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Apples

Agricultural Enterprise Studies
in England and Wales
Report No. 33

WYE COLLEGE
UNIVERSITY OF LONDON

CULINARY APPLES IN 1973: TIME TO START AGAIN?

Studies in the Economics of Fruit Farming
Report No. 12

R. R. W. Folley

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1975

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University of London
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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.

Acknowledgements

The Farm Business Unit extends its thanks to the growers participating in this attempt to provide a body of data about culinary apple production. This was an onerous enquiry for growers and their interest and cooperation are much appreciated. We hope the report lives up to their expectation and will prove useful.

Individuals at Cambridge and Wye have contributed much to the report: we would particularly mention Mr. W.C. Housden and Mr. Hugh Elsom respectively for their field work and preparation of individual results; also Mrs. Hilda Evans for preparing the typescript and Miss Alice Jones for undertaking the printing of the report.

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Summary

The estimated financial results realised for the 1973 crop on a group of twenty-five culinary fruit enterprises, predominantly of medium size, showed good profits - higher in East Anglia than in Kent -averaging £170 an acre from a yield of 7.02 tons an acre of which 5.32 tons (76 per cent) was sold in the fresh market (the remainder for processing).

The above profitability was in part the result of insufficient provision for replacing old orchards and in part due to a favourable market situation. Most orchards in the sample were in later life and almost total sacrifice of revenue for five years or so would be necessary for continuity of output in these circumstances. The market situation in 1973 (along with 1972) shows a sudden reversal of previous experience lasting over twenty years: after a continued slide, supply seems finally to have been curtailed relative to demand.

Marketing from the farm was frequently carried out at a cost of 25p to 30p per 30lb. unit; and in the circumstances of 1973 the growers with less regular crops were relatively successful.

Long-term storage, while increasing net returns per acre, was associated with higher-cost operations and did not lead to equivalent profit in 1973. On a small sub-sample of enterprises, labour productivity was greater on areas of more than 20 acres than on acreages of less than 20. New orchards set out in 1969 to 1971 had cost between £355 an acre and £710 an acre to establish, according to tree density; a fact possibly related to a general reluctance to grub old orchards.

Over England and Wales as a whole, acreage and production of culinary apples have been in almost unbroken decline since 1948-50; particularly, the largest enterprises have been cut. Demand has been declining contemporaneously, and growers' withdrawal of acreage, together with the effects of the weather, kept prices at a reasonably stable 1948-50 equivalent. By inference, profit levels were modest, neither encouraging most growers to reinvestment nor persuading them to get out.

Possibly 40 per cent of growers experience severe year-to-year fluctuations in net returns. And there seems to be little to be gained at present by intensive care of old trees. On the other hand, growers

apparently manage the two markets, for fresh and for processed fruit, so as to maximize aggregate profit.

The up-turn in price may be the signal for a new start in culinary apple growing. Rationalization has been postponed for a long time, but is now due. On paper, growers with old trees can be undercut by growers who have successfully achieved high investment, high yield production. Few growers will take this risk, however, without an assurance of rewarding prices, and in this connection the established growers are a danger. Rationalization would result in a two-thirds reduction of effective growers and a one-third reduction of 1973 acreage. Regular exports are not feasible until regular and lower-cost production is the rule.

Introduction

British growers' liking for growing culinary apples, and British households' partiality to them, are unusual, if not unique. Outside Britain in countries where apples were originally grown for eating fresh, as in Canada, the cooked apple was a sort of by-product of fresh consumption. In some European countries, such as West Germany, where there is a tradition of cooking and processing apples as well as eating them fresh, the same varieties have been used, with greater or lesser preference, for all purposes. Only Britain began with and has sustained specialised production of apples for cooking (stewing or baking). At the time of writing culinary apples are frequently grown by farmers who have no other apple enterprise.

This is the second economic report to appear in the space of two years upon this hitherto neglected farm enterprise. The first report was that of the Apple and Pear Development Council (APDC) concerning the prospects for the cultivar Bramley's Seedling, which is nowadays almost synonymous with culinary apple growing, for it has no rival in its own season, which is now starting earlier in the year.

Some growers of culinary apples were unable to understand why two separate economic enquiries into the same subject should be undertaken, by different people, at about the same time. The timing of the studies was coincidental. That of the APDC was conceived during 1971, the present study possibly a little earlier and planned in ignorance of the other by the national group of horticultural economists at the Universities, which examines the major horticultural enterprises in turn.

In the event, the two reports complement each other in content, for while the APDC report gave most space to demand, marketing and the consumer, with a summarised section on production, the present report concentrates upon production, and only refers marginally to marketing. The present and the future weigh differently in the two reports, however. The APDC report looked firmly to the future, and did so in a far more comprehensive way than University Departments of Agricultural Economics would have been able to do. The present report is very much concerned with the recent past - a stock-taking rather than a forecast.

Here lies the connection between the two which provoked the title of the present report. The APDC has made a cogent case for revitalising culinary-apple growing and for organising the marketing of the crop far more positively than is done at present. The economists, looking more closely into the circumstances on Bramley-growing farms, draw attention to the production aspects and the features on which the hoped-for revival could be based. Growers' present intentions being what they are, it seems that only a minority of established producers, including some of the larger ones, will choose to take the opportunity to move in the direction propounded by the APDC*.

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* see: Bramley's Seedling Apple. Prospects for the Future. Apple and Pear Development Council, Tunbridge Wells. 1974.

The Study : Sample and Method

The Sample

Records from twenty-five growers are embodied in this report. This number is about two-thirds of those initially contacted and whose names were obtained by random selection. A random group of growers always reveals some least-known facets of crop production and this group was no exception: it brought to light some instances of how old-fashioned enterprises can continue on small farms in spite both of competition from modernised enterprises and of incentives to removal.

The fact that two-thirds of initial participants persevered with the enquiry guarantees that they take an interest in their culinary apple enterprise and regard it as a commercial venture. In other words, although culinary apples are not a fashionable fruit crop the present sample consists of bona fide growers.

Some basic features of the sample, and how the features are distributed between East Anglia (exclusively the Wisbech area) and the South-East (predominantly Kent) are given below:

	No.of farms	Av: size of farm(acres)	Av:size of enterprise (acres)	Total acreage	Total crop (tons)
East Anglia	9	55	23	209	1659
South-East	16	181	30	483	2948
Whole sample	25	136	28	692	4607

The study thus covers almost 3 per cent of the area of commercial culinary apple orchards in England and Wales (E. and W.) (23,000 acres) and of output (159,000 tons) in 1973.

Type and status of enterprise. No grower among the twenty-five was specialising in culinary apples - which allows for the possibility of a wide range in type of enterprise. In fact, there are two main types of culinary apple enterprise, and on the farms concerned certain features would apply to nearly all enterprises, indicating that most growers have a roughly similar appreciation of the crop.

Most numerous in the sample is the moderate-sized enterprise on a medium-sized mixed farm; followed by the smaller enterprise on a family farm. The first-mentioned type of enterprise tends to be more important in the farm economy than the second, largely because other intensive crops figure more largely on the smaller farms than on the medium-sized farms.

It is exceptional for culinary apple orchards to occupy more than half the area of intensive crops; although they frequently provide more than one-third of normal yearly farm revenue.

The status of an enterprise is decided by its occupation of the land and its contribution to farm revenue: it can be the same for large and for small enterprises. If we use the following criteria for scale and importance -

Scale: large enterprises exceeding 15 acres;
small enterprises 5-15 acres

Importance: large businesses* providing more than £15,000 net returns from culinary apple sales;
small businesses providing £3,000-15,000

basic enterprises contribute more than one-third of farm revenue

important enterprises occupy more than half the intensive area of the farm,

we can classify the twenty-five enterprises as under, noting how the big change in numbers comes between basic and important enterprises (as defined above):

	for 19 large enterprises	for 6 small enterprises
Numbers of large (or small) businesses	15	5
Number of basic enterprises	14	3
Number of important enterprises	3	0

*the distinction between scale of enterprise and size of business arises because a large area of non-bearing orchards does not constitute a large business.

On both large and small farms, then, there was a big difference between the importance of the culinary apple enterprise to the farm's revenue and its occupancy of available land. On seventeen farms (68 per cent) - including the whole East Anglian sample - the enterprise

was a 'basic'. Only on three farms (12 per cent, all in East Anglia) was it important. In terms of farm organization, therefore, the enterprise typically intensifies a mixed farm, but not to the extent of creating a type of farm.

Enterprise structure. The average size of enterprise in the sample does not correspond well statistically with the national situation. According to the 1970 Orchard Census data, the average size for England and Wales was as follows:

for all commercial enterprises	- 5.4 acres	(Kent 13 acres)
" enterprises exceeding 5 acres	- 14.4 acres	(Kent 17 acres)
" " " 10 acres	- 16.4 acres	(Kent 20 acres)

The relatively large size of enterprise in the sample can be traced to the predominance of Kentish farms. Kent is notable among other areas for having no substantial numbers or acreage of very small enterprises. As there are few large enterprises also, medium-sized growers are most strongly represented. It is thought that over England and Wales as a whole medium-sized enterprises can supply most of the crop.

Growers with more than 100 acres of bearing culinary apple orchard have become fewer in number during the last ten years. This is one aspect of a general withdrawal, during which the structural position has been remarkably stable. Orchard Census data show the following comparisons between acreage and number of holdings in our two important size-groups at intervals since 1962:

	in 1962⊕	in 1966	in 1970	1970 as per cent of 1962
Single size-group with largest acreage	100+ acres	100+ acres	100+ acres	
Acreage in group	6416	5997	5447	85
No. of enterprises	198	185	115	58
Acreage in 20-50 acres size-group	5586	4730	5549	89
No. of enterprises	790*	598*	442	56

* Bramley's Seedling only

⊕ includes 'non-commercial' acreage (if any)

The over-weighting of the sample with enterprises of between 20 and 50 acres is shown in the following comparison between its structural pattern and that of E. and W. as a whole for 1970, excluding enterprises of less than 5 acres.

Acreage size group:		5- <10	10- <20	20- <50	50- <100	100+ over
Sample:	number	6	4	11	4	0
	per cent	24	16	44	16	0
E. & W:	number	544	375	442	138	115
	per cent	32	22	26	13	7

Accordingly the national situation cannot be built up from the sample results as accurately as has previously been done for dessert apple and pear enterprises.*

Costing Method. As with previous fruit-growing studies, operations in the orchards have neither been studied nor reported on in detail. The little more or little less that a certain grower may spend on, say, pruning or on organic fertilisers is of small moment in the whole economy of the crop. Close acquaintance with growers' methods is ruled out by the necessity of keeping field visits to a minimum but any growers' practices are thought to be of secondary importance in an economic study in relation to the overall results obtained.

Marketing. When marketing their crop the greater number of growers in the sample were following the now 'classical' procedure of selling through commission in large wholesale markets after grading and packing the crop on the farm. These growers' experiences with the 1973 crop form the substance of the factual record. Within the sample as a whole there were instances of the numerous other ways of marketing being used - i.e. through a cooperative; by agreement with a retail chain; to a travelling wholesaler; or to a broker or dealer. The net effects of different ways of selling the crop cannot be established from the data

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* Dessert Apples & Pears: Financial Results of the 1969 Crop. Wye College.

Dessert Apples & Pears in 1972-73. Financial Results for a Sample of Growers. Wye College.

available, as there is no description of the crop and so its value using another method cannot be assessed. The only comparisons possible are when both the sale price to the first buyer and the cost of marketing (and of that part of selling for which the grower pays) are known. Where marketing methods are varied the only common denominator between enterprises is a net price after marketing - a 'price' or value worked back to the 'orchard gate'.

In the present case a known market (or sale) price is the starting-point in all possible instances, since it serves as a sort of benchmark for all concerned. Little comparison between the effectiveness of differing marketing methods is thus possible, but net prices home, which are important to the grower, do provide a basis of comparison between enterprises without always an explanation of differences.

Sales to processors, an already complex national marketing situation is further complicated by the significant place of sales to processors - 22,300 tons (18 per cent) according to the 1970 Orchard Census, but now some 24 per cent of the crop. Culinary apples for processing may or may not be rejects from fresh-market supplies: they usually have been, but occasionally an entire hail-damaged crop, or a crop of particularly small apples in one orchard, may be sold in its entirety, and without the expense of grading, to a processor. Apples which have been 'graded out' are sold at processing price, the grower relying upon the improved value of the market crop for his main profit.

The good-quality processing crop envisaged by the Campden Research Station* was in its infancy in 1973, and the growers in the sample were still looking to fresh-market sales for their profit. Their attitude has been recognised in the costing method adopted. That is, the financial result of the fresh-market operations (i.e. charging all costs against market sales) has been worked out first and this result has then been altered by adding the revenue from the processing crop. Where processing apples are 'graded out', both fresh and processed fruit are jointly produced up to the stage of packing and there can only be an arbitrary decision about how much the one has 'cost' and how much the other: it is more satisfactory to assume the grower wanted a

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* see the APDC report.

market crop and receives processing revenue as a by-product. The alternative is to handle the fresh and the processed elements together but this tends to conceal the effect of sales for processing upon the overall result.

'Profits' vs. Gross Margins. Strictly speaking, since the culinary apple enterprise is but one of many on the farms in the survey, it is erroneous to publish a 'Management and Investment Income' for the enterprise, because its profitability cannot be precisely determined. The non-specific costs on the farm can only be allocated among enterprises arbitrarily.

Where only comparison of profitability is required, as in selection among alternative crops, 'Gross Margins' have come into favour and serve well if only the variable (or specific) costs of an enterprise need be considered. There are good reasons, however, for trying to get closer to profit than the Gross Margin in the present enquiry. Since the culinary apple enterprise is more intensive than other enterprises on the same farm, its fixed costs will invariably be higher too, and to ignore the difference tends to show a bigger margin than is justified. Profitability taking precedence over management in the present context, appropriate fixed costs have been charged to the enterprises but the financial result - the Management and Investment Income - is described as estimated.

Other notes

Rent. Rent is here an imputed charge, for fruit growers are rarely tenant farmers. (The British convention of separating farming from land-owning requires the estimation of a rental value appropriate to the enterprise.) What is wanted is a measure of the value of the land for farming divorced from any element of interest on the investment in the orchard. In arriving at a mean figure of £27 an acre extremes of £15 an acre and £40 an acre have been met. In each case the figure quoted is the notion of what the grower would expect as lessor; and, since there is little investment value left in the orchards under consideration, it would seem that growers are subconsciously awarding themselves a small share in the expected profits of the enterprise, for their rent-equivalents are more than double the rate for normal farm tenancies.

Depreciation of orchards is not shown as a separate item, because virtually all the orchards concerned would have been written-off by any conceivable method of accounting. Provision for replacement is a different matter. It is a justifiable charge (usually concealed as the cost of 'carrying' the non-bearing area) where growers are intending to continue in production. At the advanced stage that most culinary apple orchards have reached, the normal piecemeal replacement, carried out at intervals of five to ten years would not maintain the original bearing area. The potentially severe effects of long-delayed replacement are brought out in a later section in which the national situation is referred to.

Business and other costs. These ancillary costs (such as accountant's fees, insurance premiums, and levies), as shown are modest by fruit-growing standards, but a majority of growers played down their importance when the matter was discussed. In contrast to many specialized dessert apple growers, culinary apple growers (a) can spread their fruit-growing overheads over their farm acreage, and (b) operate their farm at relatively low cost in any case. Hence the figures shown are considered realistic.

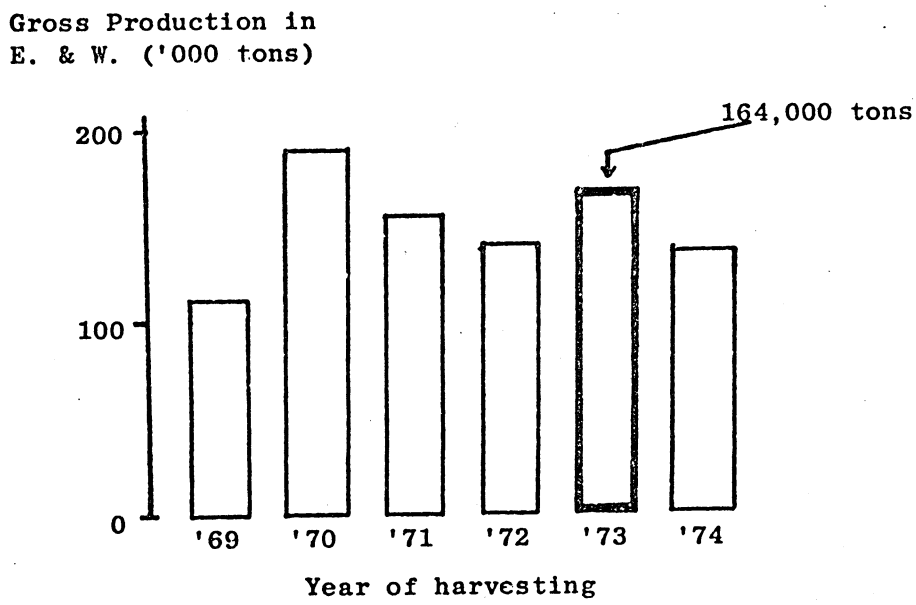
Presentation of results. As with dessert apples and pears in the 1972 economic survey there are immense differences in result from farm to farm, which space does not allow to be reported fully. Some method of summarizing the results while retaining their sense is required. In this context the conventional mean value, or average, can be distinctly misleading if few of the figures are alike to begin with. For this reason the average values calculated in the report have frequently been supplemented in the tables by a 'Modal Range' of values: this shows the limits within which the most consistent one-third of results occurred - in other words the experience of the one-third of growers whose results were most alike, and playing-down extreme values.

PART I

The Facts about the 1973 Crop

For the purpose in hand the 1973 crop was in one respect ideal. It was neither a 'short' crop, giving rise to higher-than-long-term prices, nor an excessive crop, giving rise to surplus and lower-than-long-term prices. It can be seen in a five-year perspective in the diagram below.

Figure 1. The 1973 Crop in Perspective



It is to be expected, then, that yields should be near normal and reasonably distributed in 1973, although the total crop is well below the APDC-assessed potential of 230,000 tons.

The yield recorded on the sample of farms is expressed in two ways: first as an average yield per statute acre of enterprise (i.e. aggregate crop ÷ aggregate enterprise acreage); then as the average of each farm's yield per statute bearing acre (the mean yield per farm), as follows:

	Average Yield per acre	Mean Yield per bearing acre
Total (tons)	6.66 (373 bushels)	7.02 (393 bushels)
of which, sold fresh	5.04 (282 bushels)	5.32 (298 bushels)
processed	1.62 (91 bushels)	1.70 (95 bushels)

'Average' yield is more appropriate to national acreage, 'mean' yield to a cost of production on single farms.

Distribution of yield per bearing acre

Within the range recorded, low, medium and higher yields were equally frequent. There was obviously no 'average' yield in the sense of a yield experienced by, say, two-thirds of growers. The full distribution was as under:

Yield level (tons per acre)	Number of enterprises	Yield level (tons per acre)	Number of enterprises
below 5.0	4	8.1 to 9.0	4
5.1 to 6.0	2	9.1 to 10.0	2
6.1 to 7.0	4	over 10.0	4
7.1 to 8.0	5		

The general level of culinary apple prices in 1973-74 was above the recent average but lower than in the exceptional year 1972. The growers' average sale price of fruit for fresh consumption was £1.26 per 30-lb. unit; and the average market price for fruit sold wholesale was £1.45 per 30-lb. The price index for culinary apples issued by the Ministry of Agriculture, Fisheries and Food was 171 (1968-71 = 100), compared with 223 for 1972-73.

The actual value of the growers' crops at the point of sale to the first buyer was not known in all cases; but the farmgate value was £417 an acre, made up of fresh market sales of £361 (5.3 tons at £68 a ton) and processing sales of £56 an acre (1.7 tons at £33 a ton).

Market (i.e. sale) value of the crops is better documented for a sub-group of growers consigning to wholesale markets. Their results show an average sale value of £698 an acre, reduced to £442 an acre after paying all marketing expenses, and made up of fresh market sales of £392 an acre (5.8 tons at £68 a ton) and processing sales of £50 an acre (1.7 tons at £29 a ton).

Financial Results

The primary financial results are contained in Tables 1-4. Tables 1 and 2 constitute a pair and give per acre and per 30-lb. figures for (a) the whole sample and (b) the largest sub-group of growers using wholesale markets. Tables 3 and 4 are another pair and separate the Wisbech-area growers from the growers in Kent.

Overall, the Management and Investment Income (MII) averaged £170 an acre (Table 1) or 37p per 30-lb. unit (Table 2), which is equivalent to £24 per ton of crop. So not only is culinary apple growing "going to be profitable for most growers for a good many years ahead" (to quote the APDC), it was profitable at the time the report was being prepared. Moreover, the margin of 29 per cent on growers' costs is close to the 25 per cent propounded by APDC as the growers' due. There were two unprofitable enterprises in the sample, on one of which this result was due to crop failure.

Geographically, Wisbech was much the more profitable location (Tables 3 and 4). Both average yields and average prices were higher there than in Kent. It would seem that the effect of the superior soils on which the relatively localized Wisbech crop is grown outweighed in 1973 that of a supposedly superior climate on the more-dispersed Kent crop. The phenomenon of a higher average price to the north of the River Thames than to the south has cropped up before in economic surveys of dessert-apple growing, and must soon become part of general knowledge.

The usefulness of a modal range measure can be seen in the very first line of Table 1, for the average sale value of the crop was about £150 an acre below the experience of a large number of growers (i.e. a few very low values had dragged down the average figure).

Table 1. Summary of Financial Results per statute bearing acre

	Enterprise average: all 25 farms		Enterprise average: 19 farms using markets	
	Mean value £	Modal range £	Mean value £	Modal range £
Results per bearing acre				
Sale value in market	-	-	648	766-849
Market return to grower	-	575-820	554	683-820
Net return after marketing	361	383-595	392	402-595
(Net return as % sale value)	-	-	(63)	
Processing sales	56	34-105	50	57-105
	417	469-613	442	472-567
Variable-type costs:				
Spray materials, fertilizers, etc.	45	33- 49	47	38- 45
Casual or contract labour -				
growing	11	14- 29	10	16- 29
picking	42	34- 50	46	41- 49
Total	98	56- 87	103	70- 81
Gross Margin	319	306-466	339	323-428
Fixed-type costs:				
Regular labour	39	38- 68	49	40- 57
Machinery and power	22	29- 38	24	30- 37
Rent and rates	27	19- 25	26	19- 25
Business and other	24	12- 21	27	14- 21
Total	112	66-101	126	68- 93
Net Farm Income (e)	207	235-417	213	290-381
Labour of grower and wife	37	36- 73	33	19- 92
Management & Investment Income (e)	170	103-289	180	105-199
of which,				
from fresh market	114		130	
from processing	56		50	

Notes: (e) = estimated

1. Values in the first column are the means of participating enterprises, whose numbers differ: hence the column may not be arithmetically consistent.

2. In the division of the crop into a fresh market and a processing element, all costs have been charged to the fresh market element; so the net receipts from processing sales are a direct addition to net income.

Table 2. Summary of Financial Results per Unit of Sale

	Enterprise average: all 25 farms		Enterprise average: 19 farms using markets	
	Mean value p	Modal range p	Mean value p	Modal range p
Results per unit of 30-lb.				
Sale value in market	-	-	145	151-162
Market return to grower	104	101-128	121	102-126
Net Return after marketing	83	76-114	86	92-103
Cost of marketing	(21)	46- 60	59	48- 58
Production cost:				
Labour (all)	33	25- 34	32	25- 32
Materials	12	9- 14	11	10- 12
Other	17	11- 14	17	11- 14
	62	40- 48	60	40- 46
Surplus on fresh sales (e)	21	33- 59	26	33- 55
Attributable to processing sales	16	5- 16	15	6- 9
Total surplus (e)	37	22- 55	41	31- 50

Additional data		
Bearing acres	26	29
	per acre	per acre
Fresh market sales (tons)	5.51	5.84
Processing sales (tons)	1.77	1.73
Total yield (tons)	7.28(= 408 bushels)	7.57(= 424 bushels)
Per cent of crop sold fresh	76	77

Notes: (e) = estimated

1. all values in the first column may not be arithmetically consistent.
2. 'attributable to processing' is the net receipts from processing sales divided by the number of 30-lb. units sold fresh.

Table 3. Summary of Financial Results per statute bearing acre for Each Region

	East Anglia (9 farms)		South-east (16 farms)	
	Mean value	Modal range	Mean value	Modal range
	£	£	£	£
Results per bearing acre				
Sale value in market	738(7)	774-857	597(12)	613-662
Market return to grower	623(7)	618-743	514(12)	493-561
Net return after marketing	480(7)	466-549	341(12)	338-390
(Net return as % sale value)	(63)(7)		(61)(12)	
Processing sales	88	101-146	41	29- 34
Output	478	269-298	371	417-422
Variable-type costs:				
Spray materials, fertilizers, etc.	50	38- 42	43	26- 34
Casual or contract labour				
- growing	6	0	13	0
- picking	42	48- 50	42	35- 50
Total	98	101-117	98	90-116
Gross Margin	380	147-191	273	297-349
Fixed-type costs:				
Regular labour	32	0	43	38- 57
Machinery and power	28	32- 37	19	10- 14
Rent and rates	24	20- 21	28	19- 25
Business and other	22	11- 13	25	12- 16
Total	106	89-103	115	68- 93
Net Farm Income (e)	274	160-290	158	119-160
Labour of grower and wife	45	51- 73	32	16- 24
Management and Investment Income (e)	229		126	
of which,				
from fresh market	141		85	
from processing	88		41	

Notes: (e) = estimated

1. Values in the first column are the means of participating enterprises, whose numbers differ: hence the column may not be arithmetically consistent.
The numbers in brackets refer to the number of results included.

2. In the division of the crop into a fresh market and a processing element, all costs have been charged to the fresh market element: so the net receipts from processing sales are a direct addition to net income.

Table 4. Summary of Financial Results per Unit of Sale for Each Region

	East Anglia (9 farms)		South-east (16 farms)	
	Mean value	Modal range	Mean value	Modal range
	p	p	p	p
Results per unit of 30 lb.				
Sale value in market	158(7)	151-156+	137(12)	129-145+
Market return to grower	133(7)	128-131	114(12)	101-102
Net Return after marketing	102(7)	102-113	77(12)	61- 71
Cost of marketing	56(7)	58- 67	60(12)	50- 58
Net Return after Marketing (all farms)	92	58- 67	78	50- 72
Production cost:				
Labour (all)	30	20- 22	34	25- 30
Materials	12	11- 14	11	8- 11
Other	18	18- 20	16	14- 17
	60	68- 75	61	40- 47
Surplus on fresh sales (e)	32	55- 59	17	29- 38
Attributable to processing sales	20	16- 25	13	6- 8
Total surplus (e)	52	68- 75	30	28- 38
Additional data				
Bearing acres	23		27	
	per acre		per acre	
Fresh market sales (tons)	5.89		5.57	
Processing sales (tons)	2.16		1.35	
Total yield (tons)	8.05* (= 450 bushels)		6.92* (= 387 bushels)	
Per cent of crop sold fresh	74		81	

Notes: (e) = estimated

1. all values in the first column may not be arithmetically consistent.

2. 'attributable to processing' is the net receipts from processing sales divided by the number of 30-lb. units sold fresh.

the numbers in brackets refer to the number of results included, where this is less than the full sample.

+ * regional differences in yield and in market price are significant at the 1 per cent level.

With prices of culinary apples and growers' costs at their 1973 level there was a good margin for mischance on the farm, and two growers were still able to show a profit even though one sold no apples to the fresh market and the other harvested a crop only 30 per cent of the average for the year.

A mock-up of the national situation

Notwithstanding the shortcomings of the sample, previously mentioned, there is something to be gained by trying to elucidate the national situation. Growers are rarely able to see the trade as a whole and if they could it would help them with their own decisions. To this end the average results for the two regions have been combined by weighting and 'raised' to apply to the 21,500 bearing statute acres of culinary apple orchard in E. and W. in enterprises exceeding five acres. When culinary apple production as a whole is thus made more typical of Kent than of Wisbech, it seems that 11 per cent of enterprises were unsuccessful and the most frequent result was an M.I.I. in the range £100 to £199 an acre. The full distribution was as under:

M.I. Income (£ per acre)	No. of enterprises in sample	Estimated per cent of all enterprises in E. and W.
-50 to 0	2	11
0 to 49	2	6
50 to 99	5	18
100 to 199	6	38
200 to 299	4	13
300 and over	5	14

The calculated position for 1973 is shown in Table 5. Here the 'Output' figures in Tables 1 and 3 have been re-worked to give a 'farm-gate' value for the crop - the value after marketing charges incurred off the farm have been deducted from the proceeds of sales. The figure of £75 a ton does not correspond well with the MAFF estimate of £90 average for the same crop, although the estimate for the average price for the fresh crop, £93 a ton, is closer. Some discrepancy can be expected between this estimate prepared from growers' prices for the crop and its national value as determined from market price statistics. The present estimate, for instance, makes allowance for selling 'on the

tree', or entirely for processing. Also, if a buyer 'at the foot of the ladder' subsequently pays for grading and packing on his own premises, the sale value of the crop will be increased but the grower is not getting the benefit.

As regards quantities, the figures of 112,000 tons for the fresh market and 41,000 tons into processing seem suitably increased from the APDC figures of 108,500 tons and 26,500 respectively for the shorter 1972 crop.

As mentioned on p. 6, cost accounting does not provide a reliable guide to comparative unit costs of fresh and processed apples; but with processing tending to come more into favour just now, growers will want consciously to work both outlets for the best. Table 5 construes a national net cost of production for the fresh crop of £63.20 a ton, assuming that (a) the grower is producing for the fresh market and (b) is grading-out the processing fruit.

Table 5. Estimated Cost of Production of the Fresh Crop, 1973

	A		B	
	to break even		including 20 per cent margin on farm-gate value	
	£		£	
	total	per ton	total	per ton
Whole crop, picked	5,130,000	33.50	8,700,000	77.70
Whole crop, graded, packed, stored	8,230,000	53.80	11,800,000	105.20
Fresh crop, graded, packed, stored	8,030,000	71.70	11,600,000	103.50
deduct net value of graded out fruit	950,000	8.50	950,000	8.50
Net cost of market crop	7,080,000	63.20	10,650,000	95.00

Growers for whom the processing fruit was a bonus might thus have felt rewarded with an average price for the fresh crop of £95 a ton, or £1.26 per 30-lb. unit. Without the aid of the processing crop revenue, a price of £103.50 a ton or £1.38 per 30 lbs. would have been necessary.

Relative Profitability of the Market Crop

Reverting to Table 2 and following the same line of argument, it would appear that growers found the processing crop almost as profitable as the market crop in the circumstances (i.e. 24 per cent graded out and sold at £33 a ton). Overall, growers recorded a profit of £21 a ton on market sales, but one-third as much processed fruit added £16 per market ton. Table 1 shows this method of accounting to give the nineteen growers using wholesale markets an M.I.I. of £130 an acre from 5.8 tons of market fruit (£22.40 a ton) and of £50 an acre from 1.7 tons of process fruit (£29.40 a ton). At a later stage, £5 a ton is charged for assembling the processing fruit. Once this adjustment is made the average profit per ton from the two outlets were identical, which means that the quantities and qualities were just right, for growers could not have gained by doing anything different.

The foregoing tables would have more meaning if growers were in a position to control events and supply specified amounts and categories of fruit. The crop being so much at the mercy of the weather, economic appraisal becomes a somewhat academic matter. It does, however, raise the question of policy in production, and whether the market crop is always worth what it costs, when there is another way of selling the fruit. Production and marketing policies are thus closely associated and are discussed later.

A Qualification of the Results. While the average M.I.I. may seem advantageous, being about 28 per cent on turnover, the growers who wish to continue growing culinary apples are not at all in an enviable position. The culinary apple enterprises were certainly profitable for enterprises that were being run down: until 1972 that may have been the growers' intention, reinforced over the previous 10 to 15 years. Now, however, replacement has been left so late, and costs have risen so much, that an occasional profit of £30 a ton (in Kent) would soon be swallowed up in the re-creation of the present bearing acreage in, say, the next ten years - as would be necessary if the growers changed their minds and decided to continue.

Their position can be worked out on paper somewhat as follows. When all the orchards in an enterprise are more than 50 years old, a crash programme of replacement necessitates each present bearing acre

supporting about 0.80 acres of new planting (i.e. 5 acres have to foster 4 acres). Since economic establishment of a moderately intensive orchard now costs at least £400 an acre, not to mention the loss of the crop on the land taken over, at least £320 per acre of present orchard has to be found one way or another. For demonstration purposes it is assumed that this 'loading' per acre is £350 and the money will have to be borrowed. To 'service' £350 an acre over 20 years at the present time requires at least £35 an acre annually, and to cut the period to the ten years during which the existing trees can contribute something raises the annual charge (for 10 years) to £52.50 an acre a year. With an average annual yield of market fruit from the old trees of, say, five tons an acre, the charge per ton sold fresh works out at £10.50 a ton, and would be more on the small, intensive farm where a valuable crop had to be sacrificed to the new orchard. In other words, profits would be halved while making up arrears of replacement.

Alternatively, the old trees could be replaced out of profits. Then a number of permutations are feasible but there is no gainsaying that the establishment of one acre will typically absorb the profit on between three and five acres. So at the cost of five profitless years for the enterprise, one-third of the acreage - and perhaps half the previous output - can be re-created.

A more normal replacement cost, assessed as the cost of having one-sixth of the orchard area non-productive, would be £20 to £30 per bearing acre (i.e. an average £100 to £150 a year for each non-bearing acre, spread over five times the non-bearing acreage).

Marketing from the farm

Marketing through a cooperative is not typical of the culinary-apple grower, who is not a fruit specialist. Co-operation for marketing - such as combining to make full loads for market - exists in practice; but in both Wisbech and Kent growers have been reluctant to submit their relatively low-value product to the expensive process of grading and packing by professionals. It has been estimated that growers market some 90 per cent of the crop themselves - from which arises the possible need for new and specific forms of inexpensive cooperation in bulking supplies for processors, as featured in the APDC report.

Substantially similar marketing procedures brought different results to different growers. The proportion of the sale price in the market left after all marketing expenses had been paid averaged 63 per cent, with a distribution as under:

5 growers recovered at least 67 per cent of sale price,

12 growers recovered between 50 and 66 per cent of sale price,

2 growers recovered less than 50 per cent of sale price, in one case due to a low market price, in the other due to excessive costs on the farm.

The great importance of marketing to the grower is self-evident. Starting with a sum of £500 an acre, a one percentage point saving would earn £8.00 an acre. According to Table 2, growers could be said to grow the crop twice, once for themselves and once for their customers, for the marketing charges for a 30-lb. unit of fruit were identical with the cost of the contents - i.e. 58p. This total is made up as follows:

21p per 30-lb. for costs incurred away from the farm,

37p per 30-lb. for costs incurred on the farm.

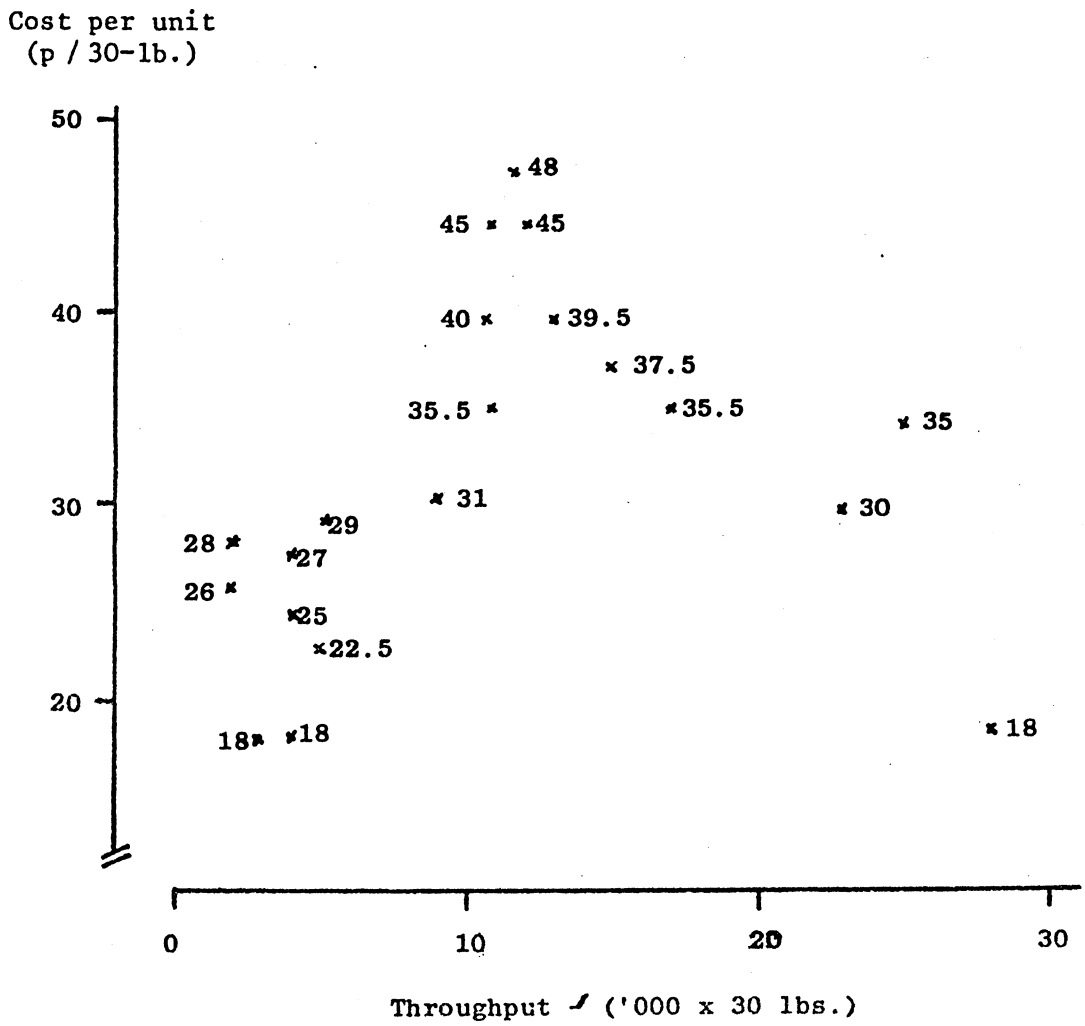
There will be co-operative packhouses which would have taken in the growers' fruit for packing and grading, and for storing two-thirds of the fresh crop at a price of 37p per 30-lb; but there are two reasons why the job was perhaps preferably done on the farm. First, the high proportion of culled fruit would have been an embarrassment to a busy packhouse. Second, the 37p is an average for the group and about two-thirds of the growers recorded a lower figure, largely by cutting the work on the crop. A distribution of unit cost among growers doing their own marketing is as follows:

	Range in farm-based marketing cost (p. per 30-lb. unit)			
	below 20	20-29	30-39	40 and over
Number of growers	3	7	6	4

It seems clear, then, that there were many states in which culinary apples were acceptable to buyers. In general, the larger growers, equipped to do a good marketing job and with the responsibility of keeping up quality, were spending more than the smaller growers. Unit costs, however, tended to be higher at intermediate levels of throughput - say, 11,000 to 12,000 30-lb. units over the season - than for larger or

smaller throughputs. This feature is brought out in Figure 2. Apparently, larger-scale working was more economical of labour, and small growers' buyers less selective, for there seem to have been no gross differences in quality of crop between the sizes of enterprise, judged by the proportion of fruit sold for processing.

Figure 2. Marketing Cost on the Farm in relation to Throughput, 1973



Does the market pay for quality? In a buyers' market superior quality may make the difference between sale and no sale, or between a good price and a poor price. In a sellers' market - as 1973 is assumed to be - this effect is less noticeable. The different notions growers have of marketing culinary apples can be illustrated by three actual cases. In the Table below (Table 6) Grower A is the model grower, grading the crop carefully, storing 90 per cent of his crop and

marketing regularly through the wholesale markets, from November to May. Grower B is an effective supplier, having an entirely commercial enterprise, but operating to lower standards than Grower A. Grower C has no storage for the crop and might be labelled an opportunist in marketing, prepared to adapt to the situation in each season as it comes. One of his farm buildings serves as a packhouse for the duration of the crop.

Comparative data for the three growers are as follows (Table 6).

Table 6. Comparative Economy of Marketing Method

	Grower A	Grower B	Grower C
Fresh market throughput (30-lb.)	13,000	9,000	5,000
Per cent of crop sold fresh	60	86	95
Hours of labour per 100 x 30-lb.	46	14	5
Average price in market per 30-lb. (£)	2.13	1.45	1.62
Marketing costs on the farm (per 30-lb.)			
	p	p	p
Labour	19.6	6.1	2.7
Materials	14.4	16.2	13.7
Services	4.0	0.6	1.2
Overheads	5.6	7.2	0.6
	43.6	30.1	18.2
Net return to grower (£ rounded)	£1.69	£1.15	£1.44

In the above table the market is shown to be sensitive to Grower A's superior quality. Grower A is grading out more fruit than Grower B. In the process he is incurring additional expenses of 14p per 30-lb. and obtaining 68p more in the market, reduced to 45p back at the farm, a net gain of 31p.

Compared to Grower C, however, Grower A is spending 26p per 30-lb. extra and obtaining 51p more in the market, 28p more back at the farm, a net gain of only 2p or 4 per cent of his increase in price. Grower C's good performance can only be explained in terms of the imperfections of the market. That is to say, in spite of the acclaim given to contracts with supermarkets and the pressure for conformity in supply there are still markets within markets for growers lucky enough to find

them. A mutually advantageous trade can be agreed between a grower and a buyer, the buyer paying less than he would in the market and the grower providing a rough-sorted crop which suits the buyer. While noting the existence of these imperfections they cannot be given prominence because they are exceptions and only occur because the largest volume of fruit is marketed in a different way.

The integration of production and marketing can also be illustrated from Table 6. To see many growers' results is to realise how marketing can be a way of exploiting the crop already grown. This critical look at the picked crop is likely to be overlooked by growers whose energies are spent in supervising its physical handling. Nevertheless, there may be circumstances in which a high-quality crop has cost so much when picked as not to leave room for a further, say, 45p per 30-lb. charge for marketing because the market will not take the fruit at its full 'cost' price.

Grower A would seem to be close to, if not in, this position. His profit per 30-lb. is less than that of either Grower B or Grower C, comparative figures per 30-lb. being -

	Grower A	Grower B	Grower C
	£	£	£
Cost at the farm gate	1.17	0.61	0.56
Marketing cost	0.44	0.30	0.18
Supply price (including 25% profit)	2.01	1.14	0.93
Sale price obtained	2.13	1.45	1.62
'Lift' in sale price	0.12	0.31	0.69

What may be thought to be the 'best' crop has not been most profitable in the circumstances described.

The lack of interest in the crop prior to 1972 and the increasing regimentation of marketing are tending to influence growers to take a 'fait accompli' attitude to their wholesale market operations. It would seem, however, that there may be a few more years, while the sellers' market persists, of opportunity for initiative in marketing culinary apples for growers whose knowledge of the trade is as good as the buyers. Freelancing has been under a cloud in the past because growers were typically at a disadvantage in this respect when dealing with buyers.

The recorded costs of marketing are given in Table 7, with allowance for variation between farms as in Tables 1-4.

Table 7. On-farm Marketing Costs per fresh market 30-lb. unit, 1973

	20 farms using wholesale markets	
	Mean value	Modal range
	p	p
Labour	7.8	8.9- 9.4
Materials	13.1	13.7-14.6
Services	4.2	3.9- 4.3
Overheads	5.8	4.4-11.1
Total	30.9	24.3-29.3

For consignors to wholesale markets the cost of containers was the heaviest item, and fewer growers had a cheaper private solution to this problem than any other. Some growers had low-cost packing premises, and others cut the labour on the crop or paid for fewer services (e.g. had no chamber storage). On three farms only was the container cost below 5p per 30-lb: here the growers were using the buyer's containers, and although the 'services' charge was thus increased, overall cost was lower than otherwise. The item 'overheads' is exaggerated in importance in Table 7, for most growers' packing sheds and stores were well written-down by 1973. The inclusion of three comparatively new installations, however, where overheads 'cost' 16p-20p per 30-lb. throughput, raises the average figure. This item, however, tended to accompany reasonable costs for the three other items and not to crown expenditure already very high without it.

Individual instances of selling neither in wholesale markets nor to supermarkets were met in the sample, with results comparable to those of the majority of growers.

Selling on the tree. Three growers sold the crop as grown and realised an average output of £242 an acre and MII of £121 an acre (compared with the sample average of £417 and £180 respectively).

Processing. Two entire crops were sold for processing and registered an average output of £283 an acre, MII of £83. In one case the profit was due to an above-average crop, grown for 30p per 30-lb; in the other to an average price of £30 a ton for a crop of average size.

Storing. The 1973-74 season was considered normal in most respects, but storage had little apparent influence upon the profitability of enterprises (no doubt because its effects could not be isolated). Growers' policies in this context were very varied, thus -

8 growers did without stores,
2 growers with stores cleared early in the season,
9 growers with stores cleared regularly during the season,
3 growers with stores cleared late in the season,
(3 growers did not declare their policy).

Groups of results of approximately equal number can be formed for (a) growers not storing, (b) growers storing up to two-thirds of the crop, and (c) growers storing more than two-thirds. Average results for each group, among those using wholesale markets, are as follows (Table 8).

Table 8. Unit Price and Profitability in relation to Storage Policy, 1973.

		Group A no storing	Group B up to 67% stored	Group C more than 67% stored
No. of enterprises		7	7	8
		per 30-lb.	per 30-lb.	per 30-lb.
Average price in market	(p)	135	136	161
Marketing cost	(p)	49	56	65
Net return after marketing	(p)	86	80	96
		£/acre	£/acre	5/acre
Output of fresh fruit		407	373	340
M.I. Income		235	164	146
Tons per acre sold fresh		6.3	6.5	5.4

Judging by the above figures, 1973 seems to have been the year of the opportunist, in that growers with lowest investment in the crop had perhaps a higher yield than growers whose orchards cropped more regularly and they were able to take advantage of a high price and their low costs. Relative to this type of producer, the more-committed type of grower more conscious of the market and his place in it, could not show such good financial results.

Labour productivity in production

Scale of enterprise is a frequent talking point in farm management, and the present results bear out the general contention for horticulture, that the small enterprise is physically most productive. So if land were very scarce, and culinary apples even scarcer, a large number of efficient small enterprises would be the economic prescription. 'Small' in this context means big enough to occupy most of the time of a committed grower, and in the circumstances described perhaps not enough efficient growers would be forthcoming.

Given the present demand for culinary apples, with no shortage of land but labour distinctly scarce, allied to a reluctance to move into culinary apple production, it makes economic sense to have relatively few enterprises, mainly large enough to ensure good productivity of labour. In other words, over E. and W. as a whole, there will be more acres but fewer man-days devoted to culinary apples than if enterprises were smaller. Within the sample of farms there is a notable increase in labour productivity once an enterprise attains to 20 acres or more.

Scale of enterprise in the sample is in broad agreement with size of farm, so when it is discovered that small enterprises utilize more labour per acre than large enterprises, it is the small farm, displaying careful husbandry rather than high labour productivity, which is being picked out.

The growers submitting labour records fell neatly into three groups, i.e.

i. a group with a small area of old, large trees,
ii. a group with a large area of old, large trees,
iii. a group with a large area of younger trees.

It is thus possible crudely to compare the economy of large and small areas and the economy of large trees and smaller trees.

Scale of Enterprise. Table 9 sets out the comparison by scale of enterprise, Table 10 by size of tree.

Table 9. Labour use in culinary apple orchards, 1973, by scale

Operation	on areas less than 12 acres	on areas of 20 acres or more
	hours per acre	
No. of enterprises	3	8
Pruning, clearing, prunings	53	42
Manuring - organic & inorganic	1	2
Spraying - washes and herbicides	7	5
Grass cutting	7	4
Other work	-	1
Total, growing	68	54
Total, picking & hauling	103	56
Total hours	171	110
Tons per acre	9.1	7.8
Hours expended per ton:		
on growing	7.4	6.9
on picking, etc.	12.1	7.2
Total:	19.5	14.1

On the available evidence, it would seem that the basic activities of pruning, spraying and mowing are fairly uniform operations on all sizes of farm, but carried out more quickly - in about three-quarters of the time - on a large acreage. As regards picking and hauling the same weight of crop, the small growers' performance drops to about 60 per cent of the large growers'.

Overall the small growers' greater care of their trees was not quite recompensed in greater crop, and they were disadvantaged to the extent of half-an-hour a ton prior to the picking stage. At the picking stage they dropped another five hours per ton and finished on the crop with 5½ hrs more work per ton - equivalent, in 1973, to almost £3 and to £4 in 1975.

Contrary to expectation, perhaps, the small growers were not disadvantaged in selling in 1973. Possibly those in the Wisbech area grew a crop of slightly better quality, for more of it was sold fresh

and their net return after marketing averaged £0.98 per 30-lb. unit, compared with the average £0.80 to £0.85. Reckoning a 'lift' of 15p per 30-lb., their net return was about £11 per ton the higher, so when good prices are obtainable and time allows, it would seem that the extra care with the crop is worthwhile.

Size of tree. There being no new large areas of smaller trees in the sample, the comparison between bush-type and larger trees refers to the smaller enterprises. It would seem that management is as important as tree size in deciding the amount of work put into a crop; and in this connection the smaller trees are shown to receive more attention than the larger trees up to the time of picking (Table 10).

Table 10. Labour use in culinary orchards, 1973, by size of tree

	hours per acre	
	for large trees	for smaller trees
No. of trees per acre	36-48	60-84
No. of enterprises	3	3
Pruning, clearing, prunings	53	56
Manuring - organic and inorganic	1	3
Spraying - washes and herbicides	7	11
Grass cutting	7	14
Other work	-	4
Total, growing	68	88
Total, picking and hauling	103	68
Total hours	171	156
Tons per acre	9.1	8.0
Hours expended per ton -		
on growing	7.4	11.0
on picking, etc.	12.1	8.5
Total	19.5	19.5

In this instance a lower yield per acre was less of a handicap for the grower with smaller trees and the crops were grown and picked for the same number of hours per ton as the larger trees. Noting the very

small samples of growers, this result can only be a pointer to what extended investigation may reveal.

Grubbing and Replacement

Forecast of grubbing old trees. Attention has been drawn in a previous section to the penalty of allowing trees to grow too old before replacing them, if the enterprise is to continue. It is also known that old trees, insufficiently replaced, constitute most of the sample of orchards covered by this survey. The 1974 Orchard Census, however, is expected to show an encouragingly high proportion of new trees of Bramley's Seedling. Together, these two features seem to indicate that a lot of the new planting has been on farms which did not previously have culinary apples.

This survey has also revealed that the growers had no immediate plans for quick replacement of their trees. Their overall stated intentions were to remove 68 acres over a period of three years - about 12 per cent of the acreage of old trees and 4 per cent a year. This rate must surely increase quickly as the trees left get older.

One feature of the grubbing situation, however, is the contrast in intentions between separate farms: this makes the position perhaps more understandable in terms of growers than of acres. A substantial new acreage was confined to three farms, which means that a few growers are 'building into' culinary apples whereas many more expect to get out.

Assuming that decisions to grub trees remain as previously intended, a possible guide to events in the next five years is as follows:

3 growers (12 per cent) will have predominantly young orchards,

6 growers (24 per cent) have a replacement policy of a sort, and will grub in rotation,

7 growers (28 per cent) already have blocks of different age, and can be flexible in their policy,

9 growers (36 per cent) have only old trees and give no sign of replacing them.

A possible inference from the above is that a number of growers will cease production, say, ten years hence or earlier if the price of the crop falls. In other words a structural shift is imminent. This view is taken up again in Part II.

Cost of establishing new orchards

The actual effect upon a fruit enterprise of replacing trees *in situ* could only be ascertained by close study, for not only has the actual expenditure to be known, but also the value of what has been given up when the land was assigned to the trees. This survey does not aspire to such precise measurement, but four growers kindly volunteered data about new plantations, including two of the new type of practice with M.IX, and their records are now passed on as a matter of general interest. They relate to the cost of orchards established by 1974, and planted between 1969 and 1971. Growers' experiences covered both intensive and traditional planting, with results as in Table 11.

As the price of trees has increased by some 50 per cent since 1969, in line with the cost of all goods and services, a tree-intensive plant set out in 1974/75 can be calculated to cost £1,050 an acre in direct and incidental costs, reducing to perhaps £760 an acre if five years' establishment be allowed instead of three years, and prices of culinary apples remain at 1973 levels.

Dr. A.P. Preston of East Malling Research Station has endorsed new plantings of *Bramley* over a range of tree densities - between 80 trees and 726 trees an acre according to whether a semi-vigorous, semi-dwarfing or dwarfing stock is used. The obvious difference in area between the new plantings using M.IX and those using semi-vigorous rootstocks implies that established growers are feeling their way with tree-intensive systems and experimenting on a small scale with early-season *Bramley*.

Table 11. Examples of Establishment Cost of Culinary Apple Orchards

	Case 1				Case 2					Case 3					Case 4				
No. of trees per acre (range)	400-450				200-250					150-200					100-150				
Rootstock	M.IX				M.IX					M.26 & 106					M.II				
Planting distance (ft)	14 x 7				17 x 12					16 x 16					24 x 16				
Area planted (acres)	1-2				1-2					2-5					10-15				
Hours of manual labour per acre (in year quoted)																			
Year	1	2	3	Total	1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total
Planting, tying, gapping	140	30	-	170	46	10	5	5	66	36	-	-	-	36	14	2	-	-	16
Pruning	7	7	10	24	-	15	20	22	57	-	3	3	6	12	5	10	14	14	43
Spraying/Cultivating/ Other	10	11	15	36	11	12	20	24	67	9	27	41	42	119	10	11	11	13	45
	157	48	25	230	57	37	45	51	190	45	30	44	48	167	29	23	25	27	104
Expenditure per acre (£ in year quoted)																			
Trees and stakes	320	-	-	320	98	-	-	-	98	88	-	-	-	88	413	10	-	-	53
Fertilizers, washes	52	22	7	81	33	11	25	25	94	3	3	5	18	29	12	18	18	21	69
Manual labour	88	34	18	140	40	25	33	40	138	7	24	31	38	100	18	16	19	24	77
Tractor labour	10	5	55	20	6	6	8	8	28	4	2	4	4	14	6	7	7	8	26
Total expenditure	470	61	30	561	177	42	66	73	358	102	29	40	60	231	79	51	44	53	225
Imputed costs:																			
Rent	25	25	25	75	25	25	25	25	100	25	25	25	25	100	25	25	25	25	100
Interest (5%)*	23	26	28	77	9	11	14	18	52	5	7	8	12	32	4	6	9	11	30
				152					152					132					130
Total cost				713					510					363					355

*this low rate is intended to take into account the reduction in taxable profits due to the additional expenditure.

PART 2

Using the Facts: derivations from and additions to Part 1

Prior to 1972 most culinary apple enterprises in E. and W. achieved no distinction and few if any growers were building up their acreage. In the absence of records for earlier years it is thought that the peak acreage of 82,000 was realized in 1947-48, for up to 1939 culinary-apple varieties were still being planted on the new farms coming into existence and not being taken out on the longer-established farms. Whereas after 1947 very few were being planted and the long-term process of grubbing the foundation areas of 50-year old (or more) trees was in evidence.

Acreage statistics show how culinary apples have fallen from favour in the last twenty-five years. Only one other crop, also a horticultural crop, which had a substantial output in 1947 is now reduced to one-third of its 1947 acreage - plums. Table 12 gives evidence of a similarity of experience between culinary apples and plums in E. and W.

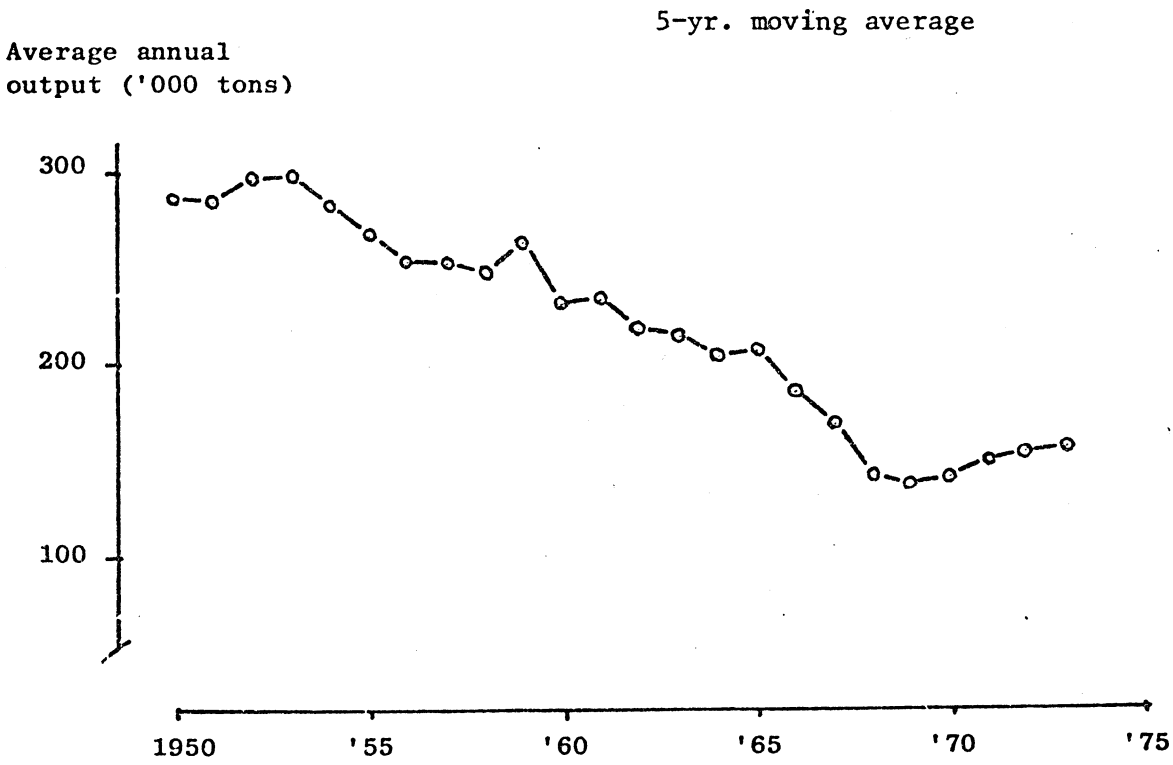
Table 12. Relative Decline in Acreage of three Fruit Crops E. and W. 1947/8 to 1973/4

	Acreage		
	1947/8	1973/4	1973/4 as per cent of 1947/8
Culinary apples	82100	27200	33
Plums	47000	15400	33
Cherries	17600	6700	38

Of course, acreage does not give the whole story, and statistics can be misleading. In agriculture and horticulture acreage is sometimes quite rightly reduced as output per acre increases. Nothing like this happened to the mass of culinary apple enterprises. Had there been a three-fold increase in output it would have been well-publicized. In fact, the long-term trend in annual output has been downward over most of the period, having steadied in the 1970's (Figure 3). As can be seen in Figure 3, recent output has been about half that of the peak reached in 1951-52. Considering that both population and income per head in E. and W. were rising continuously during the same period, this contrary move in output requires some explanation. In this case imports are not to blame: there have been years since 1963 when a

modest total of imports has supplemented a light home-grown crop, but otherwise British (including northern Ireland) growers have had the market to themselves. Moreover, culinary apples do not have an obvious dietary substitute and, as the APDC report has shown, are recognised as a distinctive commodity by housewives.

Figure 3. Trend in annual output, 1947-74 (E. and W.)



Yet there is all the evidence of the demand - the desire - for fresh culinary apples declining during the last twenty years. While this sort of change of taste or of habit is what all producers most fear, it is also clear that the 'industry' was in no position to fight back. Prior to APDC growers had no promotional organization, and in their circumstances solidarity was not a live issue. Cost-cutting was preferred to re-investment on most holdings, which implies that most growers felt unsure of their capacity to reduce unit costs more than the consequent fall in prices if output were to be increased by a policy of more-intensive management.

A decade of indifferent weather during the 1960s probably produced a greater reduction in supplies than growers intended, which at the same time accustomed consumers to doing without some culinary apples but saved growers from even lower prices.

Thus, both demand and supply changes seem to have contributed to the past decline, and are examined further at a later stage.

Culinary Apples in British Agriculture

Considering that about two out of every three English housewives would normally buy culinary apples once a week during the marketing season (APDC), the crop has an established position in British horticulture, and seems to an observer to have suffered through neglect. It did not have a strong following among growers and hence intermediaries - aided by the processing fruit trade - played a larger part than usual. Efficient in discharging their particular function, intermediaries work within the status quo and do not attempt public relations.

Three distinguishing features of this crop may thus be, first, dissociation from other fruit crops, including tolerance of lower quality; second, labour-intensity in the kitchen, at a time when housewives have an increasing aversion to it; third, its necessarily small scale, in that a relatively small area of land will potentially suffice to provide the nation's requirements. At present (1974/75) 27,000 acres seem adequate for the culinary apples wanted between August each year and the following June.

For whatever cause or causes, culinary-apple growing has been out of favour for most of the last twenty years. Aging trees have not been replaced; acreage and production have shown a downward trend; cropping and quality of crop have become less reliable. No doubt those concerned with distribution have worked as efficiently as they were permitted to by the circumstances and have adapted as far as possible to an environment of a relatively high-cost low-value product requiring minimum-cost handling. The big question now is whether this environment is the only one feasible - in which case the decline will continue, only more slowly - or whether a new start, involving more purposeful production by new growers paying more attention to yield and quality and giving consumers more initial satisfaction would be worthwhile. In the present state of demand anything like a national resurgence seems out of the question, but the same may not apply to a few more growers who succeed in producing in quantity a better article at a lower unit cost. The latter requirement seems all-important and cost needs to be low as the result of high

productivity of labour and capital, not because expenditure has been withheld.

Who grows culinary apples?

It could be argued that the culinary apple 'industry' (i.e. growers collectively) is handicapped by the longevity of its production equipment. Culinary apple production on its present scale is much older than dessert-apple production. Half the present culinary acreage is the remnant of that substantially established between 1890 and 1914; to it has been added those acres planted in different circumstances and as an adjunct to dessert apples mainly in the two periods 1932-39 and again during 1945-55. Until 1957 there was a greater acreage of culinary apples than of dessert apples in E. and W. Culinary apples would be more than half of the 120,000 tons of home-grown apples estimated for 1908 and of the 326,000 tons for 1925 (in which case the then output would have exceeded the 160,000 tons of 1973).

The statistical picture. While statistics cannot show the human aspects of culinary apple growing, they do provide (a) a measure of certain features, notably the number of producers and their commitment to culinary apples, and (b) a sense of the dispersion of culinary apple enterprises.

Up-to-date data are awaited at the time of writing but the structural picture is adequately given by Tables 13 to 15, for either 1966 or 1970. This is fuller information than provided previously (p.4) and is included for reference only.

According to the Orchard Census 1970 data, culinary apple acreage is distributed within total apples and pears acreage as follows (Table 13).

Table 13. Distribution of Culinary Apple Acreage, within Total Apple and Pears Size-groups (E. and W., 1970)

Total area size-group (acres)	0.25-9.9	10.0-19.9	20.0-49.9	50.0-99.9	100 and over
Acreage of culinary apples	5950	2653	5589	5516	5447
(per cent)	24	11	22	22	21
No. of enterprises	3500	375	442	238	115
(per cent)	75	8	9	5	2

Source: MAFF

The above general size-distribution, however, is not typical of Kent, and the difference is marked enough for Kent to be listed separately, as in Table 14.

Table 14. Distribution as in Table 13, Kent only

Total area size group (acres)	0.25-9.9	10.0-19.9	20.0-49.9	50.0-99.9	100 and over
Acreage of culinary apples	1042	1047	3628	3788	4277
(per cent)	8	8	26	27	31
No. of enterprises	442	151	255	143	75
(per cent)	42	14	24	13	7

Source: MAFF

Kent is thus notable for having comparatively few small enterprises and many large enterprises. In most other counties the reverse has been more common. There is no simple explanation of these structural differences. Is it the proximity of large enterprises in Kent which has lead to a ratio of two small enterprises to one large enterprise and not ten to one as happens elsewhere? Why are the enterprises outside Kent predominantly so small?

From Table 13 above the following may be pointed out:

a. the large proportion (75 per cent) of very small producers,

b. the relatively even spread of acreage by larger size of unit,

c. the small number (2 per cent) of influential growers.

If the large culinary apple enterprise is not of prime importance, the large fruit farm certainly is, for in a structural analysis the largest unit acreages are shown to exist as constituents of a still larger orchard acreage. In Table 15 the ten largest acreage-groups are shown in descending order, alongside the structural features of each. Enterprise acreage and total orchard acreage tend to decline in the same way as aggregate enterprise area.

Table 15. Structural Importance of Culinary Apple Enterprises: ten most important situations (E. and W. 1966).

Aggregate acreage in size-group	Size-group of enterprise (acres)	Size-group of total orchard area (acres)
1,776	50 - 69	100 & over
1,734	30 - 49	70 - 99
1,701	100 & over	100 & over
1,611	30 - 49	100 & over
1,524	20 - 29	30 - 49
1,355	70 - 99	100 & over
1,310	10 - 19	30 - 49
1,227	30 - 49	50 - 69
1,196	10 - 19	20 - 29
1,032	5 - 9	10 - 19

Source: MAFF

Fully half the crop, then, is grown where the economies of large-scale production (if there are any) should apply on the farm, if not to the enterprise itself.

Something of the pattern of geographical dispersion of enterprises is shown in Tables 16 and 17.

Table 16. The Frequency of Occurrence of Culinary Apple Enterprises (a) in E. and W. agriculture and (b) in orchard areas by major region of E. and W.

a. No. per 1,000 agricultural holdings		b. No. per 100 orchard enterprises	
in England and Wales	17	in South East Region	52
in South East Region	57	in East Region	76
in Kent	186	in South West Region	90
		in West Midlands Region	92

Culinary apple enterprises thus tend to be less frequent away from south-east England, but where they do occur they constitute more of the orchard enterprise. In other words the culinary apple enterprise (possibly allowing for some tolerance in definition of culinary apples) is more frequently the sole orchard enterprise away from the better-

known fruit growing counties. Furthermore, such enterprises are also smaller (Table 17).

Table 17. The Proportion of Culinary Apple Acreage found on the smallest and the largest enterprises, by major region of E. and W.

Region	5 acres or less	49 acres or more
South-eastern	7	34
Eastern	24	17
West Midlands	40	3
South-western	56	0

Thus there is built up the picture of a regionally unbalanced structure, in the sense that in all regions but the south-east there is only small-scale production. The inference is that there must be a big movement of supplies from Kent to the large wholesale markets in other parts of the country.

Kent also comes into the reckoning again in the context of structural change. For although Kent, like other counties, has been losing acreage, replacement of orchards has led to the net loss of acreage in Kent being proportionally less than elsewhere, which implies that culinary apple production in E. and W. is becoming concentrated in Kent. If the trees taken out elsewhere were non-productive, of course, the preceding statement is only true in the statistical sense.

The organizational picture. Culinary apple production was for a long time largely in the hands of the large-scale growers who founded big businesses upon mixed fruit growing before 1939. Currently, however, the most important culinary apple enterprises are of medium size - the aggregate acreage of enterprises of 10-50 acres exceeds that of larger and of smaller enterprises. The emergence of the middle-sized enterprise must be due to supplementary acreage of culinary apples on the comparatively recent dessert-apple and pear farms.

It seems a feasible hypothesis, therefore, that comprehensive measures to 'organise' production have been still-born within the industry. That is to say, the culinary apple enterprise is either too small, or too subordinated on the farms in question; hardly any growers live by culinary apples alone and thus have less incentive to make the

most of the enterprise. While the crop from the small enterprises filters into consumption through local buyers, much of that from the medium-sized enterprises is marketed through the dessert-apple growers' cooperatives, and the crop from the large enterprises is typically marketed independently either through the wholesale markets or by contract with a large retailer.

In such circumstances it must be difficult for individuals to have the 'feel' of the whole industry, and even more difficult for any single body or group of individuals to influence all the others.

The demand for fresh culinary apples

Referring again to the APDC report, buying for private use is nine to ten times that of caterers, and the account of the survey of consumers' attitudes it contains leaves no room for doubt that housewives at least know about Bramley's Seedling and its qualities as a cooking apple. They also considered a retail price of 10p a lb. acceptable. Growers, for their part, would be largely satisfied with a net price home of 4p a lb. or £1.20 for a 30-lb. box*. Why then is the culinary apple industry not in a healthier state than it is? Acreage has been falling for a far longer period than the two years (quoted by APDC) during which housewives have been serving dessert less frequently as part of the main meal of the day.

It may be that the APDC caught the industry at the bottom of a cyclical trough, just when it is ready for a boost to help it out of the trough. If this is so, it is important it should be recognised, for if traditional growers see no cause to change their past attitude, the future will be in the hands of newcomers to culinary apple varieties.

Whatever the position of the industry in the acreage cycle, it has been a long time in the making: its decline is long-term. Until about twenty years ago, growers were still cropping the trees planted during the period of greatest enthusiasm between 1890 and 1914. After 1945 the older trees and those of the less popular varieties were grubbed, and within the last twenty years the original Bramley trees have begun to disappear. Prices were high in 1972-73 partly because there was insufficient acreage in bearing to provide 'normal requirements' when yield per acre was low. The reason for this is that when yields were

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* for the 1973 crop.

normal, output tended to be excessive relative to demand: neither price nor net returns per acre were attractive to growers and there was no encouragement to re-plant.

Many growers of culinary apples have been losing confidence in the crop for years - as may be judged from two facts. First, trees taken out were not replaced; second, even the occasional high-price year did not invoke the customary response in extra planting. Attempts to improve supply, whether by cooperative marketing or other means of upgrading quality, were unsuccessful. This attitude among growers would hardly have prevailed if demand had been lively and a constant incentive to growers to pay more attention to marketing. In other words, the declining demand for fresh culinary apples noted by APDC is of long standing and will not easily be reversed, if at all. Some housewives may be won over by better quality at a given price, but the catering trade is not likely to come back.

The main point, however, is that the pre-1972 tempo was slow. Until five years ago most growers of culinary apples were just 'hanging on", seeing no reason to change their policy of letting the trees see their time out. The tale of twenty-five years' decline is told in Table 18.

Table 18. U.K. Acreage and Production of Culinary Apples

Period	Average yearly acreage ('000)	Average yearly output ('000 tons)
1947-50	80.6*	270
1951-55	72.5	280**
1956-60	63.0	260
1961-65	50.0	200
1966-70	38.4	135
1971-73	35.0	153

* maximum area in this period
** maximum output in 1951 (338,000 tons)

Source: MAFF

Two further series of data may be cited to confirm (a) the loss of confidence in the crop, the reputation of Bramley notwithstanding, and (b) a declining demand for culinary apples. Loss of confidence is shown by the unduly low proportion of non-bearing (young) trees at

successive Orchard Censuses (Table 19); and the contemporary decline in demand is shown by (i) a certain steadiness in real price as supply dwindled and (ii) the restrained rise in unit price for a short crop. (See Tables 20 and 21 respectively).

Table 19. Orchard Census Data. Culinary Apples

Year of Census	Acreage of orchard all	young+	Percentage of young orchard actual	required**
1951	66302	4633	7.0	11.2
1957	56584	3803	6.7	11.2
1962	43613	1798	4.1	8.2
1966	28998	2184	7.5	8.0
1970*	26450	3239	12.2	8.0
1974*	22878	n.a.	-	-

* commercial holdings only
\+ up to 4, 5 and 7 years in separate censuses
** the proportion required to maintain the current bearing acreage

Source: MAFF and Fruit Intelligence

It would seem from the above that there were growers who, in contrast to those in the sample, were planting culinary apples after 1966 - in sufficient quantity, in fact, almost to restore the continuity of bearing acreage at its new low level. If this were planting by new growers rather than re-planting by established growers it raises the possibility of excess acreage if the established growers should decide to follow suit.

Falling value

With demand and supply as described, values were bound to fall. Table 20 shows the undistinguished record of culinary apples since 1947. The 1947-50 equivalent price was exceeded only in exceptional years (e.g. in 1972), and even at the improved real price during 1971-73 the aggregate value was no more than 75 per cent of its 1947-50 equivalent. Three separate quantities contribute towards this situation - i.e. acreage, yield per acre and price per ton. Acreage is known to have fallen. Yields have been too variable to disclose any trend, but it would be safe to say that the average yield of the typical orchard has not increased over the period. The irregularly-declining output was instrumental in keeping average prices fluctuating round their 1947-50

value: in the face of declining output, however, the national crop was losing value ..... and this is the better test of demand (Table 20).

Table 20. Unit Price and Aggregate Farmgate Value of Culinary Apples

Period	Yearly Average Price (£ per ton) at: current value	1947-50 equiv:	Aggregate Farmgate Value (£ million) at: current value	1947-50 equiv:
1947-50	22	22	5.8	5.8
1951-55	35	28	7.0	5.0
1956-60	24	16	6.2	3.7
1961-65	38	22	7.0	3.7
1966-70	53	26	7.0	3.1
1971-73	84	31	13.0	4.4

From the growers' point of view there has been a diminishing amount of purchasing power to be shared between them. The response of some growers is to give up their entire enterprise, others to reduce their acreage. And although each enterprise may not have provided the same amount of purchasing power in 1970 as in 1950, the purchasing power of each acre retained seems to have been very well maintained. Whether growers are adept at estimating demand, or whether demand adjusts itself well to what growers do, is not clear. For the record, however, the index of purchasing power of a standard acre (i.e. assuming average yield and average price per ton in each year) has moved as follows over the twenty-five years.

Table 21. 1947-50 Equivalent Value per acre of Standard Crop

Period	1947 -50	1951 -55	1956 -60	1961 -65	1966 -70	1971 -73
Av: price (Table 20)	22	28	16	22	26	31
Av: yield (tons per acre)	4.2	4.2	5.0	4.8	3.7	5.2
Value per acre	92	118	80	106	96	161
Index	100	128	87	115	104	175

It is plausible to interpret Table 20 as indicating, first, an initial 'slipping' of demand during 1956-60 (when the unit price fell in current money terms and buyers' expenditure was actually less than before although supplies were getting shorter; and second, a longer period, sustained throughout the 1960s, when supplies dropped appreciably and

called forth no greater expenditure by buyers - a sure indication of a continuing fall in demand. (The possibility of a monopsonist (a single large buyer) having undue influence in the market can be ruled out, in view of the large share of the crop sold on the wholesale markets.)

A previous Wye College report* conveys the feeling in the industry at the time of the postulated initial 'slip' of demand. To quote, apropos 1959-60: "In certain areas of Kent grubbing has been proceeding at a rate decided by the exhaustion of the economic life of the tree. If applied over the country as a whole this would leave about 46,000 acres in 1971. This rate of grubbing is about keeping pace with the decline in demand, and if demand is to be overtaken, growers should aim to have only 40,000 acres by 1971 ..... by 1971 the 'normal' crop of Bramley's Seedling will be about 125,000 tons .....".

As it turned out, the rate of grubbing increased after 1960, so that by 1971 acreage was down to 36,000, but the total value of the crop was not increased at all. Indeed, far from acquiring any scarcity value, the culinary apple crop continued to decline in constant money terms until after 1970. (See the right-hand column of Table 20.)

Response to shortage. A slipping demand can also be inferred from a declining ceiling value for the crop during the 1960's. In that decade there were three years of short crop when, if consumers were feeling the shortage keenly they would have bid up prices. In 1967, however, the second short crop in succession (so it cannot be said that processors were holding off) sold at a lower average price than a crop of about the same size in 1961. Bearing in mind that both population and income per head had increased in the interval, a relatively falling off in demand is the most plausible explanation of a declining ceiling value (see Table 22).

Table 22. Current and Real Average Price - Three Short Crops

Year:	1961	1966	1967
Output of culinary apples ('000 tons)	109	126	107
Average current price per ton (£)	70	44	61
Average real price per ton (£)	70	38	51

* R.R.W. Folley Adjusting to Lower Prices for Culinary Apples Wye College, 1961

Experience on the farm. From the growers' side some of their loss of confidence in the crop can be attributed to specific happenings. During the period 1956-60, for example, there arose uncertainty in the premium for storage once storage ceased to be a novelty. It was in the early 1950's that both cold and refrigerated stores burgeoned on culinary apple farms. Within the space of four to five years the original scale of premium in price for long stored fruit was much reduced and long-term storage, although of undoubted help in 'firming' mid-season prices, became more of a gamble. During this period the price trend was definitely downward from season to season, with marked instability developing in the last four months of the season. For example, in 1958/9, buyers showed how excessive was a harvested crop of 285,000 tons (the largest of the decade). Wholesale price for the stored crop fell to 2p a lb. and it is questionable whether one grower in ten made a profit on culinary apples in that season.

Some ten years later the storage premium was less of a worry, for growers had more experience of regulating their marketing ..... and processing was becoming a more respectable trade, offering promising openings to growers. Just at the time when the promise might have been confirmed growers found themselves consistently short of suitable fruit and the expected trade did not develop.

The decade of the 1960's was probably critical with respect to 1974 production. It was during this period that the trees wanted for bearing in 1970-75 should have been planted. As the Orchard Census data show, they were not forthcoming until late in the decade and then, by inference, not from established growers.

Growers' reluctance to re-plant can be traced to the economics of their enterprise. There was little dynamism in the industry because growers were enchained by circumstances ..... largely of their own making - but, as usually happens, individuals cannot be held responsible, for individually they could not correct or improve the situation. Contemporary cost accounts show the typical 'Bramley' enterprise of the period (cropping standard trees in their later life) to have been making annual profits of £5-20 an acre with infrequent heavy losses on big crops. Yields were averaging about 300-400 bushels an acre and expenditure some £70-100 an acre.

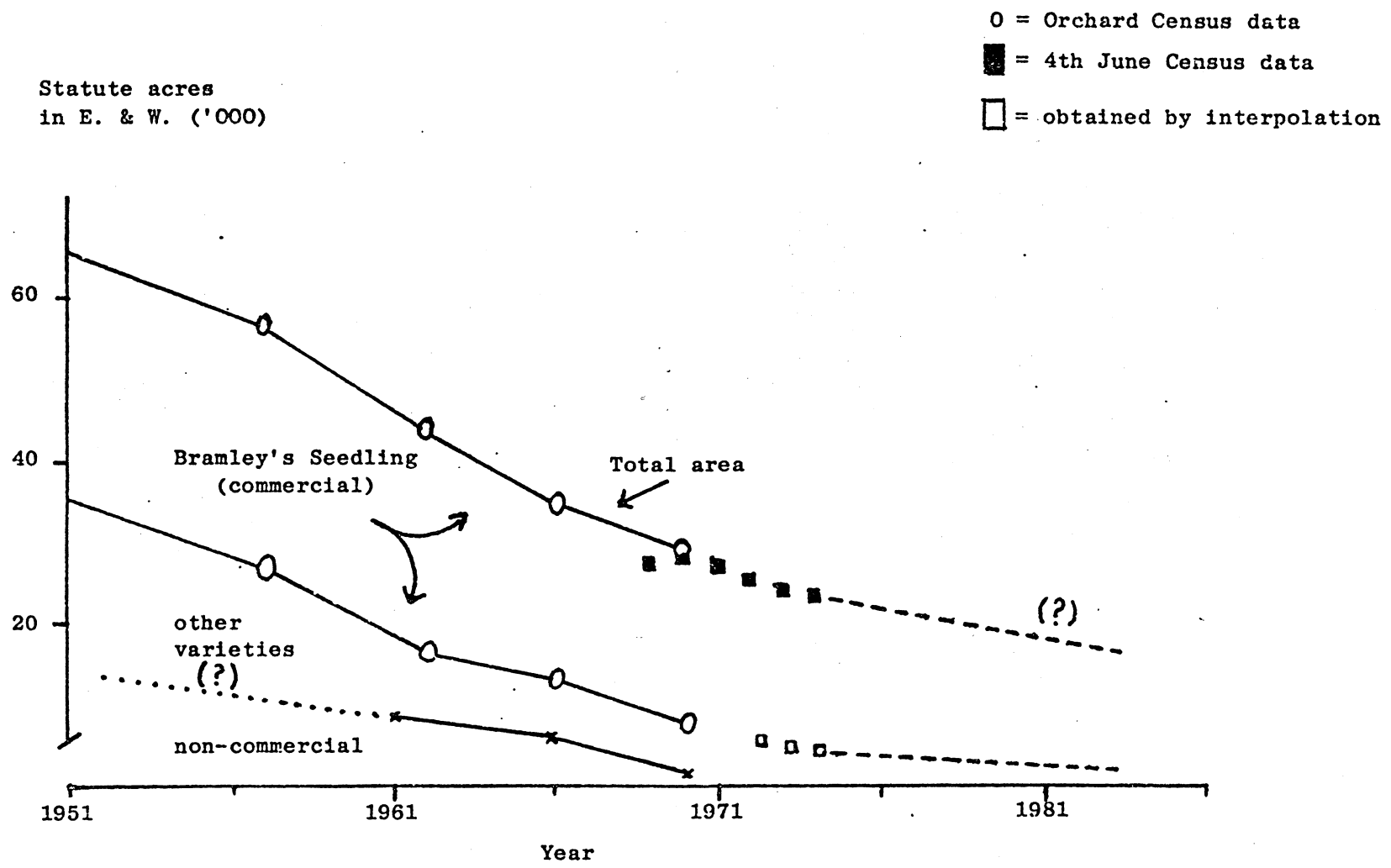
In other words, growers had settled for a quiet life, and acceptance of the "status quo". Their trees were both too old and too old-fashioned to be revitalised ..... and in any case to 'grade up' would call for more skilled labour and this was not available. So a policy of "cutting losses" and taking a profit when it came applied on many enterprises. It is not usual for such a philosophy to prevail in farming, and it can only be assumed, first, that growers had tried high-input/high-output production and too often found their efforts negated by a low crop; while, secondly, prices did not respond well enough to scarcity and were abysmal if there were physical excess. Objectively, it could be said that the siting of many culinary apple orchards was not ideal and consequently variation in supply did not help the situation: but the difference can only be marginal.

Thus there emerges the picture of an industry caught in a low-productivity trap. Because yields were low, and uncertain, more acres than necessary had to be kept in production: and because of the large acreage being worked enterprise costs were correspondingly high in spite of being spread more thinly than otherwise. By contrast, the few growers who were well-located and enjoying regular crops of 500-1000 bushels an acre, were finding it worthwhile to look after their (similarly old) trees well and had no complaint with prices: but new acreage was not forthcoming on these farms because of the even greater profitability of dessert apples and pears.

Location and structure can thus be pointed to as the likely causes of the lack of dynamism in culinary apple production in the recent past. Not enough growers had done well with the crop, and whether successful or unsuccessful the culinary apple enterprise was of secondary importance on the farm.

Theoretically, the recent annual crop of 150,000 tons would have been produced on an area half that of the actual, and at unit cost 20 per cent lower. It is not within producers' power, however, to organise this scale of adjustment themselves - and it is questionable whether a 20 per cent lower price will galvanize demand and transform the industry's prospects. Figure 4 shows how a continuation of present trends will lead to Bramley monopolizing the market by 1980-81.

Figure 4. An Analysis of the Culinary Apple Acreage 1951-73.



In fact, cause can be found for assuming present growers will not try to organise much change. The next section is concerned with the way the crop and the market are likely to be managed in the next few years.

Managing the crop

Management of the crop (i.e. with a view to a good yield of fruit) is looked at now within the management of the enterprise. The enterprise, in turn, has some of the management features of the farm as a whole, e.g. the kind and the extent of labour supplied. This is the first occasion on which it has been possible to see a culinary apple enterprise from a managerial viewpoint and to appreciate the niceties of trying to organize a supply of culinary apples using trees, labour, chemicals and so on.

Attention is paid to two (economic) aspects. First, the variability in crop from year to year. Second, the rewards for trying harder to get a better crop.

Variation in yield is a well-known natural phenomenon. For reasons unknown, a certain alternation between higher and lower crops is widespread in commercial fruitgrowing. In the economic sphere, changes in yield on single farms aggregate into crop fluctuations, leading into price instability, which itself leads into uncertainty and changeable levels of activity in trading. Opportunist strategies consequently arise and the crop is thought not to be handled as cheaply as it might be if supplies were more regular.

However, back at the farm, the grower is apparently working almost in a 'pure chance' situation with regard to his output. The situation is analysable as (a) the position on the grower's farm from year to year and (b) the grower's position relative to other growers each year.

As regards (a) above, a distribution of index of variation* among thirteen growers whose records were available is as follows -

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* The index of variation is the standard deviation of the yield data

Index of variation	No. of enterprises
0-9	2
10-19	4
20-29	3
30-39	3
40 and over	1

It is shown above that wide annual variations in crop were about as frequent as small annual variations. These data refer solely to Kent, and mean that more than half the growers could expect the following year's crop to be half or double the present year's crop according to circumstances. Two growers in every three would have experienced a half crop at least once during the five years.

From the management point of view, the big contrast is between the work put into growing a crop and the actual result. Growers do not know what to expect. The yield records previously referred to show the following (a) percentage change 1972 from 1973, and (b) distribution of percentage change from 1972 to 1971 and from 1971 to 1970 (Table 23). The 'normal' crop of 1973 is the standard in these calculations.

Table 23. Year-to-year variation in yield on individual farms

Percentage change, 1972 from 1973		Frequency distribution of percentage change		
per cent	no. of enterprises	per cent	no. of enterprises 1972-71	1971-70
below 34	2	0- 9	4	2
35-44	1	10-19	3	3
45-54	3	20-29	3	2
55-64	2	30-39	3	2
65-74	0	40-49	3	2
75-84	2	50 and over	0	1
85-94	1			
95 and over	3			

The left-hand column above indicates no normal or modal change on these enterprises: big swings in yield were as frequent as small swings in yield. The right-hand column tends to confirm that in the period under review there was no typical or most-frequent percentage change in annual yield.

Each grower, however, is not in a private world of yield instability: he is also affected by yield movements on all other culinary apple enterprises. Apparently having little, if any, control over his crop, no grower can 'play' others' experience to his own advantage. In fact, the inter-enterprise situation is less haphazard than individuals' positions suggest. It can be established that within the group considered, the more-disadvantageous yield movements are not random but limited to certain farms. That is to say, a grower with a relatively high average yield would have no cause to worry lest growers with lower average yields had the higher yield (and revenue) in a short-crop year. Instead of, say, ten farms each being disadvantaged in relation to other growers by one yield change in a five-year period, the position was -

4 farms relatively disadvantaged by 4 changes,
0 " " " " 3 changes,
4 " " " " 2 changes,
1 " " " " 1 change,
1 farm experienced no great change.

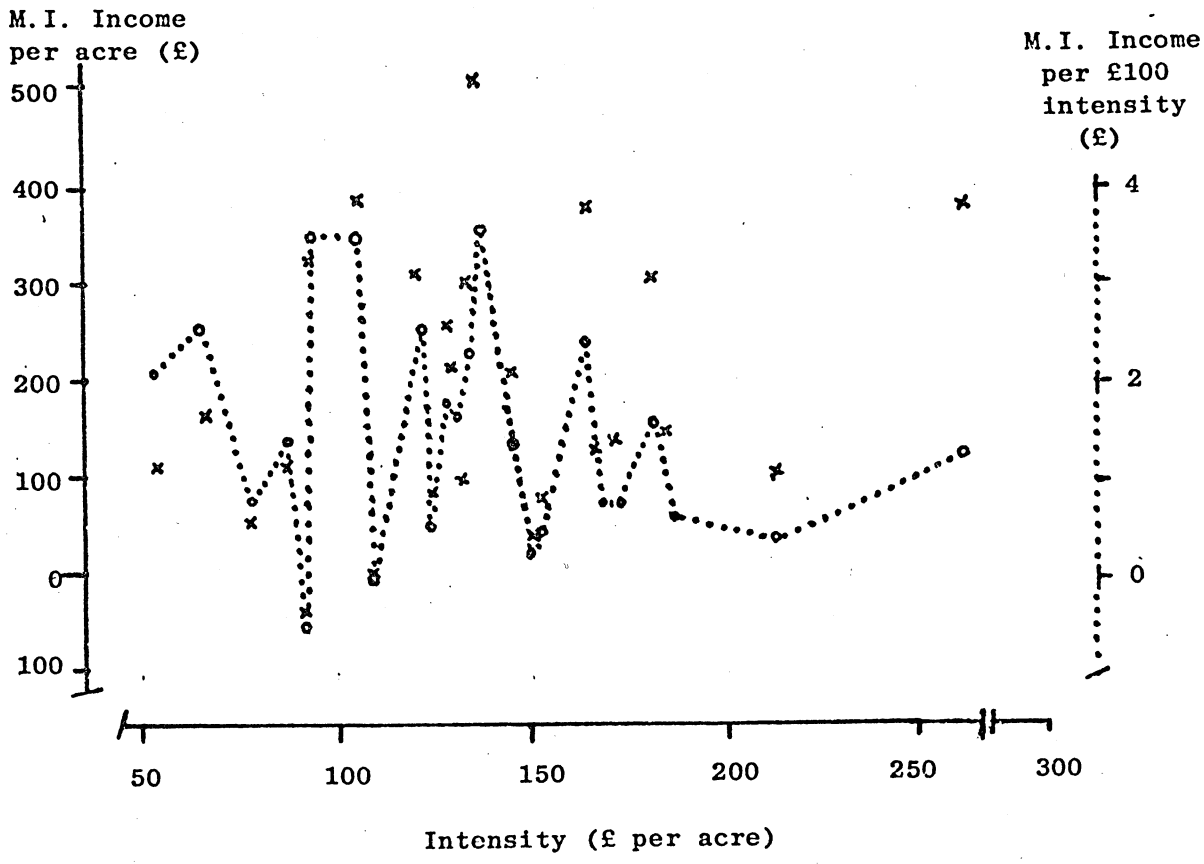
The above is equivalent to saying that some growers, although suffering variations in annual yield, have consistently higher yields than others, while a lower average yield tends to be associated with greater swings.

Rewards for trying harder. Bound up with the level of yield is the organization of production. What follows in this section is explicitly restricted to the management of old trees in orchards with which the growers must be assumed to have had long experience (i.e. to have decided on the basis of the trees' performance how it is best to manage them).

Management in this sense is the same as 'intensity of production' or what the grower spends in an effort to increase the yield above a basic norm. For the present purpose, the measure of intensity is the cost of all labour (but excluding fruit picking) and raw materials. So a grower who is pruning carefully, using organic manures, and carrying out a full spraying programme, will be more intensive than one pruning with a saw, putting the sheep into the orchard in Spring, and perhaps selling the crop on the tree.

Intensity as thus defined has then been related to the M.I.I., with results as in Figure 5. If greater intensity in 1973 led to a higher profit in the year when weather had less effect than of late, the entries on the diagram would move upwards to the right. As can be seen from the position of the small crosses in Figure 5, an M.I.I. of £300-400 an acre was realised at intensities of £85-100 and £160 an acre as well as at £260 an acre. There is no general upward movement.

Figure 5. M.I. Income in relation to Intensity of Production



Barring disasters, the response to increasing intensity in the lower range £50-130 an acre), is variable but on the whole positive: a good response is less certain in the upper range (£310-260 an acre). Such evidence is circumstantial, for it does not relate to the same trees managed in two different ways, but a possible inference is that the yield in any year is largely determined by external factors and only, as it were, adjusted by anything the grower does, with the possibility that his capacity for such adjustment is less than he thinks it is.

Growers reading the above may well respond that the argument is all right as far as it goes. They have learned to accept a certain capacity in their trees, but can still improve, say, fruit set and particularly size and quality of fruit by their own intervention: yield is only one element of profitability.

The relationship between intensity and M.I.I. has been further expressed as a ratio - M.I.I. per £100 intensity - and is traced on Figure 5 as a broken line. It is clear beyond doubt that as between these enterprises, the profit per £100 intensity was far greater for below-average intensity than for above-average intensity. Indeed, once intensity exceeded £170 an acre it was apparently rare to get a pro rata response, although there was a chance that profit per acre would be improved as a result (to what some growers got with half the expenditure). On the contrary, the two cases of financial loss (due to inadequate yield) were associated with low intensity.

It cannot be said that the trees were 'taking a rest' in 1973; if anything they should have been responding mildly to past management. In fact, there was in this sample a sort of 'bonus' in 1973 - an unearned element in profit, possibly because little adjustment of the externally-decided crop was feasible. For the intensity:M.I.I. ratio shows one thing: growers with below-average intensity had a two-to-one chance of an above-average ratio, whereas growers with above-average intensity had a two-to-one chance of a below-average ratio, and no greater chance of actual profit per acre.

The seeming disutility of spending money on old culinary apple orchards may be a freak of the 1973 season, when prices were high: but if prices are low a policy of additional expenditure unrequited in the crop is even more suspect. Certainly, the short-crop situation, where the fall in yield on the less-intensive enterprises may be relatively severe, also needs examining. In the available data, however, the eight enterprises frequently disadvantaged by annual yield variations are equally distributed between above- and below-average levels of intensity.

In view of the different levels of regular labour input on small enterprises and large, the intensity results were examined for scale effects. No such scale effects were apparent. Each size of enterprise was represented at several levels of intensity. Intensity was independent of size.

The data have been closely examined also to see if greater intensity ensured a higher proportion of market fruit and a lower proportion of processing fruit than otherwise. No such effect was observable, for the individual results were too variable for any significance in them to emerge.

Managing the Market

The 1973 crop being near normal in size, it is worth knowing whether the 'normal' crop represents the maximum-profit position for growers, or whether from their point of view, in the short term a smaller or larger crop is desirable. These "economies of variation" are presented in Table 24 and are based upon available data for the short crop of 1972 and the full crop in 1970 respectively, although the 1970 crop cannot be accurately appraised in the light of the improved tone of the market after 1971.

Table 24. The effect of Variation in Size of Crop, c. 1973

	Short crop (135,000 tons)		Medium crop (160,000 tons)		Full crop (185,000 tons)	
Farm gate value (£/ton)		137		90		68
Growers' gross revenue (£)		18,495,000		14,400,000		12,580,000
Marketing costs*		4,882,000		4,904,000		5,100,000
Output		13,613,000		9,196,000		7,480,000
	£		£		£	
Variable costs	1,890,000		2,080,000		2,135,000	
Fixed costs	2,350,000		2,350,000		2,350,000	
		4,240,000		4,430,000		4,485,000
Margin+		9,363,000		4,766,000		2,995,000
Average value per ton		137		90		68
Average cost per ton		68		60		52
Orchard gate value per ton		100		57		40
Production cost, per ton		31		27		24
Growers' surplus, assuming a required profit of 20 per cent on normal turnover (i.e. £2,820,000)		48		12		1

* calculated as under:

short crop:	108,000	tons	fresh	at	£44;	26,000	tons	processing	at	£5
medium crop:	112,000	"	"	"	£42;	41,000	"	"	"	£5
full crop:	120,000	"	"	"	£40;	60,000	"	"	"	£5

\+ available for proprietor's labour, management and interest on capital

These figures show the extent to which growers as a whole can expect most profit from the short crop. It is shown that the "full crop" would earn them a fair reward and the short crop a considerable windfall. To meet this situation in the market, and taking a short term view, the most reasonable policy for the individual grower is to do nothing to increase the average level of crop. There is even no incentive to try to avoid crop failures, for there is no penalty to any grower if all growers fail to produce a normal crop. To raise the average crop would suit consumers but would also almost certainly mean that growers made a loss on the "full" crop - unless unit costs were to fall as average output increased.

There is, of course, just as good an argument against doing nothing. The present situation is surely unstable - too good to last. Progressively reduced supplies and continually rising prices can only (a) reduce physical demand for culinary apples, (b) encourage buyers to look elsewhere and (c) generate over-response and potential surpluses.

Meanwhile, growers have a sellers' market and wiser counsels suggest growers should safeguard their market as well as they can. The APDC report makes clear they have two outlets - one slowly declining in the long term (i.e. fresh consumption), one expanding, possibly fast if encouraged. How do growers then "manage" their marketing?

Conventionally, the competing claims of the two outlets are decided in the grading room. Apples of good size and/or appearance have the greater value fresh; and any small, bruised or tolerably damaged apples, which would be a drug on a wholesale market, are diverted to processors. As apples come in many shapes and sizes growers can swing the balance a little one way or the other. To honour an advantageous processing price a grower can trespass on the fresh market by lifting the size (diameter) qualification by, say, 2-3 mm. Conversely, high market prices for fresh apples will draw off a small proportion of the crop which might otherwise have gone for processing.

Referring to Table 24, it can be seen that given a normal crop, the 'average' grower has a picked crop for which he would want £32.40 a ton (i.e. £27 cost plus 20 per cent (=£5.40)). He can then either sell it or put more work into it in the hope of more profit from it. Selling is a clear option for the grower whose crop is an embarrassment - i.e. on the

family farm without stores or with no labour or desire for subsequent grading and packing, or even for the big fruit-grower experiencing an excessive dessert-apple crop. Other growers, dealers, brokers and processors are all potential purchasers.

The value of the picked crop, standing in bulk bins or orchard boxes is indeterminate, and most growers will choose in future to do one of three things: either to grade, pack and store the crop for sale in the fresh market; or to be less selective and sell for the "higher uses" (vide APDC) of processing; or sell the whole crop for indiscriminate processing.

No single grower is likely to have much difficulty deciding what to do: but considering the range in quality of crop which growers experience, there are likely to be different policies for different enterprises. Among the enterprise results calculated for example, are a number - about 10 per cent - for which the fresh market gave barely adequate returns and a good overall result was due to the bonus of sales to processors. It should be realised that a number of factors can contribute to a poor return for the fresh crop -

i. a low proportion of market fruit,
ii. high costs of marketing,
iii. low selling price.

In short, the extra return a grower expects when he decides to grade and pack is not always realised.

By making some assumptions about prices for three qualities of crop, and relating these to the proportion of each quality in the crop to be handled, a rough guide to policy in given circumstances can be obtained.

Step 1. Initially, there is the picked crop of 7 tons per acre, costing £32 a ton. As assembled for the 'lower uses' processor, the grower's supply price is £38 a ton. The processor's offer is £25-30 a ton.

Likely result - no trade. The processor can only acquire rejected fruit; and this can mean an entire crop only in the event of near catastrophe on the farm, such as 80 per cent of marked fruit.

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* this term refers to outlets, for culled fruit the chief of which is cider-making, and is used to differentiate these outlets from those for which the buyer specifies a good Grade II sample.

Step 2. A higher price can be realised on part of the crop from 'higher uses' outlets. The processor's offer is £50 a ton plus a storage premium. The grower's supply price is £32 basic, plus £20 a ton for rough sorting and assembling.
Likely result - uncertainty for the grower: if he could put 75 per cent into higher uses and 25 per cent into lower uses, he could average £44 a ton - £328 an acre, but his costs would be £364 an acre. On the other hand, if the sale of a clean, entire crop could be negotiated at, say, £47.50 a ton, the grower would receive £322 an acre and a margin of £66.50 an acre /£322 - (7 x 38)/.

Step 3. Try the fresh market. An average price of £90.00 a ton on the farm looks attractive, the grower's supply price then becomes £32 basic + the average cost per ton marketed. Given a 76 per cent grade-out, some growers can market for £26 a ton, others need more.
Likely result - grading for the fresh market. The grower's supply price rises to a minimum £63 a ton or £441 an acre but he receives in return £495 from 5½ tons sold in the fresh market and £30 from 1½ tons sold for processing - a total of £525 and a margin of £84 an acre.

Only two factors can undermine the attractiveness of the fresh market for a grower - the quality of his crop and the efficiency of his marketing. To grade a 7-ton crop and pack out only 4 tons would reduce revenue to £420 (£360 from the market, £60 from processing). The grower's return would then be less than his assumed due reward of £441 an acre. Similarly, if at the 5½-tons grade-out the cost of marketing operations rises by £6 a ton the grower's margin is halved, at £42 an acre.

In each case an opportunity to sell, say, 6 tons at £70 a ton (vide APDC) and one ton for £20, to make £440 an acre, at a cost of £364 an acre (7 tons at £52 a ton) and a margin of £76 an acre, looks attractive.

A re-statement of the above may read as follows:

1. a normal crop cannot normally be sold profitably for "lower uses" processing;

2. some 5,000 tons to 10,000 tons of a medium-sized crop (more of a larger crop) might advantageously be sold at £60 a ton so long as marketing expenses do not exceed £20 a ton;

3. assuming relatively short crops for the next three to four years, a market crop will be the good grower's best bet.

Looking ahead to the next few years, assuming the growers' supply price for a 7-ton crop has risen to £70 a ton while the "lower uses" processing price is £25 a ton there will be little incentive for growers to grade a crop to sell on the farm for £70 to £80 a ton until process-outlets are satisfied. At a price of £120 or so a ton on the farm, however, a crop with 50 per cent market fruit would be worth grading. Under the conditions quoted above the minimum requirement of market fruit to justify grading the whole crop is as follows (Table 25):

Table 25. Quality of a 7-ton crop justifying Grading and Packing at various Net Home Prices

	Net Home Price (£ a ton)					
	70	80	90	100	110	120
Minimum requirement of market sales per acre	7.0	5.8	4.9	4.2	3.9	3.3
Per cent of crop	100	84	71	60	56	47

Thus, so long as growers produce about 75 per cent of fresh market quality in their normal crop they require a net home price of about £90 a ton if they are to attain a full reward for their effort. And as the price rises successively inferior crops will pay for grading. The fresh market will be supplied at the expense of the processing market. This reasoning is unreal at present because, of course, crops of variable quality are graded and packed and the adjustment to the market situation reaches the growers in the form of variable returns after marketing. In order to pursue the previous argument to its logical conclusion it would be necessary to know the quality-distribution of individual crops: then the amount of fruit qualifying for the fresh market could be calculated.

When it is further considered that a high market price is the outcome of a short crop, and vice-versa, it is seen that market-oriented behaviour by growers would tend to stabilize market price at the cost of greater fluctuations in the price of the less-important product, the culled apple. To do so would unbalance quantities of processing fruit. Offered the prospect of a high market price, growers would use some of the crop normally assigned to processing. Given the prospect of more market fruit than was wanted it would be advantageous to give some fruit to processors for the sake of the effect upon market prices.

Such clear-cut operations would be almost impossible at present, owing to the extent of dealing in the crop so that the final price is appropriate to quality. Market-quality fruit destined for processing would quickly be diverted and find its way back, at an inflated price, to the fresh market.

Even though the arbitrage (i.e. price-levelling) operations continue as before, the short-term prospect is for short crops and high market prices. The APDC drew attention to an annual 7 per cent fall in market sales, and expected this trend to continue. If the foregoing analysis is correct, physical demand will fall along with supply in the next few years but price will be maintained, as in the recent past. If, in fact, the market price is volatile and the processing price steady, the fresh market will be given preference and the processing market neglected, since processing (culled) fruit is not a viable enterprise on its own. It follows that "lower uses" processors might well find themselves short of local supplies. Price will not be an obstacle, for good growers will not need to depend upon processing sales. At least one cider manufacturer recognised this situation ten years ago and took steps to ensure some regular supplies.

Looking beyond the next few years, with the demand for fresh fruit in its present state additional supplies will soon jeopardize the profitability of market fruit. In their own interests, therefore, growers could well try to keep the fresh and the processed markets as distinct as possible, and this involves specific purpose in new plantings. The "higher uses" trade, for example, could be conducted through long-term contracts with processors. And the flush of crop from more-intensive new orchards used to give consumers the benefit of a lower-price season before the store crop is released.

The extent to which semi-intensive production may possibly allow traditional production to be undercut is explored in the next section.

The Economics of Improvement

Some growers, as well as some non-growers, will have reservations about the future well-being of culinary apple growing so long as a good yield of market-quality fruit is 298 bushels an acre (p.9). Nevertheless, with replacement involving sums of up to £1,000 an acre, growers

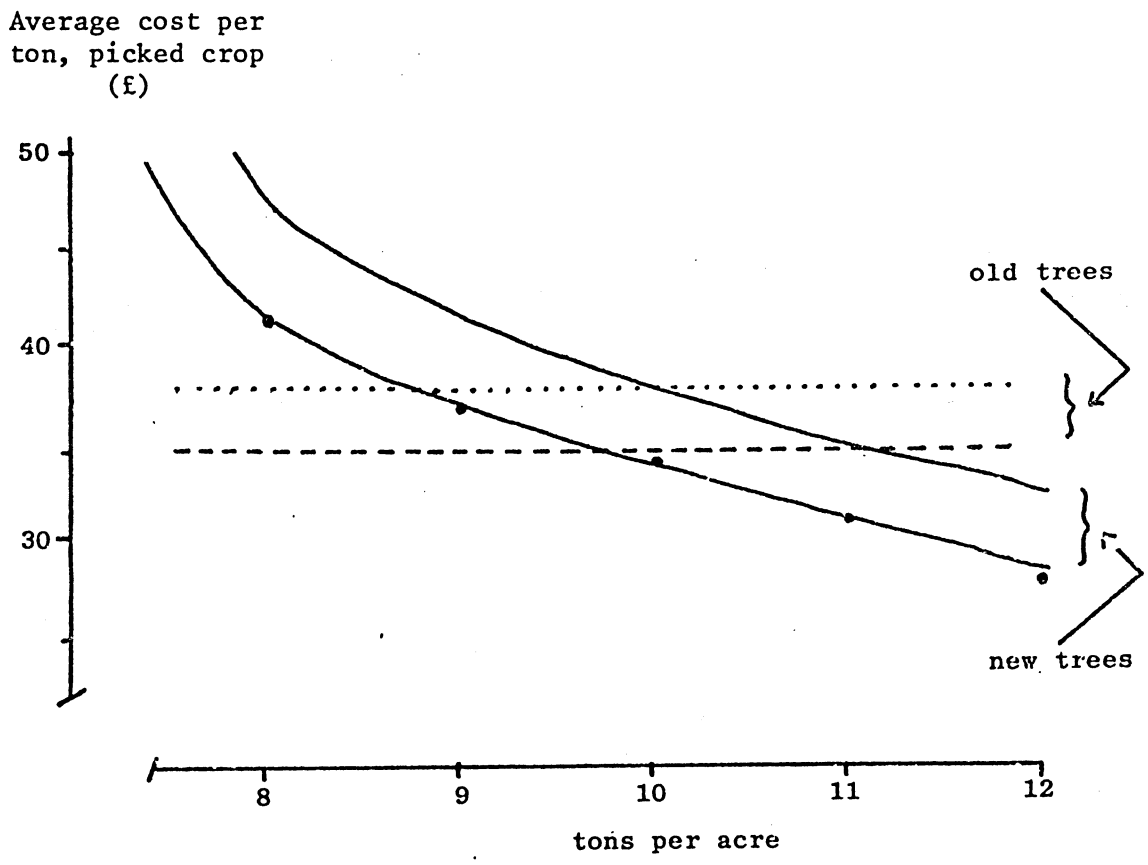
have good reason for caution in further investment. Here we see one of the lesser-known but important effects of inflation - i.e. the extension in the useful life of old equipment because new equipment is so much more expensive. Is a "new model" ever cheaper than an old model nowadays? And if not, are there any prospects of cheaper (at the farmgate) culinary apples?

First of all, the investment in new plantations is high, and could be recovered either through high prices or higher yields. Within reason the latter is to be preferred to the former, and in turn requires the new orchards to bear regularly. Some re-location would thus seem desirable, particularly if the cooling phase of the long-term weather cycle is to continue.

The operative "trade-off" between old-style and new-style culinary apple orchards is shown in Figure 6. For the sake of demonstration the short-term future cost of the picked crop from old trees is put within the range £35 to £38 a ton, and the competitiveness of new orchards, which increases as yield increases, is shown superimposed upon this range.

Under inflationary conditions the higher expenditure on new orchards will tell against them, but on the other hand their age will tell against the older trees. Figure 6 also contains no assessment of the probable benefits from younger trees in the form of (a) a less-depressed yield in a low-crop year and (b) cheaper handling of the picked crop.

Figure 6. Equality of cost : new vs. old trees, 1975-78



Making certain assumptions* about production costs on new orchards, it seems that a cost below the 1973 level (marked by horizontal lines) could well be realised at average yields of between 9.5 and 11.5 tons an acre (535 and 644 bushels). The lower figure recognises certain growers' ability to attain average performance at below average cost:

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* comparison has been made at 1973 levels of cost, as follows:

	£ per acre
Materials	50
Labour-growing	55
Rents and rates	25
Overheads and other	40
Amortization	20
	190
Harvesting	£11 a ton reducing to £9 a ton
Profit	20 per cent on cost

Costs per ton thus calculated being:
at 8 tons an acre £42, at 12 tons an acre £28.

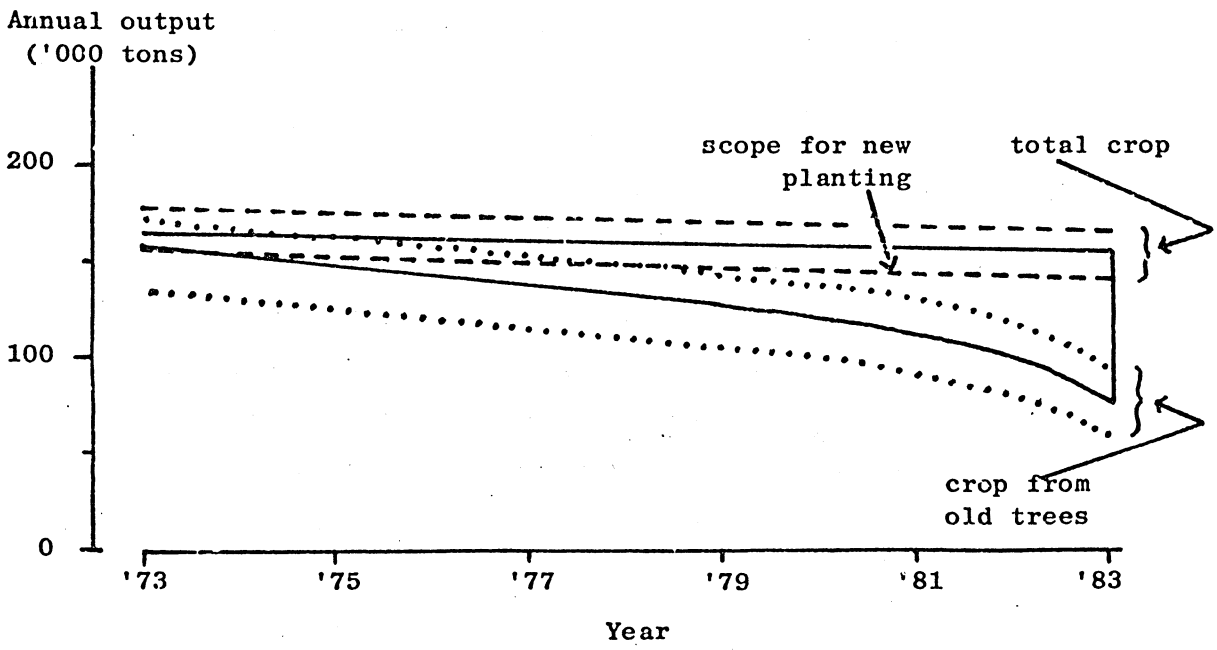
at the higher figure allowance has been made for production on farms where nothing is spared. In any case, the regular 14-ton crop referred to by APDC would undercut most others: particularly if, simply due to failing yield, costs per unit from old trees rise to the level of the dotted line in Figure 6.

Where does this leave the industry? It seems to foreshadow a rebirth of culinary-apple production (a) in areas where it has not hitherto been important and (b) on farms having other fruit enterprises, although its place is perhaps not assured on expensively-run farms.

Harking back to buyers' requirements it is suggested that targets of annual outputs of 160,000 tons may be in growers' minds, i.e. a continuation of 1973. If the fresh market has less than 100,000 tons, high prices will accelerate the falling-off of demand. Unless the processors have prospects of 60,000 tons, for which they do not have to bid against the fresh market, greater reliance on imports can be expected.

Old orchards fail in this context, although in one scheme they may continue to provide the bulk of the stored crop. As has been shown, the traditional crop can be expected to continue for another decade and to provide variable quantities of apples at moderate cost. In the short term the new supplies will have a supplementary function (Figure 7).

Figure 7. Estimated Scope for New Supplies



According to Figure 7, the scope for the new supplies is approximately as follows:

in 1973-75	up to 40,000 tons
" 1975-77	5,000 to 55,000 tons
" 1977-79	10,000 to 65,000 tons
" 1979-81	20,000 to 80,000 tons
" 1981-83	30,000 to 90,000 tons

Assuming middle-of-the range values to apply, the scope for new supplies, as represented by the area within the solid line in Figure 7, is 80,000 tons by 1983.

The tolerances are too large for anyone to imagine that the new can take the place of the old without periodic upsets in the market. The scale of planting, particularly of Bramley's Seedling, suggests that the new supplies will have a deflationary influence on the whole. Apart from the increased volume, higher standards of growing and presentation for part of the crop will tend to de-value the rest.

Were the average yield on the new plantations to reach 10.5 tons an acre, 6,000 such bearing acres by 1980 might suffice, 7,500 acres by 1983 and ultimately (after 1985), some 15,000 acres.

Possibilities of Exports

One factor which could upset all previous calculations for ten years hence is a surge in exports of fresh and processed Bramley's Seedling: it is not too much to expect it to gain favour either where quality is appreciated or where apple products are far more popular than in the U.K. if only apple-conscious consumers can be given the opportunity to buy at fair prices. The foundation of an export trade is normally either an embarrassing surplus of a product, or low unit cost in the country of origin, or manipulation of an export price by an international or conglomerate company. Culinary apple exports have no basis in any of the above and would be conditional upon low unit costs.

Bramley appears to have limited (but worthwhile) prospects for different reasons in France, Belgium and The Netherlands and West Germany. English growers' comparative advantage is probably greatest in northern

Germany, for it is a deficit area for home-grown Grade I produce and the supply of apples for general purposes there is small-scale. The Hamburg market is a target; but Hamburg is a more international area than, say, the Ruhr in this respect, and thus has lower price levels.

For some of the same reasons as apply to culinary apple production in E. and W. the West German processing crop, highly biennial, is at present produced at low cost and sold at low prices. No conceivable premium for fresh Bramley could make exporting preferable to domestic consumption for growers so long as the packed crop costs about 90p per 30-lbs. ex-packhouse. Germany's total apple production has been on a par with Italy's for many years, although volume is the only thing the two countries' crops have in common. However, this helps us to realise how the biennality of the German crop sets the tone in western European markets.

The weather that has reduced the English crop of late has also affected German output. A downward trend is now evident and, as in the U.K., the cider-apple trade picked up in 1972: from a previous level of about £11.50 a ton the price rose to £40.00 and has since fallen again to £17-18 a ton. But all the time prices are hardening faster in Britain than in West Germany, Britain is more likely to import than to export. Any differential price which may occur in the next few years is likely to be cancelled out by increased costs of shipping.

Yellow and Red Boskoop apples have been mentioned as alternatives to the Bramley for baking. Here again the prospects of high prices for Bramley are not encouraging, for real values are declining: current prices have been very variable over the last decade but have remained at about the same money level. In southern markets Class I Yellow Boskoop was 35 DM per 100 Kg in 1963, 70 DM in 1965, 45 DM in 1973 (2.3p, 4.6p and 3.2p a lb. respectively).

The occasional short-crop year in west Germany might offer prospects of sales of stored English Bramley but for the similarity in weather effect in both countries. A wholesale price for Grade 1 equivalent to £1.10 per 30-lbs. has been noted from February 1973 to the end of the season, ... well below the U.K. level, even if there had been Bramley to spare. British growers have had a transport cost advantage over Italian growers in supplying northern Germany, without the crop to make this tell in their favour.

If the DM were to keep its present exchange value against the £ sterling, sales at 60-70 DM per 100 Kg might be feasible for Class I produce equivalent to about £1.65 per 30-lbs. In practice, it may well happen that there is the choice of limited sales at a premium price above that figure as of value-for-money penetration of the market at prices below that figure. Failing advantageous shipping arrangements, the extra deductions for delivery to a wholesale market in, say, Hamburg, would probably be about 25p per 30-lb.

A local wholesale price of £1.40 per 30-lbs. for the best of the crop, compared with an average price for Grades I and II of £1.45 per 30-lbs. in 1973/74 shows how far a thriving export trade is at present out of reach.

When trying to decide upon the attractiveness of a culinary enterprise for the future, it is suggested potential growers look forward rather than backward. It could be said that many of the now old orchards never had a chance. Their origin was inauspicious and a long time ago and they were planted as a speculative way out of a temporary dissatisfaction with hops. Being predominantly farm-based enterprises, with what this means for presentation and quality, the market was not developed in the same way as for dessert apples, and during the critical periods of 1933-39 and 1947-55 few 'good growers' saw any need to move into culinary varieties, particularly as Bramley wanted handling at the same time as Cox.

To be more positive, a nice trade was building-up with food manufacturers in addition to the conventional processing outlets from about 1962 to 1966, just prior to the sharp drop in output (Figure 1). Manufacturers, being unsure of their supplies, tended to hold their hand and only since the publicity for manufacturing uses given by APDC have they been able to be more hopeful.

Today's intending growers are able to look forward to the time when the old image of the Bramley can be replaced by something better. So far as can be seen at present there is a good economic case for growing culinary apples instead of cereals or food for dairy cows on, say, 15,000-16,000 acres. Output, employment and import saving would all be increased as a result.

For all its coarse uses and the rough handling it gets, Bramley's Seedling is not a robust variety: it qualifies as a specialist's apple, for skill is needed in the orchard and care in handling. Pollination remains a problem and the mature fruits bruise easily; and it is to be hoped that the second coming of (effectively) Bramley is better-conceived than the first. More will certainly be wanted, but will only be welcome if they come regularly and are of good quality. The relatively small area required if yields can be lifted to 10-12 tons an acre makes it feasible, in theory, for Bramley to be grown much more efficiently than in the past.

Further consideration would also indicate that (a) most growers would have a reasonable size of enterprise, say 20-40 acres (thereby inevitably reducing the number of operative growers to less than one thousand) and (b) there are opportunities away from Kent if storage facilities are available. Everything considered, it would seem that there will be a marginal re-location of culinary apple enterprises during the re-planting phase. It will become less of a farmers' crop and more of a growers' crop. Storage and fruit-growing facilities will tend to anchor it in certain places but perhaps a new flexibility in their use will emerge. Bramley, however, is not cast as the salvation of the failed dessert apple growers, and the long-term nature of the crop militates against its extension on to rented land where it could be expected to do well.

Conclusion

It seems clear from the situation as reported in 1973 and seen in the context of the last twenty years, that culinary-apple production is at the end of a phase. This is the phase during which the run-down of the industry has been following the declining trend in demand. Some observers and some growers think the bottom of the trough has been reached, if not actually passed.

Looking back, the period can be seen to have been one of economic change and technological stagnation - an unusual combination. Reference has been made in the preceding pages to the apparent passiveness of growers in the face of a shrinking market. This behaviour can be traced to the relative unimportance of most enterprises: by the same token,

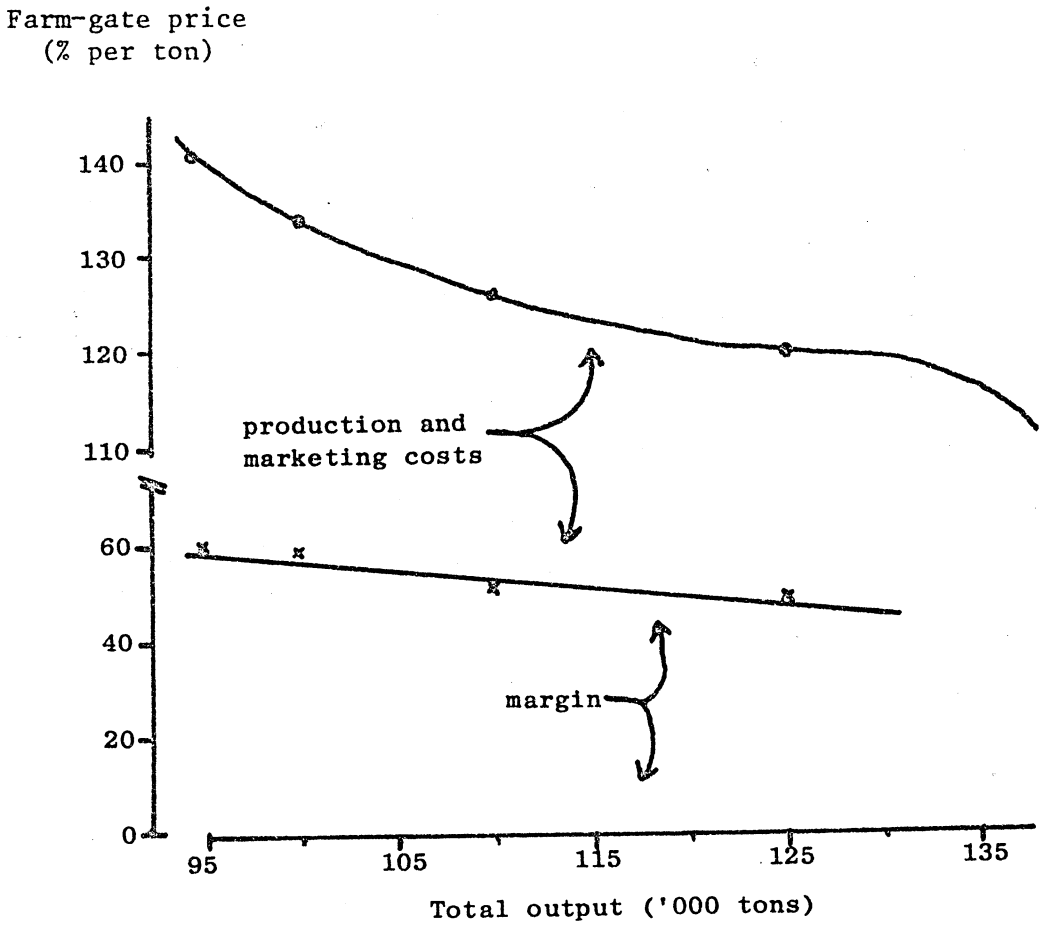
however, there should have been on the farms concerned plenty of opportunity to switch from culinary apple production into a more satisfactory crop. Perhaps the obstacle here was the trouble of doing so.

However, the results have shown that the growers managed the adjustment to market conditions well, albeit slowly and quietly. The falling demand was offset in an orderly manner and the industry as a whole maintained a sort of modest positive income over the period. The most desirable policy for growers and consumers alike may have been one of quick and thorough overhaul, leading to fewer enterprises, fewer acres, lower unit costs and somewhat lower prices, thus winning back a little trade in association with more positive marketing: but this is wishful thinking.

The example which comes to mind of fruitgrowers spending their way out of an inadequate demand condition is the Dutch growers who chose the technological-investment solution about 1960 to 1965 and converted to more-productive, tree-intensive systems. Too close a parallel with the U.K. must not be drawn (e.g. today's rate of inflation), but it is probable that if the same solution had been applied to culinary apples ten years ago the results would have been the same as in The Netherlands - i.e. increased output, prices on the floor and growers carrying the whole burden of adjustment. For five or six years, between 1963 and 1968, Dutch growers found it difficult to lift their net returns above £200 an acre at a time when costs were 15 per cent higher than this.

Table 8 has been prepared on the assumption of a short-term future output in the range 95,000 tons to 125,000 tons in three years out of five. Allowing for inflation at a rate of 10 per cent a year and fresh culinary apples holding 90 per cent of their 1973 value, the market crop is estimated to realise farm-gate values of £120 to £130 a ton (the upper line in Figure 8). Growers' costs having similarly risen to £80 to £85 a ton, the margin on fresh market sales is £40 to £50 a ton (the lower line in Figure 8). The "lower uses" processors' position will then be difficult: they can neither offer up to £55 a ton to secure market fruit nor can they be satisfied with their 25 per cent of the crop - say, 25,000 tons.

Figure 8. Estimated Performance in Fresh Market, 1975-79



The question now is whether, having put off the day of reckoning, culinary apple growers must face the issue. Is now the psychological moment to start re-building the industry on an improved basis? If the foregoing pages mean anything, the answer is a cautionary affirmative. Affirmative, because the industry's slide, unless corrected, will get worse; so new growers are needed who will take the risk of modernisation. Cautionary, because (a) growers do not have the experience of structural re-organization, and (b) there is little, if any, unsatisfied demand at present. The conventional phrase is for growers to be 'forced out' of the industry, but in this era of easy communication this should not be necessary in a community of one thousand growers. The analysis on pp. 56-57 shows how there is not room for some new growers and all the established growers. Assuming an average enterprise of 40 acres, 400 to 450 growers could supply the arterial trade in market and "higher uses" processing fruit. Culled fruit will be less in evidence and the more careful organization of supplies mooted by APDC may not be called for.

Appendix A. Acreage, Yield, Output and Price of Culinary Apples, England and Wales, 1947-1973

Year	Acreage ('000)	Yield per acre (tons)	Output ('000 tons)	Farm-gate Price per ton (£)	Equivalent 1947-50 Price per ton (£)
1947	72.1	5.50	360.0(e)	-	22.1
1948	71.3	3.20	210.0(e)	27.0	
1949	71.0	4.15	271.3(e)	17.1	
1950	68.3	3.90	246.7(e)	22.2	
1951	66.3	5.10	308.2	18.5	16.2
1952	64.7	4.50	269.1	22.7	18.3
1953	63.0	4.70	274.8	25.3	19.9
1954	61.4	4.60	267.4	27.6	21.2
1955	59.8	2.85	165.7	35.4	26.2
1956	58.1	4.75	250.3	24.3	17.1
1957	55.9	3.45	188.4	43.4	29.3
1958	53.4	5.90	273.4	17.8	11.7
1959	51.1	4.95	224.1	23.2	15.1
1960	49.6	5.70	243.3	16.8	10.9
1961	46.3	2.30	104.2	70.3	44.2
1962	43.6	4.70	197.5	31.8	19.0
1963	41.9	4.80	193.6	33.0	19.4
1964	39.7	6.40	233.4	32.0	18.3
1965	37.5	5.90	191.0	36.6	19.9
1966	35.2	3.40	117.1	51.3	27.0
1967	33.1	2.65	86.6	68.2	35.1
1968	31.2	3.50	106.2	57.5	28.2
1969	30.2	3.60	103.6	51.9	24.0
1970	29.6	5.35	195.7	37.7	16.5
1971	28.9	4.85	129.3	48.1	19.2
1972	28.3	4.75	134.3	115.1	42.9
1973	27.2	5.95	159.3	85.4	27.5
1974					
1975					

(e) = estimated by author

Source: MAFF Strict comparability within this long series of records is not to be expected.

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