategies Compared:

Cox (Strategy A) vs. Cox and 'Sovereign' (Strategy B)

Year:	1971	1972	1973	1974	1975	Five-year Total
Annual Output ('000 tons)						
Strategy A (Actual)						
Cox	170	82	150	95	130	
Other	123	108	115	105	100	
Total	293	190	265	200	230	1178
Strategy B (Hypothetical)						
Cox	68	33	60	38	52	
'Sovereign'	112	74	99	86	85	
Other	123	108	115	105	100	
	303	215	274	229	237	1258
Growers' Net Returns (£m)						
Strategy A	23.2	31.5	28.4	29.0	31.3	143.4
Strategy B	23.8	34.6	28.0	32.8	30.5	149.7

III.7 Risk in Fruit-Growing

Income instability features in an earlier section of this report, and it has been shown how growers are subject to unpredictable degrees of change in their crop from one year to the next and thus have difficulty both in estimating and meeting the market requirement of dessert apples and pears. If 'risk' means anything, should it not have been operative in 1972 and 1973? The popular concept of a risky industry is one in which a high proportion of businesses fail. English dessert-apple production has not been in that category. Another concept of risk in practice is of unforeseen and undeserved calamities, of natural origin, to meet which exceptionally generous financial provision is necessary. If, as many growers assert, two crop failures never occur in succession, this type of hazard is not likely to put many growers

out of business. Can it be that with longer experience and maturity the nature of risk in fruit-growing is changing?

Two contrasting years' results - neither of them the product of the English fruitgrowers' particular hazard, spring frosts - has thrown some light upon what might thus be called the secondary risks in fruit-growing. Primary risk, in the form of a crop negated by frost has been in abeyance since 1968 and hailstorms have possibly been more destructive than frosts in the 1970's.

'Secondary' risk for the individual grower is a compound of (a) low prices and (b) a relatively light crop. While all growers share the same price, their individual crops are variable: the result being that unexpected financial losses can occur. So can unexpected profits - state of affairs closer to uncertainty than to risk.

Economic forces are thus different in nature from natural forces. Technological progress can reduce the risk from physical phenomena, but the risk of low prices cannot be so positively removed. One fragment of economic theory says risk and uncertainty are costs and have to be paid for, i.e. consumers pay producers to take the risk. Events seem now to have moved far in the opposite direction. There is little primary risk and therefore no payment. Secondary risk in the form of a price catastrophe has been reduced by intervention schemes: leaving only the risk that as a result there will be too many growers instead of too few.

Within recent years risk has thus come to mean high probability of frequent low income or financial loss instead of low probability of high income, and the scale on which risk occurs in west European fruit-growing is too great to be insurable. In fact, the economic change between 1972 and 1973 was more pronounced for French and Italian growers than for the English growers if the samples of each are to be trusted. For purposes of comparison the 1972-crop and 1973-crop sample results have been adapted to the official EEC presentation of results*, covering 614 fruit holdings, as in Figure 10. Eighty per cent of the sample of the predominantly small French and Italian growers experienced at least a quadrupling of their labour income in 1973-74 compared with 1972-73.

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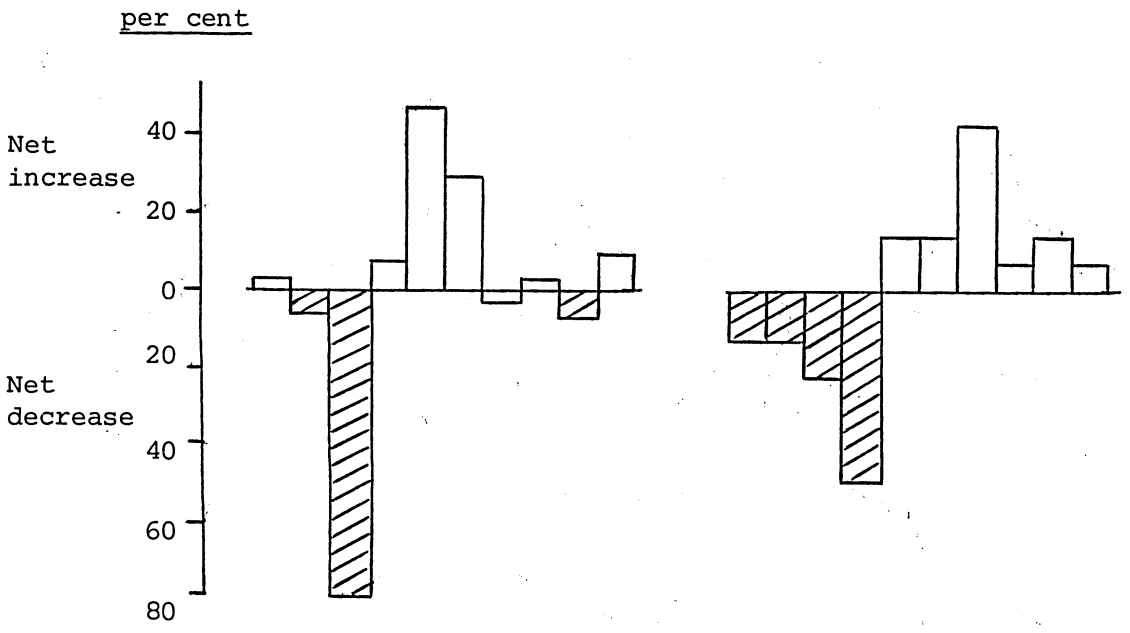
* Anon (1975). Farm Accountancy Data Network for the EEC. Year "1973". Comm. of the E.C. Brussels.

Figure 10

Comparative Change, 1973 Crop from 1972 Crop

Britain and the E.E.C.



a = more than -2000
b = -2000 to 0
c = 0 to 1999
d = 2001 to 4000
e = 4001 to 6000
f = 6001 to 8000
g = 8001 to 10000
h = 10001 to 12000
i = 12000 to 14000
j = more than 14000

a = more than -100
b = -50 to 0
c = 0 to 50
d = 51 to 100
e = 101 to 150
f = 151 to 200
g = 201 to 250
h = 251 to 300
i = 301 to 350
j = more than 350

Typical experience in 1973 was an income of 4,000 to 6,000 units, whereas in the previous year four out of five holdings had had a negative labour income. The comparable distribution for the present sample of English growers shows, as usual, a similar trend but greater individual variation.

Until the frost year in northern Europe comes round again it is prices rather than yields which growers will regard as the main source

of risk. The risk of loss is higher from a full crop than from a medium crop. And growers will feel this more acutely now than ever before because there is literally far more money at stake. The penalties for failure are far greater in the sense that £1,000 per ha is now at risk compared with £500 a few years ago. Yet British growers as a whole are unprepared to counter a frost year. A recurrence of 1967 or 1968 ten years later might well involve financial losses of almost £7,000* on the typical size of enterprise in the present sample, and perhaps £1.5m over the country as a whole.

Rather than charging consumers for risk-bearing, in the present situation producers are accepting the cost themselves. The more the fruit-growers' risks are man-made the more will high efficiency of production be a protection against risk, and if efficient management also includes having the technical means of mitigating the effect of unpredictable and potentially disastrous natural events, the degree of risk in fruit-growing is much reduced, but at a cost which may well be a deterrent to many growers.

III.8 Longer-term Movements in Costs and Efficiency

The most reliable long runs of data about English apple- and pear-growing cover acreage, output and price. Such statistics monitor major trends in the industry, and lend themselves to simple analysis such as trends in yield per ha, but they are not explicit about events on the holdings. For example, yields may be rising because investment has increased, in which case efficiency of production may or may not be improved. In practice, it is more likely that operating efficiency is increasing as growers cut their costs by employing less labour than formerly without sacrificing yield. Farm labour costs having risen so much faster than either prices or yields, resource productivity must have been impaired ..... but how seriously?

While there are arguments for not using the three sets of enterprise results in this way, it is instructive to see how costs have moved since 1969 and how far growers have been able to reduce their impact. After careful preparation to ensure the maximum uniformity, the three years' results are as shown in Table 19, Part A. Greater

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* costs of £365 an acre = £18,250.
Net returns of £130 a ton x 89 tons = £11,570.

comparability has been attempted by re-casting the 1972 results to apply to a 267 bushels an acre average crop in that year (Part B). Part C consists of a crude estimate of the annual improvement in efficiency over the four-year period.

The figures in Table 19 indicate a short-term improvement in efficiency of slightly more than 2 per cent a year (Part II). This is about the accepted rate in agriculture as a whole, but farming offers more opportunities than fruit-growing for mechanization and hence relies relatively more upon investment to raise efficiency. For fruit-growers to achieve the same rate as farmers is a good achievement. No one will claim that a 2 per cent improvement can be recognized in any one year. The importance of the annual rate is that when sustained for, say, ten years, consumers are better able to buy the same amount of fruit at lower real prices without producers being impoverished; growers have more reason for keeping up output. As the conversion of orchards to younger and smaller trees is by no means general in English fruit-growing it would seem that overall efficiency can continue to improve for as long as this conversion continues.

The remainder of Part D is intended to show how impossible it will be for growers to sell profitably at 1973 prices in 1976. Between 1969 and 1973, for example, growers would have needed an 8 per cent yearly increase in yield as well as their 2.25 per cent efficiency improvement to be able to make a profit at 1969 prices in 1973. During this four-year period production cost is estimated to have risen by 39 per cent. Between 1973 and 1976, however, the needed yearly increase in yield would be 20 per cent, for production cost increased by 65 per cent during the three-year period.

English dessert apple and pear growers lived relatively comfortably with the (now) modest rate of inflation experienced between 1969 and 1974. Since the end of 1973 economic events have laid still heavier burdens upon fruit-growers and, as Table 19 shows, the 13 tonnes per ha crop of 1969 (276 bushels an acre) will involve growers in outlays averaging about £668 an acre in 1976. By applying the known variation in expenditure per acre on different enterprises it can be conjectured that for four growers out of five their dessert apple and pear crops will then cost between £280 and £800 an acre in that year.

Table 19

Dessert Apples and Pears: Estimated Cost Comparison, 1969 to 1973 and 1976 (forecast)

		£ per acre						£ per acre	
		1969		1972		1973			1976
Part A.	as recorded								
	Marketing costs		122		90		145		239
	Variable-type costs:	£		£		£		£	
	casual labour	25		16		43		90	
	other	35	60	42	58	51	94	79	169
	Fixed-type costs:								
	regular labour	61		50		117		227	
	rent and rates	11		25		32		)	
	other	56	128	55	130	49	198	) 117	344
	Total		310		278		438		752
Part B.	amended to a base of 1969 yield per acre								
	Total		310		344		432		668
Part C.	Efficiency comparison (1969 = 100)								
	Index of weighted factor costs		100		130		151		272
	Index of estimated production cost		100		110		139		230

Part D. Annual rate of gain in efficiency, 1969-1973 = 2.25 per cent

Yearly increase in yield per acre (at constant price) necessary to stabilize cost at 2.25 per cent efficiency gain -

for 1969-73 ..... 8 per cent
for 1973-76 ..... 20 per cent

The expectations of growers with average yields will thus need to centre on a farmgate price of £1.50-2.00 per 30 lbs. Consumers' resistance can be expected at the equivalent mid-season retail price of 15 to 18p a lb. Accelerated changes in marketing methods and in the enterprise structure of the industry can thus be expected. So large an increase in factor costs must put a bigger strain upon specialized growers than upon mixed growers whose enterprises are less intensive.

No relief from increasing costs seems feasible in the short term. Mechanization of orchard processes will become more urgent and no doubt concepts of ways of managing 50 to 100 acres of trees per man will emerge during this time. As an investment of up to £1,000 an acre may be involved, it will still be preferable for medium-sized growers to keep an extra man instead, if they can. By 1980, however - before the advent of mechanization - costs may well be in the range £500 to 1200 an acre - far beyond any possible increase in consumers' disposable income - and an 'economic' farmgate price will have risen to £2.10 to 2.20 per 30 lbs., equivalent to 18p to 20p a lb. in the shops. Larger sales than in 1973 or 1975 cannot be expected at this level of price.

In the event, some growers and some consumers will find ways of circumventing some of the added costs, but on the whole the prospect in demand is one of reduced output (or diminished profitability) over the period 1977 to 1980. A short-term downward trend in output would also seem to be prognosticated from the supply side, particularly from behavioural analysis and in answer to the question: "What factors determine the orchard area in England and Wales?"

Trend in future output. Changes in supply may well keep pace with a decline in physical demand, as the additional areas existing growers may plant will not exceed the larger areas which will tend to be lost when entire fruit farms are given up, and the area withdrawn is likely to be too large to be made up by the upward trend in yield on the remaining area. Were the planted area to fall to, say, 20,000 to 21,000 ha, crops of 300,000 tons, as realised in 1964 and again in 1971, seem unattainable.

Projection of medium-term trends in acreage and yield, and in output, is made in Appendix III and Appendix IV respectively. Speculatively, three of the next five crops will be within the range 190,000 tons to 240,000 tons, with the average for the period being about 225,000 tons.

IV. A WEST EUROPEAN PERSPECTIVE

In the light of the foregoing conclusion it could be argued that English dessert apple and pear growers will be affected just as much, if not more, by what happens in the U.K. as by competition from growers across the Channel in the next few years. To be assailed both from within and without might be crippling for a number of growers, so there is good reason to conclude this report with an assessment of what English growers can expect from the EEC. This will have to be done circumstantially, since the EEC farm accountancy scheme is not yet in full swing and only The Netherlands issues annual reports upon the current state of fruit-growing. In what follows, the fragmentary economic data available have been fitted into a framework of (a) output and structure, (b) economic features and (c) financial results, examining first the north European industries and then (so far as possible) the southern European industries.

IV.1 Output and Structure

Output. Britain has about 9 per cent of the total commercial area of apples grown in the EEC and intended for fresh consumption. The combined acreage of dessert apples and pears in Britain is on a par with that of two other countries of northern Europe, West Germany and The Netherlands, but there the similarity ends. The proximity of Italy to Germany has put a restraint upon German growers, while the export hopes of the Dutch growers have led them to plant far more trees than their fellow-countrymen require for their own consumption. Belgium has a dessert-apple acreage more appropriate to its smaller population but an output almost equal to that of England and Wales. Thus the fruit-growing industries of the northerly countries of the EEC have little in common and do not conform to one pattern. They do not give a guide as to what size of industry would objectively be proper for the U.K. Some relevant figures are given in Table 20.

The year 1973 was chosen for this comparison because it was the most recent year of 'normal' output.

Conclusions from Table 20:

1. E. and W. is less-developed for apple production than any west European country at similar latitude.

Table 20

Output and Physical Performance in Table Apple Production, Four Countries of EEC, 1973

				per 1m population		
	Area ('000 ha)	Output ('000 tonnes)	Imports from France/Italy ('000 tonnes)	Area ('000 ha)	Output ('000 tonnes)	Apparent self sufficiency* (per cent)
Netherlands	22	445	41	1.6	33.0	92
Belgium	8.5	230	51	0.8	23.0	82
W. Germany	25	550	425	0.4	9.1	56
E. and W.	21	268	142	0.4	4.9	65

Source: Tuinbouwcijfers, Landbouwstatistieken.

2. Physical productivity of table apple orchards is lower in E. and W. than elsewhere.
3. British growers have provided British consumers with fewer table apples per head of population than growers in the other countries.
4. From the British consumers' point of view imports from other EEC countries are essential.

British apple production thus has the overall feature of being much less intensive than in other countries at the same latitude. The intensity and scale elsewhere are associated with (a) the popularity of specialized production on small areas and (b) widespread conversion to high tree densities, (c) numerous small farms and a tradition of growing fruit, leading to an industry of several thousand small producers, and (d) fewer constraints than in the U.K.

Structure. Small-scale fruit-growing on the Continent is on a par with small-scale farming: it can be considered more of an accident of agricultural history than the result of positive economic choice. Would-be fruit-growers had only small farms, and fruit-growing was one way of intensifying production and giving more rewarding employment to the whole family. Now, pride in ownership and difficulties of

* 'Apparent self-sufficiency' relates only to imports from France and Italy.

partitioning holdings maintain the status quo. Some salient data about the size structure of apple orchards are given in Table 21.

Table 21

Percentage of Area of Table Apple Orchard in Units of Specified Size, 1970-72

	below 5 ha	5-10 ha	11-20 ha	21 ha and over
Netherlands	18	26	29	27
Belgium	61	17	6	16
W. Germany	17	——— 42 ———		41
E. and W.	11	17	24	48

Conclusions from Table 21:

1. In continental northern Europe the family farm is the basis of fruit-growing.
2. A majority of holdings must be incapable of efficient mechanization.
3. Economic adversity is more likely to be met with a lower living standard than with abandonment of the holding.
4. Structural improvement cannot be long delayed.

IV.2 Economic features

Density of planting. The question of high tree densities is dealt with under this heading. English growers, having larger areas of orchard and cultivars less well-adapted to the original concept of intensity, did not feel the same necessity as on the Continent to increase their tree numbers per ha quickly. Conversion is proceeding in England, but relatively slowly and at least ten years later than in The Netherlands and Belgium. Belgium, in fact, has made the most complete conversion to intensive production, whereas Netherlands growers probably have gone furthest in actual tree numbers planted per ha. In the middle 1960s 75 per cent of trees planted in The Netherlands were set out at densities exceeding 800 per ha (320 per acre) and five years later 50 per cent of trees were set out at densities exceeding 1600 per ha (640 per acre). Since then there has been a withdrawal from the extreme position, no doubt in response to

the high price of trees and stakes. For Golden on M.IX, however, 2000 trees per ha has recently been confirmed as a likely maximum-profit planting density.*

The small, specialized farm concentrating on intensive production of Golden has no place in the British industry. Cox is less amenable to intensive cultivation and in their new orchards Cox growers have most frequently settled for a tree population of about 1000 per ha. There are no official estimates of the relative importance of different densities of planting in E. and W.

The extent to which EEC growers are committed to intensive systems can be seen in Table 22.

Table 22

Percentage of Apple Orchards Planted at Rates exceeding 800 trees per ha, by age, 1970-72

	under 5 yrs.	5-9 yrs.	10-14 yrs.	15 yrs. and over
Belgium	98	98	91	59
Netherlands	92	78	40(e)	24(e)
W. Germany	39	19	10	11
E. and W.(e)	8	3	1	0
France	65	58	50	28
Italy	9	3	2	1

(e) = estimated

Source: Eurostat; A.P.D.C.

Intensive systems are thus not universal: their adoption in northern countries is a form of self-defence, raising efficiency and output and trying to make the best of an inferior climate.

Conclusions from Table 22:

1. The most intensive practice is associated with entire small holdings and with the necessity to re-create revenue as quickly as

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* Winter, F. (1976) A Simulation Model for Studying the Efficiency of Apple and Pear Orchards. Gartenbauwissenschaft 41, 1 pp 26-34.

possible after grubbing.

2. The additional output of apples consequent upon increasing tree numbers per ha has been an embarrassment to Belgian and Dutch growers but has helped to keep up their share of the home market - at a cost.

Dependence upon Cox's Orange Pippin (Cox). British growers are known internationally for their preference for Cox and their skill in growing this cultivar. Although considered to succeed best in a cool climate, only English growers among those in northern Europe have put so much faith in it and not thought it wise to have one or more companion cultivars. When the Cox area in E. and W. reaches its potential production Britain will be growing more than half the EEC output. The past status of Cox within the table apple output of five EEC countries is shown in Table 23. This table, regrettably incomplete, serves to indicate that over the past few years annual variation in table apple output in the northern countries may be positively associated with the proportion of Cox in the national supply.

Table 23

Cox Production within the EEC, 1970-74

		U.K.	W.Germ.	Neth.	Belg.	Denmark
Share of EEC production (%)		44	25	17	6	6
Share of table apple output (%)		55	21	18	13	15
Estimated output:	1970	157	30*	85	30	-
('000 tonnes)	1971	165	62*	88	40	-
	1972	82	51*	55	38	-
	1973	159	72*	-	-	-
	1974	91	-	-	-	-

* Bodensee region only.

The U.K. would thus seem to experience year-to-year variation in a manner more characteristic of a continental climate (e.g. West Germany) than of a maritime climate.

Conclusions from Table 23:

1. Dependence upon Cox accounts for the greater variability in the U.K. output.

2. Annual yield variations have been reduced elsewhere in northern Europe by a combination of Golden Delicious and intensive methods.
3. In order to realise level annual output more than one major cultivar must be grown.

Alternation of higher and lower yield has now become characteristic of the EEC crop as a whole, even with West German output excluded. The consequences of having alternately too much and too little fruit were outlined on p.42. Annual variation consists of (a) cultivar-induced variation or (b) location-induced variation.

Cultivar-induced variation. For whatever reason, yield variability seems to have a genetic connotation. Some cultivars bear more regularly than others. Cox yields are irregular. Belle de Boskoop has possibly a worse record. Their recent annual variation is of a much higher order than for, say, James Grieve or Golden. Deliveries to auction markets in Belgium and The Netherlands of the four cultivars mentioned over the period 1971-3 were as under (in '000 tonnes; and each indexed in parentheses to 1971 = 100):

	J.Grieve	Golden Del.	Cox	Boskoop
in The Netherlands				
1971	28 (100)	145 (100)	68 (100)	65 (100)
1972	21 (75)	121 (85)	41 (60)	41 (63)
1973	26 (93)	124 (86)	63 (93)	52 (80)
in Belgium				
1971	3.3 (100)	38 (100)	11 (100)	10 (100)
1972	2.5 (76)	39 (103)	6 (55)	9 (90)
1973	3.3 (100)	39 (103)	10 (91)	15 (150)

Sources: Tuinbouwcijfers 1975; Landbouwstatistieken 1974.

In the eastern U.S.A. Golden Delicious is known as a highly biennial cultivar, it seems to be developing in the same way in western Europe, but it would appear from the above data that in its early days, and when intensively managed, it is capable of regular yields. In one respect at least it should prove a good (but not a sole) support for a fruit-growing industry in the right circumstances.

Locational variation. Even if growers made a selection of cultivars with the object of attaining regularity of output and there were, say, two main cultivars, some year-to-year variation would still arise owing to yearly differences in performance of the same cultivar between regions.

France is a good example of a country with one predominant cultivar, the annual production of which is affected not so much by contrary yield movements in the different regions but by variation in movement in the same direction. The south-west of France can experience different weather from the south-east, and yield variation in a single area of France can be as large as for the English crop as a whole. For example, the following recent estimates have been published of the 1974 crop situation in France and in Italy.

S. European apple crop - regional variation:

Region	percentage change 1974 after 1973	Region	percentage change 1974 after 1973
France		Italy	
Paris	-35	Piedmont	-32
Loire	-19	Alto Adige	-10
Rhone-Alpes	-47	Campania	-20
Languedoc	-30		
Provence	-24		

Conclusions from the last section:

1. Hitherto, intensive systems have mainly been regarded as a technical innovation. There is evidence above that they have been instrumental in providing more apples with greater regularity and possibly more cheaply than before the 'revolution'. It is unfortunate that over-capacity occurred during the changeover.
2. In the present state of the EEC, now that the Commission is involved in shaping the industry, the question will arise one day about the proper measures to be taken in pursuit of the declared policy. For the present the policy of getting rid of the physical surpluses is enough and the debate is about the best method(s) of doing so.

Questions prompted by the last section

1. Once the surpluses have been extinguished some differences of interpretation of policy can be foreseen. Does the Commission wish to see high prices for apples, reduced consumption and a smaller industry enjoying normal profits? What combination of the four elements - price, consumption, size of industry and profitability of production - will be thought best? Will there be a decisive preference for large firms or will concern for the thousands of individuals who wish to employ themselves growing fruit be uppermost?
2. As regards the UK specifically, to think along these lines reveals how dessert apple and pear production has been borne along commercially by the efforts of private individuals: the industry has been fashioned according to their ideas. Would an industry founded on the idea that the whole point of production is consumption - the consumerism principle - be any different?

IV.3 Costs and Relative Profitability

It was a prominent French fruit-grower who referred to Britain as the fruit-grower's paradise - prophetic words at the time they were spoken in 1963. At about the same time the scientific verdict upon Britain as a location for apples and pears was geographically marginal. These two contrasting assessments may both be correct and do not necessarily cancel each other out. The first can be demonstrated by the relative profitability of English enterprises, the second by the physically poor and highly variable performance of many English orchards; and the two views can be reconciled in a conception of the place of 'marginal' production within the EEC as a whole.

Hitherto (1975), English growers have been remarkably well insulated from the typical EEC experience. In fact, the contrast has endured long enough to give credence to a belief in a certain natural protection for the home producer. Briefly, the English growers' past good fortune can be ascribed to, first, relative scarcity of Cox; second, a large scale of enterprise; and third, advantageous selling. The first is not of the growers' making: it has meant that the nation's appetite for Cox has not been fully tested, and this could prove an obstacle in the long run. The second is the English growers' way of

obtaining relatively high output per man when average yields per ha are low. The third is the way by which a high cost on the tree does not lead to English apples being priced out of the market at the retail stage.

The organization of English apple production is so distinctive - i.e. large enterprises, low yields, predominantly Cox - as to prompt the question whether it is complementary to or competitive with the rest of EEC production. One respect in which British apple production has been complementary, and which has given it a contrasting function with production elsewhere, is in marketing season. Due to the U.K.'s maternal relationship with the Commonwealth, British growers were only required to provide dessert apples and pears between September and March each year. Again, the predilection for Cox led to an earlier finish to the stored crop than might have been possible with another cultivar, not to mention the probably lower overall crop. Traditionally, complementary imports from western Europe have been necessary to eke out the domestic crop and the vestiges of the once-large imports from Canada.

Becoming a Member State of the EEC has changed the raison d'etre of English fruit-growing. By adopting the principle of Community Preference the available season for marketing English apples and pears has been extended a full two months - by about 30 per cent. English growers are entitled to compete for any share of the late-season market they may wish to have. In countries that do not have the U.K.'s overseas connections, growers have a different conception of their function and plan year-round marketing. In The Netherlands, for example, the 1972-73 apple crop was released as follows (percentage in each month):

July	3	November	11	March	9
August	6	December	7	April	7
September	9	January	8	May	8
October	19	February	9	June	4

Not for the last twenty years have thoughts of possible expansion of the dessert apple acreage coloured the official view. The matter is now worth examining - not simply as: "Do we want more of the same?" but "How can a new section be added to the existing industry?" There will

perhaps be few readers who disagree that more apples from the existing area would be welcome. The larger question is whether the English industry should expand its base. At the present time of intended net withdrawal, the proper concept might be selective replacement - a relative expansion by virtue of more-efficient holdings replacing less-efficient holdings.

Confidence in the future will only be restored when the competitiveness of the U.K. can be demonstrated. Are English growers handicapped more than growers elsewhere? Are their present handicaps partly self-imposed and not due to England as a location? On what is the official caution about the future based: will, say, 10,000 tons more or less be material in the last analysis? Are there good reasons why English domestic production should not have the same status as in other northern European countries?

Take climate. Late frosts would seem to be the one respect in which England is disadvantaged, and shared with West Germany. Otherwise, mean daily temperature and insolation (at East Malling) are very much the same as elsewhere (Table 24).

Table 24

Some Long-Term Climate Parameters for Fruit-Growing Areas in N. Europe

	Belgium	Denmark	Netherlands	West Germany	E. & W.
Mean daily temperature, month of May (°C)	12.6	11.1	11.9	12.8	11.5
Hours of bright sunshine					
- year	1596	1729	1629	1665	1561
- June and July	440	504	442	430	425

As regards economics, if the criterion of where dessert apples should be grown were to be profitability, the U.K. would be the one country in the EEC where planting-up could continue. Elsewhere, fruit-growing has been the most depressed type of farming - latterly along

with wine-growing. To repeat, English enterprises have been more profitable than they might have been, bearing in mind the considerable bearing acreages. Equally it could be said that other EEC growers' prices are not a true reflection of their costs of production. Faced with this contrast between relative scarcity and excess, observers of the scene find singularly few clues about what a stable intra-EEC apple situation would be like.

There is little appropriate economic evidence, and the remainder of this report is taken up with a circuitous approach to the ultimate question: what are the English growers' chances in the EEC? The northern growers' situation is first assessed, and thereafter the competition from southern growers.

Going back to 1968, the Netherlands published some comparative costs of production which indicate (a) that at normal levels of output, the mature bush orchard was not disadvantages vis-a-vis the mature M.IX plantation*, and (b) under similar conditions, Golden could be produced at three-quarters the cost of Cox (i.e. Cox was 33 per cent more costly per unit).

In the context of (a) above, the consultancy firm A.D. Little once reported in no uncertain terms upon the obsoleteness of bush trees: they may have other disadvantages, but the available data would suggest that in their mature normal behaviour their crop is not necessarily high-cost.

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* Comparative Costs, Semi-intensive and Intensive Production. 'River Clay' area of The Netherlands, 1968 (£ per acre).

	Semi-intensive	M.IX
Cultural costs	153	167
Harvesting and marketing	163	160
Fixed costs	220	242
Total	536	569
Yield per acre (tons)	9.4	9.8
Cost per ton (£)	57	58

(n.b. cultivar not stated)

A much more significant effect for difference in cultivar, (b) above, was noted in the same area.*

The substantial difference in unit cost shown amounted to less than 1p a lb. when cost of production was rather less than 3p a lb. When costs have risen to 6p a lb. the same proportional saving on Golden would be nearly 2p a lb., and possibly significant for the grower. Significant because the relative prices of Cox and Golden on the Dutch auctions at prevailing levels of supply (approximately twice as much Golden as Cox) only compensate for about half the difference in unit cost. Over seven years to 1973-74 the average auction price of Golden was 86 per cent that of Cox. The Dutch growers' past preference for Golden was thus built up somewhat as under:

		Cox O.P.	Golden Delicious
Cost per ton	(£)	60	45
Growers' price per ton	(£)	62	52
Margin per ton	(£)	2	7
Margin per acre	(£)	19	94

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* Comparative Costs, Cox and Golden on M.IX.
'River Clay' area of The Netherlands, 1968 (£ per acre).

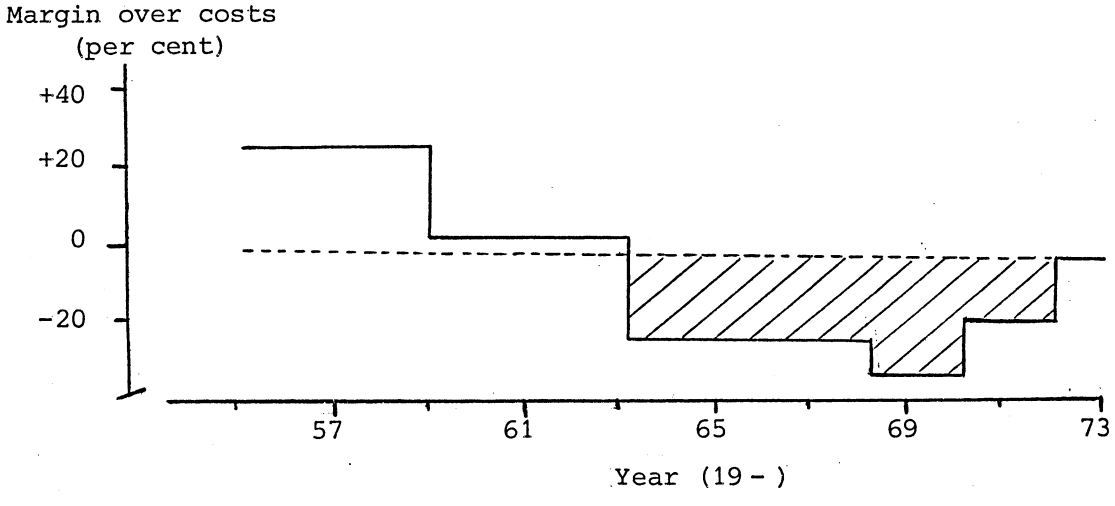
	Cox O.P.	Golden Delicious
Cultural costs	178	162
Harvesting and marketing	170	220
Fixed costs	273	275
Total	621	657
Yield per acre (tons)	9.4	13.5
Cost per ton (£)	66	49
Equivalent cost per ton in N.E. Polder (£)	56	42
Index of comparative cost (Cox = 100)		
in 'River Clay' area	100	74
in N.E. Polder	100	75

In order to survive in the Common Market, the Dutch growers elected to invest and increase output, thus allowing less room in the home market for imports. Having predominantly small enterprises (and high wages) The Netherlands' industry is high-cost and the result of the policy of rapid re-investment has been a level of home-produced supplies that has forced prices down to an uneconomic level for four growers otu of five. The alternative - of withdrawing in favour of additional imports - would have entailed a much smaller apple and pear industry and was not politically feasible. The result is that the Netherlands has a lot of hard-pressed growers, but also plenty of apples.

The Landbouw-Economisch Instituut (LEI) in The Hague provided evidence* in 1971 of how Dutch fruit-growers were assailed by cash flow problems even at the relatively early stage of 1970. In 1968 and again in 1969 growers, having cut their private expenses as far as possible, were borrowing at the rate of £50-55 an acre and by the end of 1969 owned only 60 per cent of their business assets. During 1970 about half the fruit holdings were awarded special liquidity credits by the government. This relief came six years after the descent into unprofitability* (see Figure 11).

Figure 11

Netherlands' Growers Annual Profit or Loss, 1953-1973

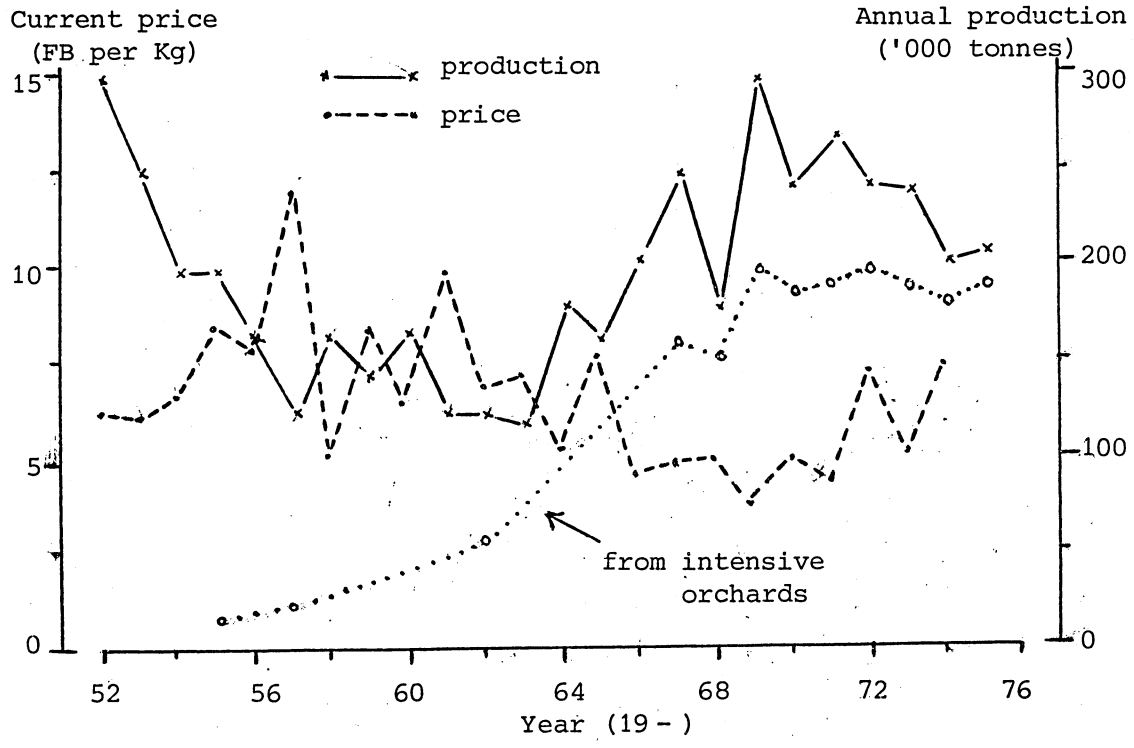


* A. Holkamp. De financiële positie van gespecialiseerde fruitteeltbedrijven in Nederland. No. 4.44, 1971.

Belgian growers, generally speaking, have followed the same policy as the Dutch growers and invested in much the same way to protect their share of the home market (i.e., small enterprises, conversion to Golden). The almost complete transformation of apple-growing can be seen in Figure 12, which traces the events since 1950. In one year, 1969, output was back to the 1952 level, 85 per cent of it re-planted orchards covering only one-third of the former area. Since 1969 output from the new orchards has been on a plateau and adversely affected by the weather since 1971. The consequence in terms of price has been severe. Belgian growers' prices are almost interchangeable with Dutch growers' prices. Between 1972 and 1974 growers' prices have been about 3p a lb. - rather less than the price of twenty years' earlier at the same level of output.

Figure 12

The Changeover in Belgian Apple-growing, 1952-1975



To sum up, there are some similarities between The Netherlands and Belgium as north-European producers in the Common Market. There are also some contrasts with the U.K., in the light of which it can be argued that English growers' experience will be different from that of the Dutch and Belgian growers. For a start, U.K. production complements that of France or Italy to a greater extent: English apples can be supplemented more readily than they can be displaced.

IV.4 English Growers as Northern Producers

In the past, English growers' great privilege has been a protected though seasonally-restricted market, and particularly in the last few years English growers' hold of the market has led to a state of profitability contrasting strongly with that of fruit-growers in other EEC countries, whether in the north or the south of Europe. Helped by the underlying scarcity, producers' prices in the U.K. have been more than twice as high as in the self-sufficient countries, and consistently twice as high for Cox as in The Netherlands and Belgium (Table 25).

Table 25

Producers' Prices for Apples, 1969-73

Units of Account per 100 Kg

Year	for Golden			for Cox O.P.		
	France	Neth.	Belgium	U.K.	Neth.	Belgium
1969	10.1	8.8	6.5	22.1	11.6	7.4
1970	9.5	8.3	6.8	20.7	9.9	8.1
1971	13.7	9.7	7.7	33.4	14.1	10.8
1972	16.9	19.0	13.5	64.3	31.2	21.4
1973	10.1	13.4	9.7	26.5	19.4	15.6

Source: EEC Agricultural Statistics, 2.74. Luxembourg.

Which level of prices is 'right'? The answer is: neither. The English growers' price is higher than otherwise as a result of the short crops: the other growers' price is too low for profitability. In the best-documented case - The Netherlands - in 1973 the average grower among a sample of fifty was about £2,500 short of his due reward as a worker-proprietor of twenty acres of orchard. Price was calculated to be 28 per cent below the economic level.

Reverting to Table 25, it would seem that in a full crop year (i.e. 1973) there could be an economic level of price acceptable to growers in the three northern countries considered. Such a price would make allowance for Dutch and Belgian growers being handicapped by small enterprises, English growers by low yields. For example, if the Dutch average price for Cox had been 28 per cent higher and the

English average price had been 6 per cent lower, the price would have been the same - 24.8 u/a per 100 kg (in Green Money reckoning). A reduction of 6 per cent in Gross Returns for Cox on the enterprises in the sample previously analysed would have entailed a reduction of about £1,600 per enterprise and a M.I.I. of perhaps £4,600 instead of the £6,200 recorded.

It is thus possible that English growers can be rewarded in a capacity of working proprietors at the same level of domestic prices as is required to satisfy growers in Belgium and The Netherlands. In this context it is not the English growers' share of the home market which is vulnerable, but their level of income - the English standard being doubtless the higher.

The more managerial rôle of the typical English grower has no place in the E.E.C.'s farm accounting procedures which are orientated to 'Income per labour unit' and negate the place of capital and return on investment. At some future stage this will lead to a discussion about economic parity between the family farm and the (larger) fruit-growing business. Having focused upon the one factor, labour, and having thousands of working proprietors in mind, the EEC Commission will have it in mind to make the Common Market a worthwhile place for the efficient, small, family holding.

British and, to a lesser extent, French growers may not be satisfied to see the family holding constituting the economic base-line, so to speak. The large commercial organizations in Britain and France differ in two important respects from that of the family farm. First, as sole proprietor, a commercial grower is not primarily a manual worker. He is manager and investor, fostering his business in other ways than by his practical skills. He employs others to do manual tasks. So it follows that what the EEC Commission considers adequate remuneration for one worker-proprietor and his son on a family farm will not be adequate for one manager-proprietor and one paid regular worker.

The difference in scale between commercial and family enterprises can be eased in one respect by associating the man-year-labour unit with a quantity of fruit rather than an area. For instance, the area per man assigned to the family farm may be 10 acres (4 ha) - an output

of, say, 5,500 bushels or 100 tonnes per man: the same physical performance could equally well be realised on the larger farm producing multiples of 100 tonnes by a combination of 8 tonnes per acre and 12.5 acres (5 ha) per man.

In another respect the difference in scale between family farms and commercial fruit farms will be less easy to resolve. In the instance of the four-man, proprietor-manager enterprise, the equivalent of perhaps six 'labour incomes' may be looked for but the productivity of the four workers may not be equal to providing them. On paper, the enterprise may in this way yield four good labour incomes but still be a disappointment to the proprietor. The substantial enterprise employing ten or more regular workers may be in a better position, provided that the potentially superior labour productivity is realized and is not all paid away in higher earnings. If economies of scale are weak, high wages will be at the expense of profits. Literally, the EEC attitude will tend to equate workers with proprietors and will look at prices in relation to incomes with this in mind. Conceivably, the small employer-proprietor of a low-productivity enterprise will not find enough to provide the going rate of return on his investment from what is left after providing the required number of 'labour incomes', one for each of his regular staff.

IV.5 Competition from Southern Europe

The notion that an economic price for dessert apples in The Netherlands, when translated into the equivalent price for Cox delivered to the U.K., would satisfy efficient English producers, extends also to French and possibly to Italian apples (the French industry being recognisably an amalgam of grower-proprietors, like those of northern Europe).

Recent enterprise studies of French fruit-growing are notable by their absence, but from the fragments of information available it would seem that (a) the majority of growers are not in the export trade and (b) internal prices constitute an incentive to look for export markets. For example, after the big 1973 crop, Class 1 Golden was quoted at 4.0p to 4.5p a lb. (English equivalent) at Paris (Rungis), between January and April 1974, compared with 6.5p to 7.3p a lb. in

English wholesale markets (and export costs of perhaps 1.5p a lb). Again, in the early part of the 1975 season, French growers' prices were down to 2.5p a lb. (English equivalent) when English growers' prices were about 4.5p a lb.

The bulk of the French export trade is likely to remain in the hands of the larger, highly-commercialised growers and co-operatives and is therefore, by inference, only a portion of the whole.

The U.K. is potentially a larger market for French apples than Belgium, the Netherlands, or - considering the traditional importation of Italian apples - West Germany, so there will be an effort to develop the U.K. market, particularly as West German consumers are said to be turning away from French Golden. Imports to the U.K. of French apples are increasing, but, as has been shown, complementary imports have been required since 1971, and up to 1974 at least (and 150,000 tons imported) these imports were not enough to break the English growers' price. In fact, it would appear that 140,000 to 150,000 tons, largely delivered in the post-Christmas period - and which represents a 30 per cent share of the market - is not high enough to constitute price leadership. So long as English apples predominate, the price of imported apples will tend to be lifted towards the English level, and so will be less of a threat. And with the U.K. being one of the major international markets in Europe and southern hemisphere apples predominating from April to July, there is only a period of four or five weeks - substantially, March of each year - when price leadership could pass to the French crop. For the most part, when U.K. prices are low delivery costs will put a brake on imports, and at the time when prices are high, French apples tend to be inferior in quality.

The present strength of French production comes from its scale and the joint "pull and push" effect of having a domestic excess - enough apples to fill gaps elsewhere if gaps exist, or to create greater pressure for export if they do not. As was shown in Figure 9 (p. 39) over-production cannot be reconciled with a high-profit position for growers. Indeed, fruit-growing (along with wine production) has been the most depressed sector of French farming for the past five years.

So far in this section it has been assumed that price-leadership by French growers was to be feared, because it would lead to wholesale prices of dessert apples so low that English growers could not compete. But, what happens in the U.K. (e.g. inflation, economic decline) may have as much bearing as anything else upon the short- and medium-term outcome.

The developing situation is shown in Table 26.

Table 26

Exports of French Apples to the U.K. and West Germany

	1971	1972	1973	1974	1975
Quantity to W. Germany ('000 tons)	257	351	250	249	202(e)
Quantity to U.K. ('000 tons)	69	78	139	149	165
Value to U.K. (£m)	7.98	10.69	19.88	24.47	n.a.
Declared value per ton (£)	116	137	143	164	n.a.
Wholesale price per ton, Paris*	98	120	98	117	150

* Golden Delicious, Cat. 1. 70-75 mm, during export season to U.K.

(e) = estimated n.a. = not available

Source: Fruit Intelligence; Arboriculture Fruitière.

The declared average value per ton at the U.K. port has been above the March wholesale price at Paris (Rungis) plus transport and M.C.A. on entry to the U.K. If determined efforts to export, or continued crop failures in Britain, win, say, a 50 per cent market share for imports, price leadership might then pass to French producers, in which event it would be useful to know what the 'economic' price might be.

Bearing in mind that sustained exporting will be limited to high-yield, high-input firms, the underlying situation regarding the supply of 'Golden' in 1975 is thought to be as follows (Table 27).

In round figures, then, the 'true' price of imported Golden grown by the most efficient growers and landed in the U.K. was at

Table 27

Estimated Comparative Cost of Supply of 'Golden' to U.K. Market, France and The Netherlands, 1975

		S. France	The Netherlands
Yield per ha (tonnes)		55	42
Area per man (ha)		5.6	4.0
Labour cost per ha	(£)	706	937*
Total cost per ha	(£)	1656	2342*
Cost per tonne, ex orchard*	(£)	30	56*
Cost per tonne, grading, packing	(£)	45	20
Total cost ex packhouse	(£)	75	76
Total cost including 17½% profit	(£)	88	89
'Economic cost, delivered U.K.**	(£)	104	99

* includes sorting on the farm.
** assuming no Monetary Compensatory Amounts payable.

least 5p a lb. in 1975. Allowing only 1p a lb. wholesale premium for the equivalent grade of Cox, the English grower could reckon on a comparative ex-packhouse price of 6p a lb., £2.40 a bushel or £134 a ton, for equality.

Referring to Figure 2 (p. 8), it will be seen that all but 15 per cent of the growers in the sample (those registering a cost of £1.90 a bushel* or more in 1973) could in theory be earning the stated rate of profit in 1975 if winter-season imports were complementary and supplied at an 'economic' cost. With yields as in 1972, however, the average cost is much closer to the economic 'threshold' price. The 1972 cost equivalent to £2.40 in 1975 is £1.71, and (according to the '72 figures) 30 per cent of the enterprises would have been unprofitable unless the import price were higher too.

A comparison similar to that for Golden above can also be made for Cox (Table 28).

The key to English growers' competitive ability, of course, is that locational advantage - i.e. a higher yield per ha - ends on the

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* £1.90 in 1973 = £2.05 in 1975; + 17½ per cent = £2.40.

Table 28

Estimated Comparative Costs of Supply of Cox to U.K. Market, Netherlands and E. and W., 1975

		Netherlands	E. and W.
Yield per ha (tonnes)		34	24
Area per man (ha)		4.0	7.8
Labour cost per ha	(£)	937*	455
Total cost per ha	(£)	2342*	1225
Cost per tonne ex-orchard	(£)	67*	51
Cost per tonne, grading, packing	(£)	23	32
Total cost ex packhouse	(£)	90	83
Total cost including 17½% profit	(£)	105	98
Export costs**	(£)	10	-
'Economic' cost, delivered U.K.	(£)	115	98

* includes sorting on the farm.

** assuming no Monetary Compensatory Amount payable.

tree. Superior climate contributes little if anything towards reducing the cost of picking, hauling, grading, packing and storing; all these costs, together with delivery, are incurred on the package basis and amount to five to six times the unit cost of the fruit on the tree. If the English crop can be handled and marketed as efficiently as elsewhere the initially lower cost of French and Italian apples can be substantially offset.

Not much is published about the economics of apple growing in Italy, and a cost of production does not have a lot of meaning on the share-cropped family farm. According to some Belgian data, however, some better-tasting apples grown under sole proprietorship in the Bolzano region would cost £26 a tonne ex-orchard in 1975 where the marketed yield was 25 tonnes per ha. In this case, where the final product is less valuable, the costs subsequent to picking must be a relatively heavy drain upon the revenue received from sales.

Following Tables 27 and 28 the efficient English grower is shown to be able to compete with the most efficient French grower if he

could supply Cox, in 1975, at 6p a lb. ex packhouse. It can thus be infered that if the 1972 and 1974 crops are frequently repeated the profitability of dessert apple and pear crops will be seriously eroded.

Conclusions from last section:

1. If there is no further marked deterioration in the rate of inflation relative to the external value of the £ sterling, good English practice is reasonably secure against 'economic' imports given yields as in 1973.
2. In years of relative shortage cost advantage will move in favour of growers abroad.
3. Dr. Roosje - no doubt with 'Golden' in mind - has set the physical limit to sustained apple yield in northern Europe at 1,000 bushels an acre (40 tonnes per ha). Dr. Luckwill has declared 20 tons an acre (50 tonnes per ha) to be a "distant but attainable" target for Cox yields.
4. Yields as in (3) above will secure the future for northern growers. In the meantime, however, English growers must offset their climatic handicap by superior technology, the most important task for which is to improve regularity of cropping. The year 1973 had little to recommend it climatically, but average yields were on the same level as 1971.
5. Although they may not be priced out of the market, the chief risk in the present situation to English growers is that they will import other growers' standard of living - which, relative to their physical production, is low.

IV.6 Future Price Levels

'Economic' net returns to the growers of all apples exported to the U.K., however, cannot be expected with prices at their level in recent years. So long as there are physical surpluses of apples there is the risk that growers will attempt to market too much and prices will be basically uneconomic. This situation, of course, is one the EEC fruit marketing regulations are intended to prevent. Thus, much of the medium-term future is bound up with the way in which the market-intervention scheme will operate and upon the success of the orchard withdrawal provisions. For practical purposes, the decisive influence will be the French government's attitude to its industry. Either

national pride may result in an over-large area being maintained as an asset to the national economy, sustained by EEC subventions, or counsels of efficiency in agriculture may prevail and efforts be directed towards raising growers' incomes by reducing the size of the industry.

On both counts it would seem reasonable to expect a long drawn-out sub-economic situation in French apple production. The contentious wine 'war' of 1975 between France and Italy showed how difficult it is in practice to obtain agreement on scaling-down an agricultural industry once the initial investment has been made. During the orchard grubbing campaign of 1970-73, about 45 per cent of the area removed was of old apple trees in West Germany - 24,000 ha compared to 16,000 ha in France. The EEC Commission's proposals for a grubbing premium (no longer a subsidy!) of about £230 an acre, limited to Golden Delicious, would involve France in paying about £1.5m to have 5,000 ha removed. Effectively controlled, this expenditure could reduce the planted area of Golden in France by 10 per cent - which, the Commission no doubt hopes, would result in the 5 per cent reduction in supplies necessary to bring supply and demand into approximate physical balance. The principle is good. The total cost of the campaign for apples may be of the order of £m 3.5 to 4.0, whereas one season's buying-in of, say, 100,000 tonnes of apples would cost £4m.

Principle apart, this marginal approach to reducing acreage is unlikely to have a marked effect, and the intervention measures may well continue to be the feature to be reckoned with. If a buying-in price is set too low, the incentive to sell for intervention will be relatively weak, the quantity of apples marketed will be higher than otherwise and price (and quality) and net returns will be low. This is not the situation growers would choose, but equally they may not be able to avoid it. If the buying-in price is set too high, it will attract sales for intervention, more apples will be withdrawn and market prices will be higher than otherwise; however, the cost of intervention will then be high and to the extent that it encourages production for purchase by intervention, will have no corrective or remedial effect. This is not the situation that tax payers would welcome.

On balance, therefore, there is the likelihood that the market intervention scheme will give increasingly less comfort to growers,

marginal growers will become increasingly desperate (and successive grubbing schemes will be increasingly popular) over perhaps a whole decade. This seems to be the way in which Intervention is moving. Appendix VI lists the declared Basic and Intervention prices for apples and Table 29 compares the rise in intervention price with the cost of agricultural labour in France since 1967. The gap between the two is too large to be bridged by increases in efficiency of production.

Table 29

Indices of Intervention Price and the Cost of Agricultural Labour in France, 1967-1976 (1967 = 100)

	Intervention price	Cost of farm labour		Intervention price	Cost of farm labour
1967	100	100	1972	91	171
1968	93	106	1973	96	197
1969	92	125	1974	101	238(e)
1970	85	139	1975	118	264(e)
1971	88	154	1976	122	–

(e) = estimated

The 'politically orientated' intervention price is thus a different instrument in 1976 than it was ten years ago. It has been more instrumental in cost-cutting on the farms than in curtailing output. Once costs have been cut to the bone, as they are now, the only further option is to cut losses and give up. By 1980 it can be expected that withdrawals from the industry will be effective in lifting growers' average prices but not sufficiently to give growers a full reward for their enterprise and investment. It may well take the average full-time EEC grower, even if he moves with the times, up to twenty years to reach a fully profitable balance between supply and demand in view of the changes in costs, prices and techniques to be expected.

V. REVIEW

Viewed objectively, dessert apple-growing on its present scale in western Europe is both novel and experimental, despite the seriousness of its commercial reality. The experimental feature applies both to scale and location. Some results of the present scale have already been obtained, and they indicate an excess acreage. For the foreseeable future the trend in acreage will be downward. As regards location, the experiment is still in progress and how much of the English style of production, the Benelux style, the French and the Italian style will be required at a given stage is still uncertain. In principle, efficient northern growers can live alongside efficient southern growers when the northern market is shared over the season as at present. With domestic crops in the northern countries in normal balance, however, in consumers' interests there must still be years when supplementation from southern Europe is required.

Taking the U.K. in this context, and making special mention of the random sample of growers concerned (i.e. infering that many others can do at least as well), it seems that the recent bearing area has been marginally insufficient in view of the prevailing level of yield. The marginal revenue from, say, an additional 400 ha would have exceeded the marginal cost. Had the recent yield been as high as expected, the bearing area would have been 'about right' for the U.K. industry in its pre-EEC function.

To be 'about right' is praiseworthy, since it means growers made good decisions in the past, but evokes only faint praise because dessert apple consumption per head in E. and W. is no higher than it was in the late 1920s. The 'about right' condition can only be judged in the light of its being the one consumers have got used to, together with relatively high prices and substantial imports. The British growers' effort has left room for growers elsewhere in the U.K. market but it has spared the country the problems of re-structuring a small-scale industry.

It would have been remarkable if the bearing acreage supplied as a result of a number of growers fulfilling a personal ambition within acceptable levels of risk had coincided with consumers' demands for dessert apples. The latter, fortunately, is flexible, and there are no

penalties if it is not satisfied. The growers' attitude is exemplified by caution in not intending to produce more than they believe they can sell readily, and subject to the further constraint that, if a lesser quantity than that will afford them an adequate size of business, the lesser quantity will be the output aimed for. A behavioural analysis, that is to say, postulates the bearing of orchard to be a function of the number of farmers, not of demand, since demand is originally an unknown quantity.* The area of a first generation of trees is thus accidental or experimental, according to the point of view.

So how was the bearing acreage in E. and W. determined? The answer, of course, is by people - growers. The first growers who took to fruit either because it was more profitable than farm crops or because hops had failed them, have been overtaken by specialists who incline to the fruit-growers- way of life and who saw it as a profitable investment in the post-1945 period.

The behavioural argument runs like this: output is a function of the bearing area of orchard, not of the number of enterprises; but in E. and W., since there are very few insignificant dessert apple enterprises, area is a function of the number of growers: hence output is a derived function of the number of growers. (The same conclusion would not apply where small enterprises preponderate. The Netherlands glasshouse industry, for example, has lost hundreds of producers in the last ten years without visible change in productive area, as a first step in a downward adjustment. Only now is a reduction in area beginning to accompany the withdrawal of producers).

Normally, there is movement into and movement out of an industry. The run of events is likely to make entry into fruit-growing even more of a rarity than ever before and also to increase the desire to give up. There seems to be no way in which present numbers of growers can be maintained, and hence the number of enterprises; thus the bearing area in E. and W. must decline. This philosophy is the basis for the forecast of English dessert apple production made in graphical form in Appendix IV in the light of trends in Appendix III.

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* Dessert-apple growers are not alone in their uncertainty. For horticultural producers as a whole, demand 'signals' received from the market(s) have told them little of lasting value to which they could respond. (See: Report on Supply/Demand Relationships in Horticultural Products. Advisory Council for Agriculture and Horticulture in England and Wales).

Prospective consumption cannot be put higher than in Appendix III as an extension of past experience because of (a) the nature of demand for dessert apples and (b) the competition from other fresh fruit. One result from studying the price movements of dessert apples down the years is a conclusion that, within a commercial range of price consumers tend to be less deterred by a high price than they are encouraged by a low price. Consequently the days of a low price appropriate to mass consumption are over and price will tend to be the growers' lifeline. Even if production were to be revolutionized (by full-scale mechanization) the retail price of apples would be comparatively little affected unless the 30lb. unit were to become the typical consumer unit. The only opportunities for overcoming the rationing effect of price would be (i) selling on the farm and (ii) a sort of recognised apple festival at the start of the main season, and lasting three weeks, during which apples would be at their cheapest and sold at a discount, partly to encourage consumption and partly to help prices for the remainder of the season.

The long-term development of dessert apple consumption in the U.K. is summarized in Table 30. Here it can be seen how apparent consumption of dessert apples was 10-15 per cent higher in 1975 than in the mid-1920s and '30s, compared with a 60 per cent increase in consumption of other deciduous fruits (excluding citrus fruit and bananas). While home-grown apples' share of apple consumption has been growing the share of apples in total fresh fruit consumption has been falling. Consumers' tastes have been widening, initially as a result of British governments' desire to help overseas producers, latterly as the outcome of increased production in continental Europe.

At first sight, to have postulated falling consumption in the future may seem to be at variance with the argument for more and cheaper English apples (p.43) and the accent put on price. Any contradiction is more apparent than real. First, the argument for more English apples was made in the context of Britain in the E.E.C. and how English growers could make the most of their opportunities, given that some levelling-down in the U.K. and more levelling-up elsewhere will enentuate. Second, expensive though English apples may be at retail, they will continue to be one of the cheapest fresh fruits available. The period 1974-75, where the previous analysis stops, may well be a

turning-point in fruit trading. From there onwards imported fresh fruit will be relatively high-cost - offering the opportunity, by sustaining apple consumption, gently to reverse the fifty-year relative decline of dessert apples.

In the light of the foregoing there is no cause for dessert apple output to be contracted in the U.K. while it is sustained elsewhere in the EEC during the next four to five years. Marginal withdrawal of acreage in the U.K. would not help the nation and would not be felt within the EEC. Indeed, if it were possible, the opposite could be recommended - higher output at home, reduced imports, more intervention in the form of resolute measures for grubbing more Golden.

Approximately ten years hence, however, the larger size of English orchard enterprises will be talling in their favour as mechanization takes over. Either small acreage or low yield will then be a handicap, but techniques to raise yield are easier to apply than measures to increase size of enterprise. There seems to be no way in which either the 5 ha enterprise or the 200-bushels an acre (9.1 tonnes per ha) enterprise can then pay their way. Dutch and Belgian small growers will no doubt be quick - and be encouraged - to form co-operative machinery syndicates, but the inevitable result of successful mechanization is the essential work in the orchards being done in, say, forty to fifty working days each year - often by hired help. The foundation of 'family' farm - work for a proprietor and a son - will have been lost. Likewise, the net returns obtained from a low yield in the U.K. will be insufficient to meet either the costs of servicing private investment in machines or the cost of contract work.

In the longer term, therefore, displacement of growers must occur, with some loss of acreage but much more being retained as part-time enterprises. Notionally, the English acreage will be contracting relatively slowly on this account. It is also probably that the large share of British output in the hands of large co-operatives will be a point in their favour. Three long-term developments which can be

Table 30

Apparent Consumption per head of (a) Dessert Apples and (b) Fresh Deciduous Fruit (including Grapes)

	1924	1934	1948	1956	1964	1970	1975
Dessert Apples ('000 tons):							
- imports	352	313	98	189	229	254	329
- home production	68	62	142	262	345	368	264
	420	375	240	451	574	622	593
Other deciduous fruit ('000 tons):							
- imports	136	115	139	116	390	425	472
Total, all deciduous fruit	556	490	379	567	964	1047	1065
Population of U.K. (million)	45	47	49	51	54	55	56
Apparent annual consumption per head (lbs)							
- apples	20.9	17.9	10.9	19.8	23.8	25.3	23.7
of which homegrown (%)	16	16	59	58	60	59	44
- all fresh deciduous fruit	29.6	23.3	17.3	24.9	40.0	42.6	42.6
of which homegrown and imported apples (%)	75.5	76.5	63.3	79.5	59.5	59.4	55.7

virtually guaranteed are (a) a steep rise in the minimum economic size of specialised enterprise, affecting all but the larger growers and "pick your own" marketing, and (b) international co-operation among larger growers as a form of self-protection against smaller, less committed growers, in accordance with the EEC rules therefore now being worked out in Brussels, and (c) conversion to part-time or 'mixed' production as mentioned above.

SUMMARY

On a sample of thirty-three farms in the southern half of England the yield per ha of dessert apples (with pears) in 1973 was 13.4 tonnes (282 bushels an acre) - an increase over the yield in 1972 of 57 per cent. As marketed by various means, growers realized £1342 per ha (£537 an acre) for the crop, out of which an average £250 per ha (£100 an acre) remained as Management and Investment Income. Recorded marketing costs (not always the full cost of supplying the first buyer) averaged £362 per ha (£145 an acre), variable-type production costs £235 per ha (£94 an acre) and fixed-type costs £495 per ha (£198 an acre).

Average cost per tonne was £54 at the orchard gate (£1.00 a bushel), £81 per tonne (£1.51 a bushel) after marketing. The average gross return experienced was £97 per tonne (£1.81 a bushel).

Great variation occurred in growers' practice and performance, with minimal tendency towards a normally-distributed yield, factor input, sale price or income per ha irrespective of size of enterprise. About one-third of the growers, however, contained their unit cost per marketed bushel to between £75 and £96 per tonne (£1.40 to £1.79 a bushel).

Significant differences in profitability were recorded for each of three regional sub-samples. M.I.I. was highest in Kent and Sussex, lowest in the West Midlands: average M.I.I. was closely associated with average yield. Size of enterprise was another significant variable. Where yields were generally similar, the group of largest (exceeding 20 ha) enterprises showed the highest M.I.I. per ha, largely due to superiority in labour productivity and attenuation of fixed costs per ha.

The change from a short crop in 1972 to a fuller crop in 1973 brought far greater changes in the profitability of enterprises than the averages of £187 per ha and £250 per ha might suggest. For 25 per cent of growers the '73 crop was less profitable than the '72 crop; and a majority of the growers experienced a change in M.I.I. of at least £200 per ha in 1973 from that of 1972.

After a poor showing in 1972-3, enterprises of less than 8 ha recovered in 1973-4. By virtue (it is thought) of finding buyers for the whole of their good crops, albeit at not the highest average price, these small enterprises showed the highest gross returns and gross margins per ha of any, but suffered the heaviest fixed costs per ha of all. There seems to be no way for the small enterprise to remain viable as a full-time occupation; costs can be reduced by substituting casual for regular labour, but for success in this move it is necessary for the regular labour to be withdrawn.

By comparison, the group of largest holdings achieved pre-eminence by a policy based on quality. To a degree, maximum physical output was considered less important than a high average price for each tonne marketed. Longer-term storage is believed to have contributed to a high average price: some French data shows that when average quality of fruit is high, to sacrifice 30 per cent of a crop is more than can be recovered by a higher price.

Gross returns per ha in 1973 increased more than costs to give a M.I.I. 33 per cent higher than in 1972. Cost per ha increased by 23 per cent over 1972; average yield was 57 per cent higher, average price 20 per cent lower, so that gross returns per ha were 25 per cent higher. In 1973, prices of early varieties exceeded those of 1972 and Cox grossed about 40 per cent more per ha.

The higher value of the larger crop apparently indicates a favourable movement in demand for Cox. Prior to, say, 1970 it had been a common assumption that the short crop was the most valuable one. As regards profitability, as distinct from the sale value of the crop, the growers' position has been improved by cost-saving in marketing.

Since 1970 alternation rather than irregularity in yield has been a feature of the English crop. It is shown how it is possible in theory to turn alternating yield to advantage. This could be more convincingly demonstrated in practice if growers could attain a specified level of average annual output. Cox being one of the less-dependable cultivars, both growers' and consumers' satisfactions would have been higher if a less valuable but more reliable cultivar would have been grown instead of Cox on 60 per cent of the Cox acreage.

Risk in apple- and pear-growing is reviewed in the light of the recent slight incidence of spring frosts and the accrual of surplusses in western Europe. A periodic depression of income (i.e. low prices for apples) is considered more of a financial hazard than occasional loss of income (i.e. no apples to sell).

Risk is increasing also in the form of steeply-rising costs. It is calculated that by 1976 a big crop will be needing up to £800 an acre to finance: crop failure will be a financially serious matter. Consequent upon the level of costs, growers cannot hope to sell at the previously economic prices. By 1980 a farmgate price of £2.10 to £2.20 per 30 lb. unit may well be required. Retail prices being then 18p-29p a lb. well before the end of the season, a reduction in consumption must be anticipated. Annual output of dessert apples can be expected to drop to an average of 225,000 tons.

Apple-growing in west European countries does not conform to a pattern. The U.K. has apparently asked less from its growers than any other country, due to a traditional dependence upon other countries. The English style of production is not repeated elsewhere, and this makes complementary imports more likely than competitive imports. Some economic aspects of production in other northern European countries are referred to and lead on the postulate that an economic delivered price for dessert apples grown on intensive-system small family holdings would be close to an economic price for English growers. The larger scale of English enterprises is likely to count in their favour in the future.

In a similar way, complementary imports from southern Europe (as hitherto) have not yet undermined the English growers' position in the home market. The ability of southern growers actually to displace home-grown supplies is limited because the advantage of higher yields ends on the tree, when four-fifths of the retail value in an export market has still to be added.

A 'politically oriented' intervention price for apples is tending in operation towards keeping many growers on a low level of income; the price index has stayed below that of farm labour, with the result that quality of fruit has suffered and more fruit than otherwise has

been offered on the market. In view of the long period of adjustment ahead, market balance is needed urgently and could be achieved most economically by further grubbing of orchards.

In the last analysis, the present cool weather cycle is the only external factor opposing a relative increase (i.e. less withdrawal) in dessert apple production in E. and W. In the longer term sophisticated technology and mechanization will provide a means of keeping the leading English growers in a dominant position in their own market.

These changes will be largely brought about by the pressure of domestic (i.e. not imported) events upon growers, not by competition from either northern or southern Europe. To repeat, if handling the crop is as efficient in E. and W. as elsewhere, good English practice can apparently provide a picked crop at the orchard gate as efficiently as elsewhere with the £ sterling depreciated as in 1975. In Table 31 there are set out some labour-productivity comparisons with The Netherlands, France and three alternatives in southern England. English growers are handicapped by physical productivity, but in terms of the sterling-equivalent cost of labour, growers abroad would have difficulty in matching English performance. Both high-investment production and low-cost production seem fairly well-secured, although a non-working proprietor on 25 ha of bearing orchard would prejudice the former.

With prices and currencies as in 1975, the supposedly 'good average' continental grower has little cause to seek the U.K. market except for fruit which is surplus to the home market. Dutch growers can realise D.fl. 1050 a tonne for their Cox crop on the auctions. French growers can realize F. 1360 a ton for Golden on the Paris wholesale market. The English growers' wholesale price for Cox in 1975 was about £210 a tonne; to the Dutch grower this means D.fl. 1125 a tonne before deducting the additional expenses of sending to the U.K. To the French grower it means a price of about F. 1500 a tonne for Golden in quantity, again before deducting the additional costs of exporting.

French and Dutch competition, then, arises at present (1975) largely because they have more apples than they want and the U.K. has

Table 31

A Comparison of Labour Productivity,

Western European Producers, 1975

	The Netherlands	France	E. and W. a.	E. and W. b.	E. and W. c.
Equivalent ha in bearing	6.5	16.0	25.0	25.0	8.5
Total man-year requirement (excluding sorting) years	2.05	4.00	5.67	6.67	1.3
Ha per man-year	3.17	3.26	4.41	3.75	6.54
Marketed yield per ha (tonnes)	35 (1)	40 (2)	22.5 (3)	22.5	13.0 (3)
Tonnes produced per man-year	110.9	130.4	99.2	84.3	85.0
Cost per man-year (£ sterling equivalent)	3960	2905	2450	2450	2250
Tonnes produced per £100 sterling-equivalent labour cost	2.80	4.49	4.05	3.44	3.78

Notes: a. = specialised production excluding proprietor
b. = including proprietor
c. = production on mixed farms

(1) = 1/3 Cox, 2/3 Golden
(2) = Golden
(3) = Cox

Conversions made at November 1975 exchange rates for sterling.

less. The English growers' first priority would thus seem to be to get the EEC surplus capacity removed as soon as possible. Apples at their economic price are likely to be one of the cheapest fresh fruits available, thus providing the opening for turning the tide of imports of other deciduous fruits.

DEFINITIONS

Market Value (= Growers' Gross Returns)

This sum of money is the value of the apples and pears sold declared to the grower. It may thus be a sale price in a wholesale market, or a value declared to a grower by a packhouse before deductions are made for the packhouse's services, or the value of sales to retailers or direct to consumers, or even the value of the crop on the tree. Market value also includes a very small amount of sales of soft fruit and other crops which cannot easily be dissociated from the apple and pear enterprise; also miscellaneous revenue (e.g. budwood).

Marketing Costs

These costs are the costs associated with marketing, both on-farm and off-farm where the latter figures are available. Under this heading come agents' commission, off-farm transport costs, hire of commercial storage, all costs involved in grading, packing and storing fruit on the farm, including transport in farm vehicles. From the total of these costs is deducted any revenue from out of season use of cold or gas stores or packing shed and any revenue received for storing other growers' fruit.

Once again it must be stressed that the average costs shown in this report are the average of many different marketing practices.

Crop Net Output (= Growers' Net Returns)

This is the money left to the grower after he has paid the marketing costs: it is notionally available to pay all expenses associated with production of the fruit, and for a residual profit.

Variable-type Production Costs

These costs are exclusively incurred in orchard operations and include: spray materials for pest and disease control; herbicides and fertilizers; casual labour for pruning and harvesting; and subsidiary items like canker paint and tree ties.

Crop Gross Margin

This item is crop net output minus variable-type costs. It is the money available for meeting fixed costs and thereafter the grower's claims for a reward for his work, his management and his investment.

Fixed-type Production Costs

These costs are the overheads associated with fruit production and are relatively inflexible. They include regular labour and the owner's own unpaid labour; fuel, power and machinery use; a rental value of land (based on its investment value); orchard depreciation where there is no replacement; upkeep of premises; all business expenses and, in exceptional cases, paid management.

Management and Investment Income

This is the sum remaining after deducting from Crop Net Output both the variable- and fixed-type costs, including the value of the unpaid labour of the proprietor and his family. It is one way of standardizing the calculation of a profit - necessary because partnerships, limited liability companies, and sole proprietorships report financial results which are not strictly comparable - and is relevant to the most frequent form of ownership of a fruit farm, sole proprietorship.

It is given this title because it is the sum available to reward the proprietor for his management and his investment. (By making suitable allowance for management the reward to investment can be estimated; and by allowing the market rate of interest on the grower's investment, the reward for management can be calculated).

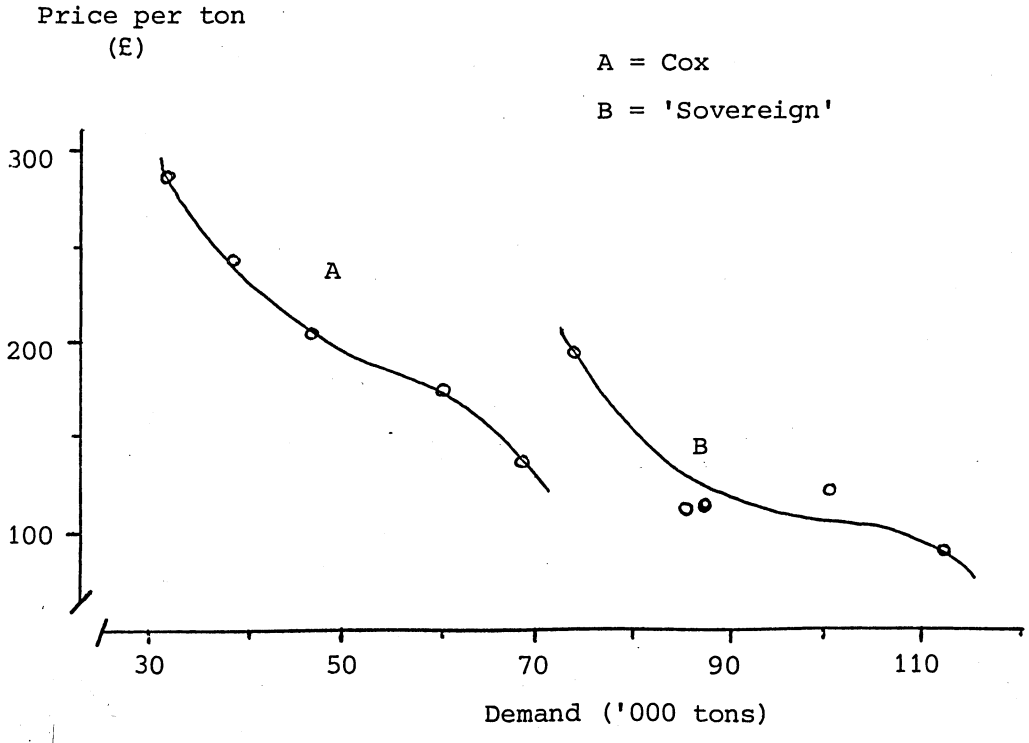
APPENDIX I

Summary - 1972 & 1973 Crop Results

per ha	1972	1973	Change 1973 over 1972 (%)
Gross returns (£)	1072	1342	+25
Yield per ha (tonnes)	8.55	13.40	+57
Av. price per tonne (£)	125	100	-20
Total costs (£)	885	1092	+23
of which Marketing	223	362	+28
Production - variable	214	235	+10
Production - fixed	448	495	+10
Management & Investment Income (£)	187	250	+33

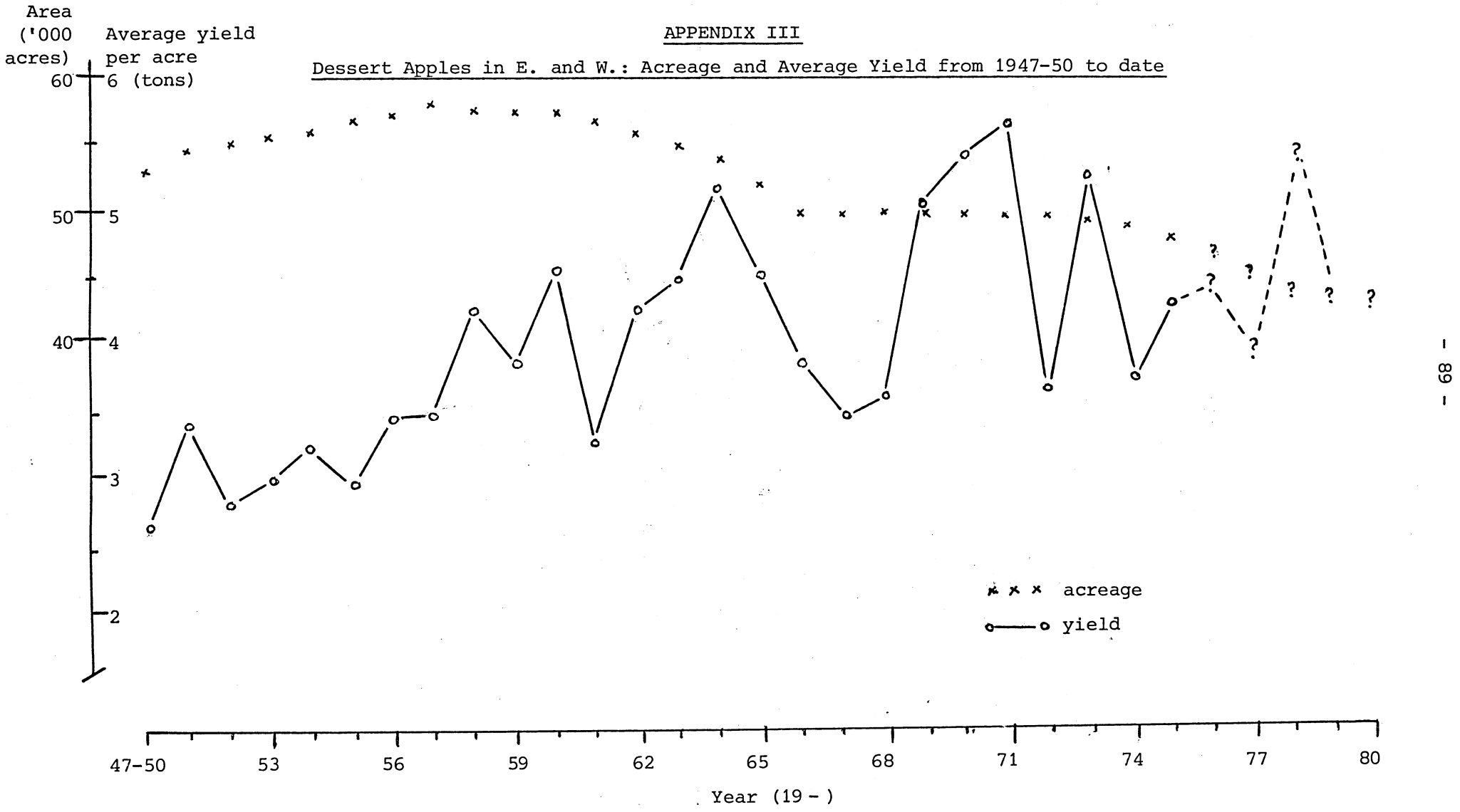
APPENDIX II

Estimated Demand Curves for Cox and 'Sovereign', 1971-75



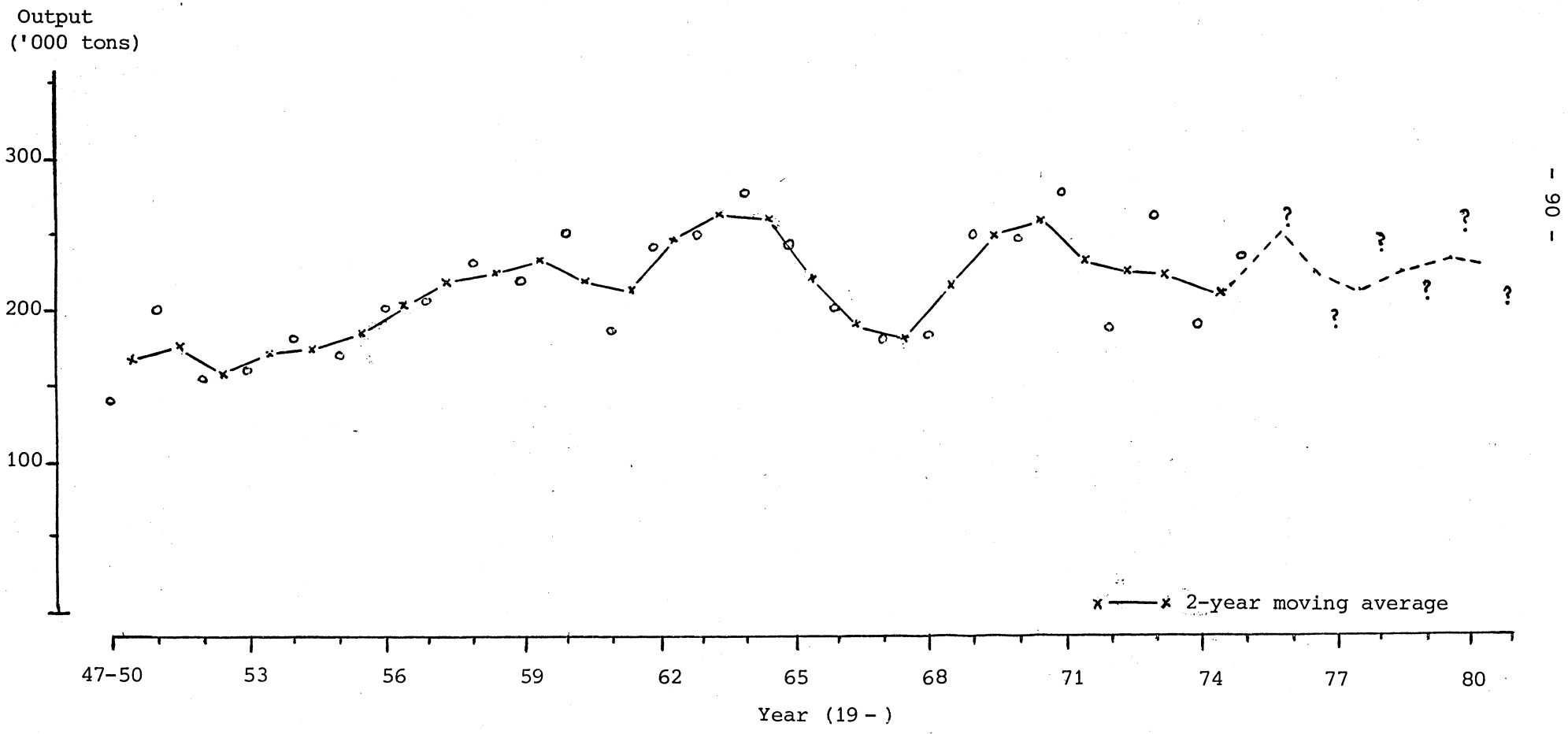
APPENDIX III

Dessert Apples in E. and W.: Acreage and Average Yield from 1947-50 to date



APPENDIX IV

Dessert Apples in E. and W.: Annual Output from 1947-50 to date



APPENDIX V

Dessert Apples in E. and W.

Year	Acreage ('000)	Yield per acre (tons)	Output ('000 tons)	Farmgate price per ton (£)	
				Actual	1947-50 equiv.
1947	56.4	3.04	171	49)	
48	57.8	2.07	120	45)	51
49	59.6	2.42	144	48)	
50	60.9	2.30	140	62)	
1951	62.2	3.24	201	54	47
52	62.7	2.62	156	58	47
53	63.2	2.80	166	64	50
54	63.8	3.07	182	61	47
55	64.3	2.76	171	71	53
1956	64.9	3.28	202	70	49
57	65.5	3.29	210	88	59
58	65.1	4.06	237	50	33
59	65.1	3.61	221	66	43
60	65.2	4.35	254	47	31
1961	64.1	3.05	189	104	65
62	63.0	4.04	245	65	39
63	62.4	4.28	255	56	33
64	61.4	4.96	283	60	34
65	59.2	4.30	247	68	37
1966	57.6	3.65	202	79	42
67	57.5	3.25	184	110	57
68	57.7	3.39	189	106	52
69	57.2	4.80	255	71	33
70	57.4	5.20	252	74	32
1971	57.1	5.40	283	82	33
72	57.1	3.46	192	166	62
73	56.9	5.00	268	106	34
74	56.4	3.55	200	145	43
75	55.8	4.09	233	-	-

Source: M.A.F.F.

APPENDIX VI

EEC Basic and Intervention Prices for Apples

Packed, Class 1. Unit: $ per 100 Kg 1967-1971; units of account per 100 Kg 1972-1976

	Basic					Average		Intervention				
	Sep.	Nov.	Jan.	Mar.	May			Sep.	Nov.	Jan.	Mar.	May
1967	9.9	10.0	13.0	15.60	21.6	14.0	7.4	5.1	5.1	6.7	8.4	11.5
1968	10.0	9.70	13.40	15.80	19.50	13.7	6.9	5.10	5.10	6.70	8.10	9.50
1969	9.1	9.5	12.6	14.7	19.0	13.0	6.8	4.7	5.0	6.6	8.0	9.5
1970	9.3	9.8	11.8	12.9	16.4	12.0	6.3	4.7	4.9	6.4	7.1	8.5
1971	9.5	10.0	11.8	13.3	16.2	12.2	6.5	4.9	5.1	6.5	7.3	8.5
1972	9.8	10.0	12.1	14.0	16.3	12.4	6.7	5.2	5.5	6.7	7.5	8.5
1973	10.8	11.1	13.4	15.8	17.2	13.7	7.1	5.6	5.9	7.1	8.1	8.6
1974	12.0	12.3	14.8	17.4	17.4	14.8	7.5	6.1	6.3	7.6	8.8	8.8
1975	14.0	14.3	15.2	19.6	19.6	16.5	8.7	7.1	7.3	9.2	9.9	9.9
1976	14.5	14.9	15.8	20.4	20.4	17.2	9.0	7.4	7.6	9.5	10.3	10.3

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