AGRICULTURAL ADJUSTMENT UNIT · UNIVERSITY OF NEWCASTLE UPON TYNE

The Long-Term Future for English Dessert Apple and Pear Growing

R. R. W. Folley

M4

THE LONG-TERM FUTURE FOR ENGLISH DESSERT APPLE- AND PEAR-GROWING

R.R.W. FOLLEY

RESEARCH MONOGRAPH NO. 4

AGRICULTURAL ADJUSTMENT UNIT
UNIVERSITY OF NEWCASTLE UPON TYNE

1973

THE LONG-TERM FUTURE FOR ENGLISH DESSERT APPLE- AND PEAR-GROWING

CONTENTS

		Page
Preface		3
1.	Introduction	5
2.	The Limitations of Climatic Advantage	11
3.	Comparative Profits from Supplying the British Market	35
4.	An Analysis of English Production Organisation	59
5.	A Mock-up of Market Shares	81
6.	Summary	119
7.	References	121

PREFACE

Entry into EEC is expected to have a major impact on UK agriculture, its pattern of production and marketing and its relative competitive position. Horticulture has been one of the sectors of British farming where it has been assumed that the changes, in this case of tariff and non-tariff barriers, would leave the industry vulnerable to continental competition and probably lead to pressures on producers' incomes and a declining share of the domestic market. Most of the discussions about the future of British horticulture under EEC conditions have, however, been at the general level and usually without attempting any quantitative assessment of the likely situation.

For many years Wye College has had a special interest in the economics of British horticulture and co-operated with the Agricultural Adjustment Unit in mounting a conference at Wye in March 1969, the papers of which were published as "The Economic Prospects for Horticulture", edited by Sargent & Rogers, Oliver & Boyd 1970.

Dr. R.R.W. Folley has made many contributions on horticultural economics, in recent years being particularly concerned with the fruit industry. When the draft of the present paper was available, late

in 1972, it was apparent that it was a useful contribution to any speculative thinking about the apple and pear industry, developing an interesting methodology and providing a set of estimates about market shares. The Unit thought it would be of interest to many involved in fruit growing and horticulture and was pleased to be able to publish the paper in the Research Monograph series.

JOHN ASHTON

March 1973

1. INTRODUCTION

"We are still producing everything, although ..... this is no longer a viable proposition." These are the words of Mr. (now Sir) Fred Catherwood, when he was Director-general of the National Economic Development Office in 1969. To most people, fruit-growing in England is typical of the sort of small-scale activity, possibly non-viable if exposed to competition, that will disappear with time. Most Britons have been led to believe from what they have read that English fruit-growers have more to fear from the United Kingdom's entry to the Common Market than, say English motor-car manufacturers.

Motor car manufacture is here invoked as a foil to fruit-growing. Both sets of producers have become accustomed to a measure of protection: both have a predominant share of the home market. In both industries physical productivity of labour is thought to be low relative to that in competing countries of Europe. Sales of imported cars have been increasing faster in the UK market than sales of British cars, and so might sales of apples when import regulations allow. Why, then, should the two industries' futures be rated so differently? The popular supposition is that natural physical productivity (which has no equivalent in motor-car manufacture) is so much higher in southern Europe than in the north as to blight northern growers' prospects if markets are

freely shared between the two areas ..... after all, do not relative prices of apples and pears in Italy and in the UK demonstrate the far greater potential of southerly regions?

There are perhaps three main reasons for English growers' prospects in an EEC community of nine nations being considered less rosy than English motor-car manufacturers. First, the English crop is (reputedly) high-cost; second, the English industry is small in comparison with its competitors; third, the EEC fruit industry has much the greater surplus capacity. It is to be expected that average unit costs of production of apples and pears will be relatively high in England because yields are lower than elsewhere, but overall improvement can be anticipated as orchards are modernized. The handicap of small scale industry (not of holdings) is likely to remain, and to become more onerous. It is here that the contrasts between fruit-growing and car production become most apparent. The English car industry is not relatively small, and its exporting potential is as great as its competitors.

The third reason mentioned is important because it is easy in the circumstances, but erroneous, to conclude that English growers cannot compete with EEC growers. It is erroneous because 75 per cent of some EEC growers are not covering costs at these prices[1]. Assessed on the basis

---

1. see: Rentabileteit van het gespecialiseerde fruitteeltbedrijf, 1970-71 No. 4.55, 1972. L.E.I. Den Haag.

of comparative costs English growers appear in a better light. Surpluses of apples and pears are expected to continue until 1975-76, by which time marginal withdrawals of orchards and the natural increase in consumption are expected to have brought demand and supply of the fresh fruit into approximate equilibrium. Under these conditions an English industry will remain, although it is likely to be smaller (i.e. having fewer acres and fewer proprietors) than today; but more efficient, more localized and with less contrast in size between the largest and the smallest units.

Pressing as a solution to the current surplus of table apples and pears in the EEC is, it is currently obscuring the larger question of where production should be located in western Europe and how the orchard area might be equitably shared among producing countries. It is easily possible for the short-term problem to be overcome without due regard for the longer term problem. For instance, if national rather than Community policies were to prevail, too many orchard acres could be grubbed in some countries and too few in others.

So long as demand for a product is increasing and revenue is buoyant there may be room for everyone wanting a share of the trade. Once the so-called 'plateau' of consumption is reached, expansion ceases, consolidation begins, and the question arises of where the cuts in production capacity should come. In the context of an enlarged EEC, this question constitutes a problem in location.

When first considered, location problems concerning agricultural crops appear to arise from differences in natural endowment between areas or regions. That is, some areas are relatively sunny, some relatively cold, some relatively wet, and so on: so that the concept of natural advantage has been used to acknowledge how good yields of crops come more naturally in some areas than others. The farming industry has lived with differentials in yield for centuries, and economics has added the notion of an economic rent in good situations in order to explain how the less-productive areas continue to be cultivated.

Cash rents are not literally the full economic rent, but they illustrate how rent helps to equate all farmers' costs, reducing the handicap in cultivating less-productive land. (And because money rents for good land are invariably lower than the real extra value of production of which they are capable, intensification of production is usually profitable for a tenant farmer.)

When the farmer is also the landlord, he is free of the levelling effects of economic rent and can benefit from his advantageous situation during his lifetime. Fruit-growers are typically owner-occupiers, so in a context of west European fruit-growing economic rent is internationalized and based on comparative physical productivity in different regions. Furthermore, the greater the natural advantage in yield in any country, the more extensive its economically permissible area of production

will be. In this way, large countries having favourable areas for fruit-growing invariably produce more than domestic markets can absorb and become exporters. At this stage distance from the market may operate as a severe constraint upon natural advantage.

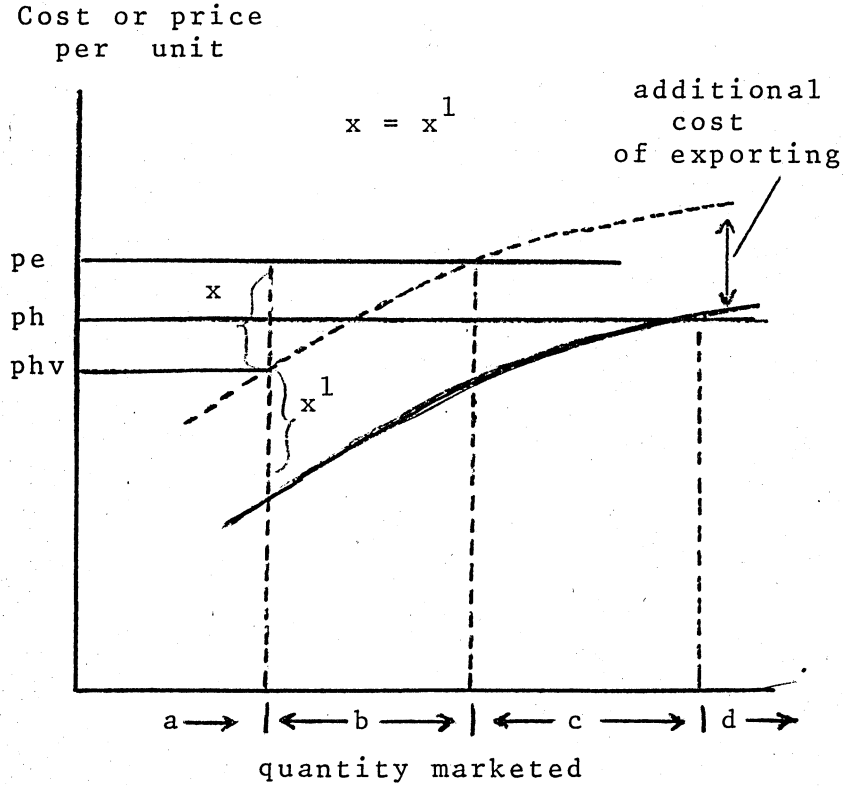
A scheme for the orderly association of home and export markets is shown in Figure One. Here the effect of varying productivity within the industry upon unit cost is shown. Comparatively little can be supplied at low cost, much more at higher cost. And there are two outlets, - a home market and an export market, respective prices obtainable being ph and pe. The export price is higher, but by less than the cost of transport.

Only low-cost producers can rationally consider exporting, and only the lowest-cost producers are in a position to 'play' the two markets. For if, by marketing all they produce, these producers would cause the price on the home market to fall to phv, they would begin to find the export market equally profitable. The firms in question, then, could justifiably test the elasticity of both markets with the intention of being able to make the most profitable, or otherwise most suitable, distribution of their supplies between the two. If the low-cost element is significant, the price on the home market will fall within the range ph-phv.

This somewhat idealized analysis of international trading is followed at a later stage in this study when the prospects for English growers in the home market are finally postulated.

FIGURE ONE

Natural Advantage and Exporting Potential



Producers having unit cost in the range -

a. can make normal profit from exports,

b. can make smaller profit from export than from home market,

c. are priced out of the export market,

d. are priced out of the home market.

2. THE LIMITATIONS OF CLIMATIC ADVANTAGE

British growers' first contact with the new fruit-growing areas in Italy and southern France tended to be a sobering experience for them. They had built their businesses on the reputedly superior quality (flavour) of varieties well-adapted to the climate of northern Europe, and now they were confronted with varieties possibly better-adapted to southern Europe and clearly giving far higher yields of apples distinctive enough in flavour to have a following among British consumers.

Arguments against taking the obvious natural advantages of a southerly location at their face value have already been published[1]. Briefly, the three relevant hypotheses are :

1) that excessive heat along with the abundant sunshine much reduces the trees' biological efficiency;

2) that the cultivars grown and the intensive use of small trees have contributed to the high yields recorded: the net locational advantage is exaggerated if it is measured

---

1. see The Commercial Grower, 23rd June 1972, and following issues.

as the difference between English practice with Cox on bush trees in early middle life and French practice with intensive Golden early in the trees' life; and

3) that natural locational advantage ends on the tree, at an early stage of the whole production and marketing process: advantage does not necessarily persist during marketing and distribution, and may be overborne by subsequent economic disadvantages.

A further qualification of the assumed primacy of a hot climate has been advanced by a prominent Dutch pomologist [1] who is on record as saying :

"Our climate is apparently very suitable for trees on M.IX rootstock. M.IX seems to be more limited in usefulness in areas of high summer temperature or where wide fluctuations and low temperatures occur."

but -

"A mature orchard cannot yield more than 1,000 bushels an acre (50 tons per hectare*) year after year without losing quality, at least under our conditions."

---

* 1 hectare = 2.471 acres

Many southern growers would be alarmed at hearing this estimate of northern orchards potential.

The Economic Environment of Production.

The economic environment, now to be taken into account, has no necessary relation to the natural environment; and at the present time its effect is to make each country's costs more uniform, not to increase the initial disparity costs due to natural influences. That is to say, there is no 40 per cent differential in cost between the resources used by European fruit-growers in the north and in the south, as is postulated for yield. Agricultural wages, in particular, are rising and losing their former disparity. The once-familiar argument of 'cheap labour' in Holland and Italy no longer applies; and in fact the same argument can now be used by continental producers against British growers.

While there is good reason to believe fruit yields per hectare to be higher in southern Europe, the same fruit-growing practices are common throughout western Europe and if the unit costs of the resources used are similar, too, it follows that costs per acre or per hectare will tend to be similar in similar orchards, wherever the orchards are situated. Where Nature is more bountiful, a larger crop can be produced on the tree for the same expenditure, but - and this is a most important point - Nature's bounty soon runs out. Once picking starts, natural advantage ceases and in the subsequent handling and preparation of the fruit for market,

any advantage is economic, offering equal opportunities for producers in all countries apart from the effects of the innate qualities of the fruit, e.g. average size, susceptibility to bruising. A grower who produces 800 bushels on an acre of trees for a cost of £100 has a unit cost 7½p less than a grower who produces only 500 bushels an acre for the same expenditure. Considering that up to 75p has still to be spent on each bushel, there is plenty of scope for this initial advantage to be redressed during marketing: a 10 per cent saving would cancel out the initial disadvantage[1]. How this relation between growing and marketing qualifies natural advantage is assessed later. For the present we are concerned with the situation on farms - what European fruitgrowers pay for their resources and how productive those resources are.

Factor Costs.

Labour.

The increase of 42 per cent in wage rates for horticultural workers in Britain between 1959 and 1969 was lower than in any other western European country. Comparative hourly wage rates, as given to the

---

1. see Roosje, G.S. "In Holland in 1965-1967 the costs of selling increased more than the costs of producing fruit did." Proc. N.Y. State Hort. Soc. 1970.

B.G.L.A. Conference in April 1971 are :

Sweden	82p
Denmark	62p
Netherlands	62p
W. Germany	58p
North Italy	41p
U.K.	39p
France	38p

If English growers can use their labour effectively on large holdings with relatively light yields there is no reason for the price of labour to be the cause of their downfall.

Materials.

Equivalent prices of the range of materials used in each country are not published. However, the most important items are products of chemical, petro-chemical or wood-and-paper industries with international connections. It can be inferred from French and Dutch growers' expenditure in relation to their use of materials that British growers are not disadvantaged by the price on the farm of the necessary raw materials.*

---

* Expenditure per acre on spray materials, on samples of fruit farms was: England £23 (1970); Netherlands £22 (1970); France £29 (1967).

The bulk price of artificial fertilizers (U.K. = 100) is nowadays approximately Netherlands, 97, France, 90.

Physical Productivity of Labour.

Past performance.

Physical productivity is barely documented in France and only sketchily outside the Netherlands and the U.K.. Cambra 1966 [2] who has made the most exhaustive collection of published fragments of costs, makes it clear that much fruit-growing in southern Europe was originally labour-intensive. Much summarised, Cambra's combing of the literature of the day shows that in the middle-to-late 1950's labour on intensive continental apple and pear orchards was being used at a rate of 400-550 hours an acre. The quoted instances are grouped by magnitude in Figure Two. The same diagram also shows a tendency for the specified labour requirement to increase as the tree population per acre increased, Italian figures being higher than those from other countries.

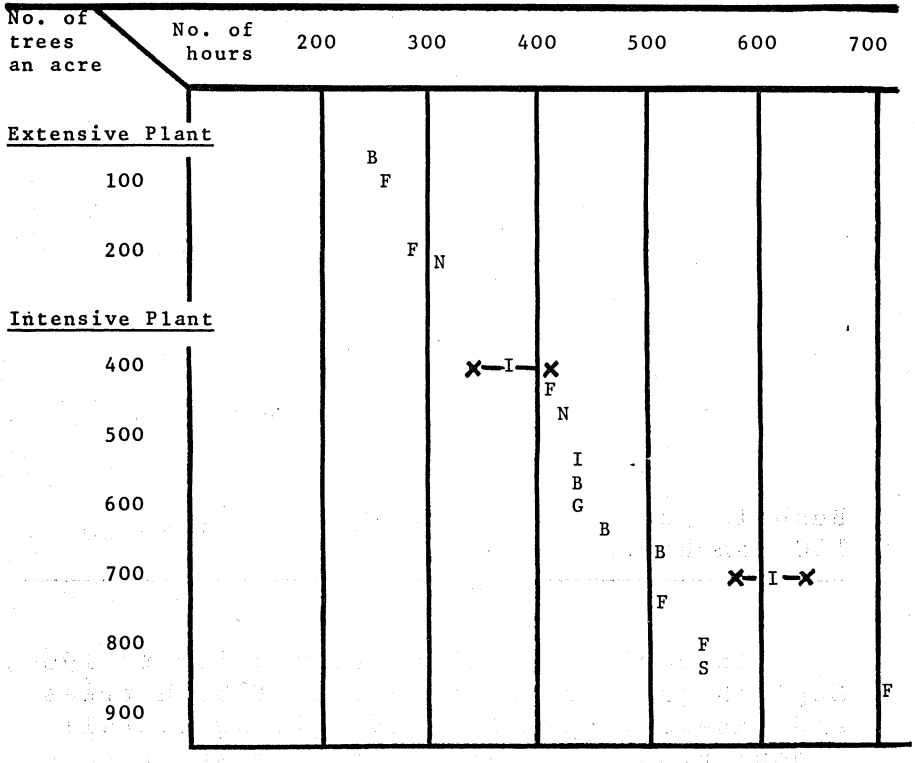
A mean value is about one man-equivalent for 5 to 6 acres, including picking. Converted to production needs, this equates with one man for 7-8 acres of orchard.

Tractor hours in apple and pear production in the same period were variously assessed at between 40 and 64 hours an acre.

Labour use on English fruit farms during the same period was on a much lower level per unit of area than those in Figure Two. Contemporary figures for a sample of farms in Kent, derived from

FIGURE TWO

Man-hours required for one acre of dessert apples and pears, 1950's



B = Belgium

F = France

G = Germany

I = Italy

N = Netherlands

S = Spain

actual records, were between 160 and 230 hours an acre[1]. At ruling yields in England at that time, physical output per man was probably on a par with that in typical continental orchards - Table 1.

TABLE 1

Estimated comparative physical productivity of labour; English and southern European apple and pear orchards. 1955 - 58.

per acre	English practice	Continental practice
Hours man-labour	160-230	400-500
Typical yield (bushels)	220-320	550-800
Bushels per 100 man-hours	138-140	138-160

It would seem then, that prior to 1960, English growers' combination of bush trees and extensive practice was giving overall labour productivity results almost as good as those realised in commercial orchards in southern Europe.

1. Folley, R.R.W. (1962) Some Orchard costs, 1950-59. Wye College.

The recent past.

During the seven years after 1958 the staffing of French and Italian orchards was found to be extravagant; much improved labour-productivity figures were recorded for the mid-1960s. In the interval more trees had matured, average size of enterprise had increased, and - probably most important but nowhere credited with importance - labour had become appreciably more expensive.

Mantinger refers to Professor G. Benetti's observation of labour use (for production) in Italian orchards being reduced between 1952 and 1967 as follows[1]:

TABLE 2

Labour use for production in Italian orchards

	Man hours per acre	
	1952	1967
Apples	253	164.5
Pears	237	194.5

Although not contemporary with the above, between 1958 and 1968 the yield from specialised cultivation of apples in Italy increased from 405 bushels an acre

1. See De Rentabiliteit van de Italiaanse Fruitteelt. Ons Fruitteeltblad. August, 1970.

to 460 bushels (18.4 tons to 20.9 tons per hectare): yields of pears increased from 253 bushels to 304 bushels (11.5 tons to 13.8 tons per hectare)[1].

Cambra records some examples of labour use in Italian, West German and French orchard for 1965: Table 3. Allowing two to three years for this information to get into circulation, where no date is given the record will apply to 1962-63.

Mainié[2] is another contributor of data for this period: Table 4. His figures are consistent with a labour productivity of 260-280 bushels per 100 man hours, but almost certainly his figures are "targets" and would apply to the period of maximum productivity of trees.

The evident contrast between new and old fruit-growing may well account for the quick conversion of French and Italian growers to the intensive systems.

These figures tend to be put into perspective by those of Cabirol [3], who has provided perhaps the most detailed, if limited, acount of this period, for a group of orchard enterprises in south-west France. His records of labour use on eleven blocks of trees are recorded in Table 5.

---

1. See Rosi, M. L'Italia Agricola 1969, Vol. 106.

2. Avenir de l'Arboriculture Fruitière ed. G.M. Perrin, Paris.

TABLE 3

Examples of labour use in Italian, West German and French orchards

Country		Labour Use
Italy	1)	1950's 8.0 metric tons from 450 hours.
		1960's 10.4 metric tons from 400 hours.
		Productivity increase 44 per cent.
	2)	1950's 16.0 metric tons from 720 hours.
		1960's 16.0 metric tons from 400 hours.
		Productivity increase 80 per cent.
	3)	1950's 5 acres bush trees and 3 acres hedgerows per man equivalent.
		1960's 10-15 acres bush trees + 6-8½ acres hedgerows per man equivalent.
		Productivity increase over 100 per cent.
West Germany		1950's 7.6 metric tons from 402 hours.
		1960's 10.0 metric tons from 344 hours.
		Productivity increase 53 per cent.
France		1950's 3¾ acres per man equivalent.
		1960's 7½ acres per man equivalent.
		Productivity increase 100 per cent.

TABLE 4

Labour requirements for different systems of Apple and Pear Production 1963

System	Labour Requirement
Classical system, apples or pears.	3.75 to 7.5 acres per permanent man; more usually 5 acres than 7.5 acres.
Italy, where intensity is greater.	2.5 acres per man with traditional methods.
Modern culture, in full production:	
Free-standing trees	12.5 to 15 acres per regular man.
Hedgerow trees.	6.25 to 8.75 acres per man

TABLE 5

Labour requirements for orchards in South West France

	man hours per	tractor hours acre
APPLES -		
Bush trees (forme libre)		
80 trees/ac:(S.W.)	112	24
80 trees/ac:(S.W.)	128	14
160 trees/ac:(S.W.)	150	24
180 trees/ac:(S.W.)	153	22
Hedgerow (forme palissée)		
236 trees/ac:(B.R.)	231	52
470 trees/ac:(S.W.)	115	20
500 trees/ac:(S.W.)	133	21
PEARS -		
(small) Bush		
310 trees/ac: (S.W.)	136	20
Hedgerow		
500 trees/ac: (S.W.)	209	22
820 trees/ac: (B.R.)	257	54
1500 trees/ac: (S.W.)	207	25

NOTE : S.W. = valleys of the Garonne and the Tarn.

B.R. = Bouches du Rhône (surface irrigated) area.

Excluding crop failures, but including light crops, the mean recorded yield of orchards in this study was 10.0 metric tons or 475 marketed bushels an acre. Produced from about 180 man-hours of labour the average productivity at the moderate yields obtained was 264 bushels per 100 man-hours.

Including crop failures, the mean recorded yield was 410 marketed bushels an acre - much below the anticipated level. Produced from 166 man-hours of labour, average productivity by this test was 247 bushels per 100 man-hours.

It is doubtful whether the English industry, being initially less labour-intensive, was in a position to match these increases in labour-productivity. Any improvement in labour productivity at this time in Britain probably owes as much to higher yields as to reduced labour use. Fragments of evidence suggest an increase in yield of 15 per cent and a reduction in regular labour use of 10 per cent between 1960 and 1965. In this case, the comparative situation in the mid-60s would have been as follows :

TABLE 6

A comparison of English and Continental practice, mid-1960's

	English practice	Continental practice
Bushels per 100 man-hours	170-180	240-280

If so, English apple and pear production was at a significant disadvantage in physical productivity, even allowing for the small size of English fruit; although some farms in their years of highest crop would equal average continental performance.

During the whole of the 1960s, English growers were more conscious of yield deficiency than of a productivity gap: the evidence seems to point to labour use in orchards abroad being reduced to a greater extent than yields were increased at home, and it is questionable whether the productivity gap was closed at all during the 1960s, for the average marketed yield of 267 bushels an acre in 1969 [4] for English growers as a whole seems hardly adequate for an estimated average labour input of 160-170 hours an acre. Something like 350 bushels an acre - an increase of 30 per cent - are required from the same labour to match the assumed phusical average for producers in southern Europe.

On the above reckoning, it would seem that 250 marketed bushels per 100 man-hours has acted as a sort of economic threshold in apple and pear production. According to the Universities' 1969-crop survey English crops of dessert apples and pears were grown and harvested at labour-inputs of between 220 hours and 150 hours an acre - in which case the smaller English crop is absorbing just as many man-hours an acre as a higher but below-average crop in south-west France. For absolute equality with the undistinguished average of 475 bushels an acre

in south-west France (as derived from Cabirol's work) English growers would need crops of 398 bushels marketed from 150 hours labour, or 585 bushels marketed from 220 hours labour.

Changes since 1965-66

Being in the grip of the crisis in the fruit sector of the EEC, it is to be expected that continental producers will have been driven to become statistically relatively more efficient since the mid-1960's. Lauret[5] refers to costs per hectare in southern France having been reduced by 30 per cent in the four years 1966-70. According to the Biennial Examination of 1970, the number of regular workers on Englich fruit farms declined by 11 per cent in the same period - from 3.95 to 3.5 per 100 acres[1] - and the poor crops of 1971 and 1972 have not helped the English growers' performance.

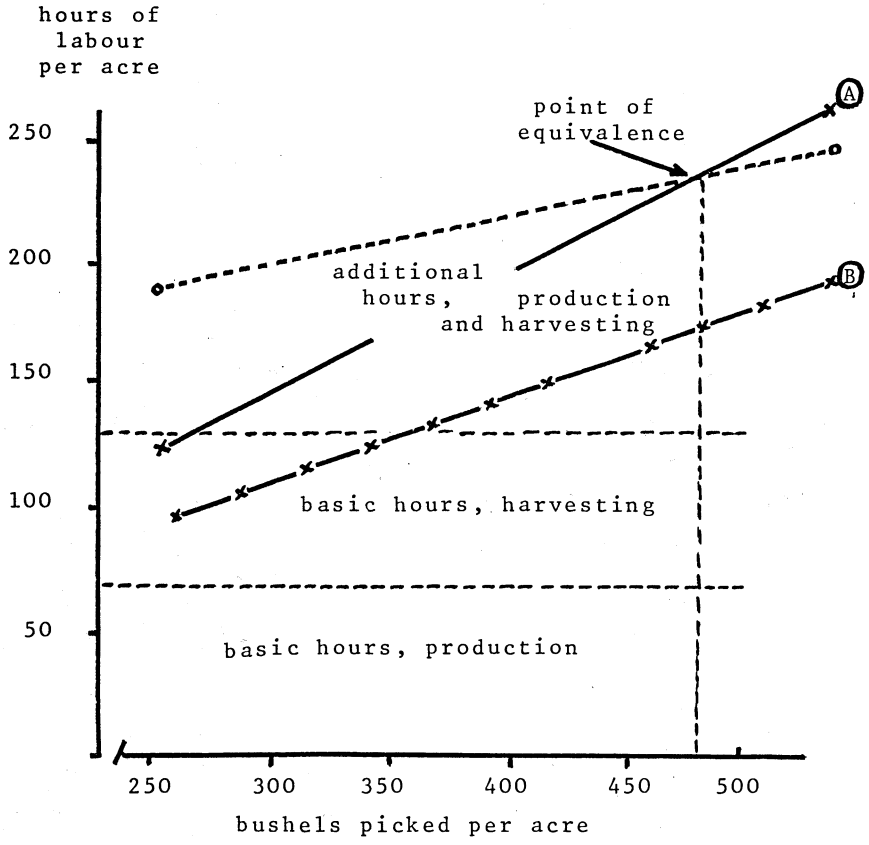
A comparative labour-productivity chart applicable to 1970-72 is shown in Figure Three. Here yield (bushels an acre) is related to labour-use in English practice - the higher the yield, the more the hours' work put in on the crop exceed a basic minimum, both for growing and harvesting. English experience is represented by the area beneath the broken line at the top of the diagram; and the requirement of 250 marketed bushels from 100 hours work is denoted by the two diagonal lines

---

1. Examination of the Horticultural Industry. 1970 (1971) M.A.F.F. H.M.S.O. London.

FIGURE THREE

Yield required to give acceptable physical productivity of labour in English apple- and pear-growing



labelled (A) and (B). Line (A) is meant to typify growers who are doing as well in their circumstances as Mediterranean growers are in their's. Line (B) shows what is necessary if English producers are to get the same productivity as southern growers. Calculated on a plain labour-productivity basis, it seems that :

a) English growers would need 470 picked bushels an acre at customary levels of staffing to reach the equivalent performance of 250 bushels per 100 hours of labour in southern Europe (follow the upper transverse line); and that :

b) for absolute equality with southern producers, at customary levels of staffing, 800 bushels an acre would be necessary (the lower broken transverse line; not completed).

The following assumptions are embodied in the above calculations :

Statement (a).
The good average English yield of marketable table apples and pears is 72½ per cent of that attainable from comparable practice in southern Europe. English apples would average 67 mm. diameter. Pack-out would be 88 per cent of the apples and pears picked.

Statement (b).
The lower-volume English crop requires proportionally less labour in the orchard than larger crops elsewhere.

The medium-term future.

First-hand and reported knowledge give rise to the following assessment of what English growers of apples and pears are up against, as regards labour productivity on southern orchards, in the next five years: Table 7. A slight relaxation may follow when the short-term pressure is off, but wages will continue to rise relative to prices, and high physical productivity must be maintained.

During the later years of the 1970's some features may move in the English growers' favour. They will have the younger intensive orchards. About 75 per cent of the area of French orchards and about 67 per cent of Dutch will be more than 12 years old,[1] much of the new planting being past the half-way mark of its anticipated life-span. Their orchards' performance during this stage is an unknown quantity, but physiological considerations would suggest that more and more work will have to be put in on the trees if the crop is to be maintained at its present level. And it is more than likely that some effects of present relative neglect of trees will have to be overcome. French planners [6] already see how the cessation

1. see Oberhofer, H. Obstbau Weinbau 1972. No. 1 p.10-16.

TABLE 7

An assessment of labour productivity,
France and Italy - 1973 to 1978

Country	Marketed yield per acre (bushels)	Estimated labour input (hours)	Bushels per 100 man-hours
FRANCE :			
Best situations :			
Apples (American vars.)	980	325	302
Apples (original vars.)	550	190	290
Pears	700	240	292
Inferior situations :			
Apples (American vars.)	420	180	233
Pears	270	140	193
ITALY :			
Best situations :			
Apples (American red vars.)	1200	360	300
Apples (Golden)	1050	400	292

of replacement planting during the crisis will lead to two-thirds of present trees being over 16 years old by 1980-82. Once the physical surpluses of apples are a thing of the past, a low-income state for growers may persist, but they will be anxious to get away from a bread-line level of quality, and initially higher prices for fruit will invoke higher production costs.

The extent to which conversion to intensive systems of planting will benefit English growers in the years ahead is not clear at the time of writing. Som possible guide-lines for English growers are given by Oberhofer[1], who quotes man-hours per acre and per hectare: Table 8.

TABLE 8

Labour requirements for intensive systems

Country	System	Man hours per acre	Man hours per hectare
South Tyrol	Standard	290	720
	Palmette	220	550
France	Hedgerow	292	725
Netherlands	Spindle	224	560
	Close Plant	177	445

1. Op. cit.

And Roosje[1] declares his experience of both pruning hours and picking hours per acre decreasing as the number of trees to the acre is increased, in the Netherlands (as regards picking, 450 lbs per picker-hour is said to be 'good' in Zeeland): supporting this with figures for the efficient cultivation of intensive orchards : Table 9.

TABLE 9

Man-hours per acre, good practice in The Netherlands

	1955 bush	1959 bush	1959 spindle	1967 spindle
Total man-hours	442	398	350	280
of which:				
picking/ marketing	196	204	185	162
Yield (bushels per ac.)	440	484	506	616
Bushels per 100 man-hours	100	121	145	220

The figures above suggest a labour-intensive condition in Dutch fruit-growing during the 1950s. Under pressure from

1. Op. cit.

events, labour productivity had doubled ten years later. There is still an evident margin between Roosje's figures and those set by growers in southern Europe, and perhaps this is what provoked Spoor [7] to his calculation of 270 bushels per 100 man-hours as his standard for the future - attainable most easily from a close plant of labour-extensive trees.

To sum up, it seems reasonable to state :

1. higher yields in Mediterranean areas result in a physical productivity hardly realisable in northern Europe;

2. the margin may well be of the order of 10-20 per cent, as indicated by notions of about 270 bushels per 100 man-hours in northern Europe and 300 bushels in southern Europe;

3. taking into account the rise in wage rates relative to the growers' price for apples and pears (even without surpluses), improvement in labour productivity in England is enjoined, and producers will probably not be satisfied in 1973-75 with physical productivity of labour less than 250 bushels per 100 man-hours.

The Higher Cost of High Yields.

Although higher yields may be the rule in southern areas, this does not mean they are obtained proportionately cheaply.

The English growers' potential competitiveness becomes more credible in the light of writers' comments upon the handicaps to fruit-growing in southern Europe. These comments are fragmentary and not at all systemized. They do, however, give clues to costs on the Continent being higher than English growers as a whole are used to. Here are some relevant extracts:

1. Italy — "20 or more sprayings" in a season, "£64 an acre, materials and labour, for combating insect pests".

2. France — "the Mistral blows 50 days a year and can reach 87½ mph".

   £28 an acre for irrigation water".

   "winter pruning 9 year old bush trees, 48 hours an acre".

   "winter and summer pruning, 5 year old hedge pear trees, 85 hours an acre".

   "establishment costs, £610 an acre".

   "rent equivalent £38 an acre".

3. Holland establishment costs £1,320 an acre.

The high level of regular horticultural workers' wages on the continent has already been referred to: and when small holdings predominate in an industry there is a pre-disposition to a low acres per man ratio, which is only slowly got rid of. For instance, the 58 Dutch holdings featured in comparative cost-of-production estimates in Chapter 3 had an average size of 18 acres and a labour requirement of 2 men, three-quarters of which was family labour. In such circumstances imputed labour costs are high, and yields need to be high, too, to meet a specification of a full reward for proprietorial labour.

It is also to be expected that continental growers will have higher costs than English growers in financing their businesses - indebtedness is commonly much greater. True, French growers in particular have had long-term and short-term credit available at less than commercial rates of borrowing, but this can be a disguised blessing if it leads to over-investment. Mainie[8] estimated the irrigated farm land developed for fruit-growing in the Costières de Nîmes to cost £400 an acre prior to planting. Some French growers had establishment loans of up to £350 an acre in the period before the crisis in markets: their interest dues could well add up to £20-25 an acre by now.

Items of this sort help to swell the fixed - or overhead costs element in

production. A figure of £110 an acre exclusive of orchard replacement has been mentioned; and the importance of fixed costs is one of the reasons for a preference for large (40 hectare) units in southern France. As regards replacement, the quick-return principle of intensive planting helps financing in the early stages by providing all the revenue possible; but if the same principle means quick maturity or decline, it is accompanied by relatively high annual depreciation. An establishment cost of £450 an acre sufficing for 15 years represents an equi-annual charge of £30; if the same sum suffices for 30 years the comparable charge is £15. English growers no doubt gain financially over continental growers in this respect.

In short, the more closely locational factors are examined, the firmer becomes a belief that no location is perfect, and all embody commercial advantages and handicaps in varying degree. A team of French scientists investigating apple- and pear-growing in southern France[1] has written "Best soils do not coincide with best conditions for pip fruit". Apart from the suitability of soils, the area gives rise to many technical problems. And in the matter of natural resources, the excess of sunshine is accentuated by the shortage of water (i.e. the necessity of irrigation). A rainfall of 133 mm. (5.2 ins.) between April and mid-September in 1965 was quoted for the Bouches du Rhône region; but water

1. Berville, P. et al., (1970) Pomologie Francaise. Vol. XII, No. 6.

requirement was later measured to be 633mm (24.7 ins.) with clean cultivation, and 822 mm (32.1 ins.) with a grass sward, so the resulting irrigation need is, in English terms, something like 18 to 25 acre-inches in six months.

Thus, a high-yield location confers a certain advantage upon producers, but it is not automatically translated into higher efficiency or lower cost: there is a catch. On the southern fringe of continental Europe, fruit trees respond by growing faster than in the north, and consequently potential yield develops more rapidly. Once a high yield is realised, to keep the trees balanced between growing and fruiting requires just as much skill - and at least as many man-hours - as further north. Southern growers do not get a cost-saving benefit proportional to their advantage in yield.

Physical- and Value-productivity.

Thus, higher physical productivity in the south cannot be directly translated into higher value-productivity.

In the matter of physical productivity, it has commonly been assumed that the input-output curves for fruit trees in southern and in northern Europe were well-separated, as in Figure Four (a). The fragmentary evidence now coming to light suggests that the areas' normative value-productivity curves may be closer together than the physical-productivity curves, as in Figure Four (b), and perhaps briefly merged, assuming certain cost-price

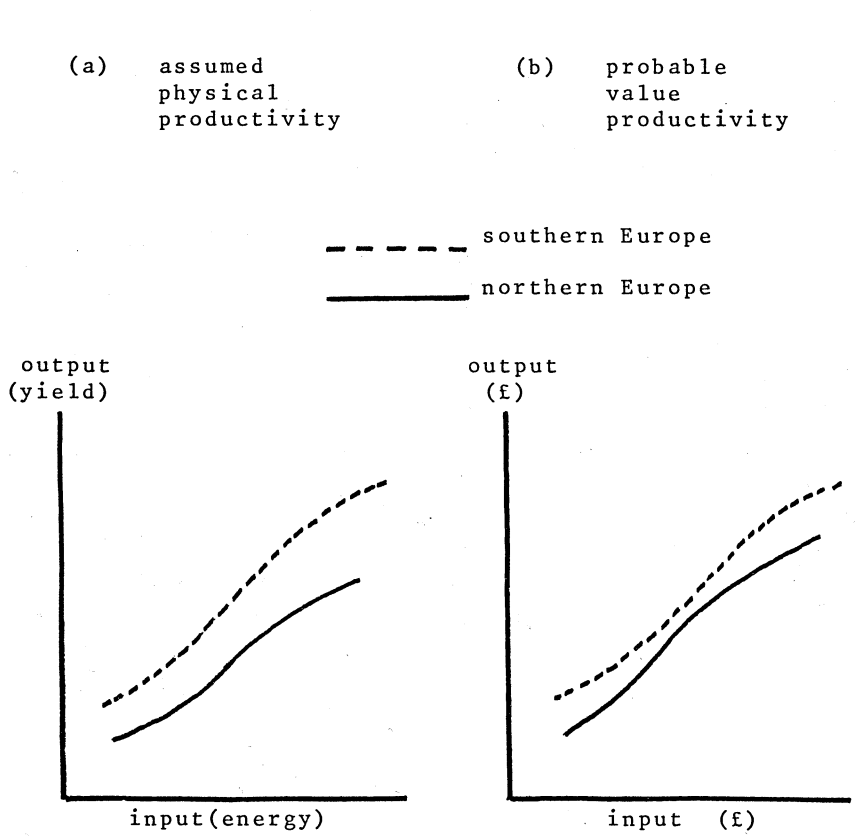
relationships. The curve for trees in southern locations is extended beyond the other because their capacity for yield is greater.

As if higher expenditure in high-yielding orchards were not enough, high yields make a much greater financial impact during marketing, when costs are incurred per bushel rather than per acre. Heavy crops of apples cost twice as much to pick, grade, store and pack as they do to grow.

All in all, the cost of the packed box of fresh apples or pears in the English retailer's shop owes little to the natural advantages of the area in which the fruit was grown disposing towards higher physical yield per acre. The cost-advantage does not necessarily extend beyond the orchard.

FIGURE FOUR

Postulated productivity of orchards in northern and southern Europe



3. COMPARATIVE PROFITS FROM SUPPLYING THE BRITISH MARKET

In the present state of knowledge, the limitations of climatic advantage can be appreciated but not measured, and hence cannot be convincingly expressed. In any case, the kind of fluid, shifting situation in which fruit-growers now find themselves is difficult to present intelligibly. One way of gleaning an understanding of the situation is to fix the value of certain quantities (variables) and postulate an appropriate, but static, result (solution). Subsequently, the variables can be given different values, and the effect of the change upon the solution can be observed.

This is the procedure followed in this chapter, and later in Chapter 5, with the express notion of providing a datum, or one calculated assessment, where hitherto only opinions or vague statements have been offered. The analysis, as now published, is confined to the first, static stage; it does not attempt to introduce fluidity.

Also, it seems to be more useful to look forward than to look back, and to fix future values. In this respect, the only relatively secure ground is on cost of production; and so, whilst realising the tenuous connection between cost-of-production and trade, or success, the solution offered is more appropriate to the long-term future, when the economic

principle that 'prices must in the long run cover costs of production' will have worked itself out. To this end, the sole criterion adopted for competitiveness of a country's producers is that their marginal suppliers shall be making the equivalent profit per unit (packed box) as in other countries.

In a short-term context, the results may serve to show how much the present situation is a distortion of the long-term basis of market-sharing.

The shortcomings of such a solution are only too obvious. It negates the finer points of establishing a 'fair basis of competition' - which, if pursued, leads into some largely philosophical questions. For example, on family farms, whole generations of family workers will accept sub-normal 'wages'; on entrepreneurial farms workers are likely to be well-paid, but capital is lavished upon the enterprise and a sub-normal rate of return upon investment will be tolerated. The question is: should individuals be free in the modern society to 'give' the community a part of their services; and at what stage are its effects unwelcome? What allowance should be made for different styles of finance in different countries: how is equity to be reached between the company-status firm which owns virtually all its capital but has to satisfy shareholders in its dividend distributions and the sole-proprietor firm using 50 per cent loan capital on which only a market rate of interest must be paid?

In the present context minimum absolute cost per bushel will not be regarded as all-important. If English Cox were costing, say, 5p a lb to grow, and Dutch Cox 4p, but the English grower was receiving 6p a lb and the Dutch grower (from the English market) 4½p a lb, this is interpreted as a prima facie case for expanding English production (being more profitable) and contracting Dutch exports, not vice versa. Of course, the data available at present cannot be construed quite in this way. English Cox has not found its true price in free international trading, nor does the recent average market price of French Golden Delicious denote its long-term cost of production. Current market values are misleading, due to the contrasting state of the market in Britain and in the EEC.

Extent of economic advantage.

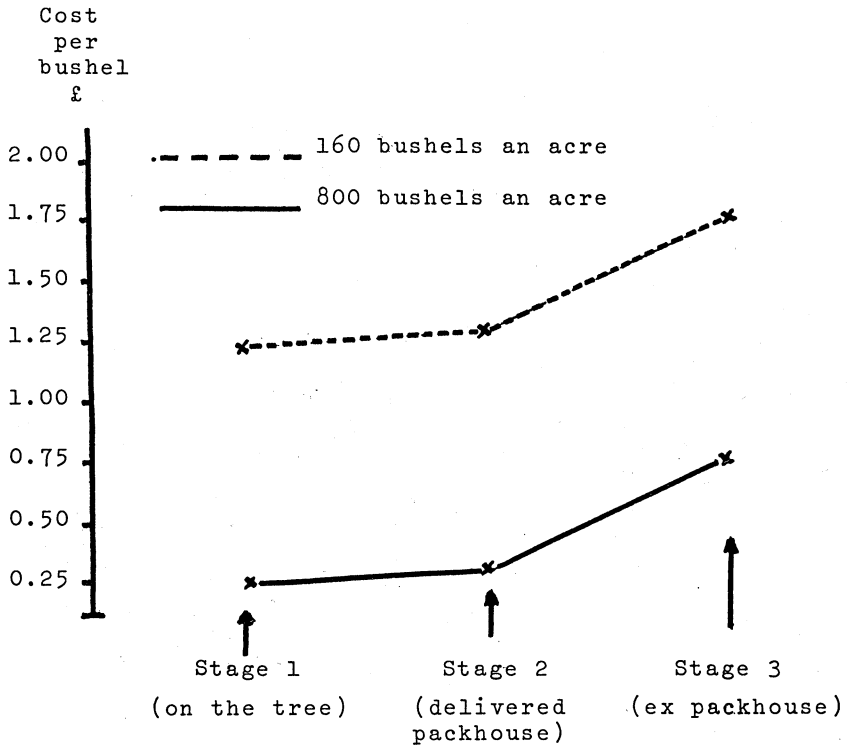
Values can now be added to the theory expressed in Chapter 2 concerning the limited economic advantage of a natural advantage disposing towards high yield per acre. Evidence is first provided from a single farm, secondly from statistical analysis of fruit farms' financial results and finally from a comparison of costs of production in countries having different average yields. Figure 5 is the first submission: it is derived from Cabirol's[1] figures and shows how cost per bushel increases from stage I, when the apples are on the tree, to stage III, when the apples

1. Op. cit.

FIGURE FIVE

Comparative Unit Cost at

three stages in production



are boxed and packed and ready, perhaps after storage, for despatch from the co-operative packhouse. Data are given for a light crop and for a heavy crop.

The formality of Cabirol's method is evident, but the diagram serves to illustrate the principle that natural advantage may determine the unit cost at stage I, but thereafter man-made influences hold sway; the benefit of natural advantage may persist all through the marketing process, but does not confer progressive advantage. According to Figure Five

1. the 800-bushel crop costs £1 a bushel less on the tree than the 160-bushel crop; and

2. the 800-bushel crop costs exactly twice as much to pick and market as it does to grow (on the tree).

The second submission is evidence of a surprisingly weak correlation between yield per acre or hectare and unit cost per bushel for some north-European apple and pear crops in 1969*.

---

* r = -0.29277 for the English crop; When handled as two halves, of below average yield and above-average yield, results were :

for lower yields, r = -0.32712
for higher yields, r = 0.37941

Results for the Dutch crop were similar to the British in magnitude and distribution. Respective correlation coefficients were :

$r = 0.02615$ for the whole sample,

$r = 0.24804$ for lower yields,

$r = 0.33569$ for higher yields.

Over the samples as a whole, increases in yield at below-average level were associated with a reduction in cost per unit; yield increases at above-average levels were associated with a rise in cost per unit. This evidence is circumstantial in a context of comparative international costs, but it tends to make cost comparisons based on yield less convincing. Some difference in quality, and in marketing practice can be inferred as between low-cost and high-cost production.

Costs of Production

The third submission tends to confirm the tendency for unit cost of production to show less variation than either yield per acre or cost per acre. This was noted in the English apple and pear crop results for 1969[1], and it can be seen also when estimated costs an acre in different countries are converted to costs per unit.

---

1. Folley, R.R.W. (1971) op. cit.

A number of recent cost-of-production statements have been assembled in Table 10. All the statements shown here originally refer to the year 1967 or later, and have been re-worked to be more comparable in method, in constitution of sample and in marketing procedure. To this end, the original European data were amended as follows :-

1. costs raised to 1969 level,

2. grower or proprietor, and all the recorded work of his family rewarded for their work at the going rate,

3. non-bearing area assumed to be 15 per cent of orchard area,

4. apples and pears assumed packed in the growers' non-returnable boxes,

5. two-thirds of the marketed crop assumed to be chamber-stored,

6. growers' costs carried through to point of entry of packed boxes into the distribution trade,

7. Average costs derived from large samples of producers have been kept separate from those for small samples which are possibly more 'wishful' in character (see Table 11).

TABLE 10

Areal and Unit Costs of Commercial Production of Apples and Pears

as at 1969 Crop Results from comprehensive samples

£ per acre

	Netherlands[1]	S. England[2]	S.W. France[3]	New Zealand[4]	S. Africa[5]
	£	£	£	£	£
Orchard-based expenses	136	91	138	120	73
Harvesting, storing and marketing.	145	138	245	351	135
Fixed costs	160	140	170	83	138
Total cost	441	369	553	554	346
Yield per acre (bushels)	280	267	410	630	522
Average cost per bushel (p)	157	138	135	88	66
	(d/d auction)	(ex-packhouse)	(ex-packhouse)	(100p. if for export)	(d/d to port)

NOTE : Interest on fixed capital, and allowance for grower's own manual work, included throughout.

Sources : (1) Rentabiliteit van het gespecialiseerde fruitteeltbedrijf. L.E.I. Den Haag.

(2) R.R.W. Folley (op. cit.)

(3) Cabirol (op. cit.)

(4) New Zealand Apple and Pear Marketing Board. 21st Annual Report, 1969 and D.W. McKenzie.

(5) The Deciduous Fruit Grower, Aug. 1969. (1967/8 crop)

Average performance.

On the evidence of Table 10 at the low levels of average yield concerned, yield per acre in western Europe does not have a decisive influence on national unit cost. There is also a prima facie case for not considering English apple- and pear-growing as a whole the most expensive (or expendable) in western Europe, because there are obviously circumstances in which English practice gives results superior to those in the Netherlands and France. The lower-yielding English farms operate relatively cheaply, and if all existing orchards were necessary, some English growers would average higher profits than Dutch or French even if selling their fruit at the same price. The basis of comparison here is intended to be industry-wide, and the inference is that crop failures occur elsewhere as well as in England, and that where these occur on more specialised and more heavily-capitalised farms the results are relatively more disastrous.

Away from western Europe, some costs ex-packhouse are definitely lower, both in New Zealand and South Africa. The former gains from a high average yield, the latter from low labour costs.

'Good average' performance.

In Table 11, the basis of comparison is altered, the samples of continental growers being smaller and their average performance much better - much closer, in

TABLE 11

Areal and Unit Costs of Commercial Production of Apples and Pears

Results from selected samples - £ per acre, 1969.

	Netherlands[1]	S.W. France[2][3]		Italy[4]	England and Wales[5]	
Orchard-based expenses	119	138	131	196	81	64
Harvesting, storing & marketing	242	382	314	440	164	60
Fixed costs	224	171	171	163	146	58
Total cost	585	691	616	799	391	182
Yield per acre (bushels)	560	727	594	940	373	166
Average cost per bushel (p)	104	95	104	85	105	109

SOURCE : (1) P.A. Spoor and J. Goedegebure. Kostenbegrotingen van Appelen en Peren, L.E.I. 1968 Dan Haag.

(2) J. Cabirol (crop failures excluded from this sample).

(3) Rapport au Congres Pomologique, 1966. (44F/quintal at orchard gate; 233q./hectare).

(4) Dr. H. Mantinger. op. cit.

(5) R.R.W. Folley (op. cit.)

fact, to the general awareness of yields in France and Italy. Following the argument in the Introduction, it is now taken for granted that exporters of apples and pears will be the high-yield, low-cost producers. Whole industries do not confront each other across national boundaries: only the most efficient producers can contemplate sales in other countries. In Table 11 English growers as a whole are put side by side with the more efficient element in the French and Dutch industries. Here, the differentials in yield are seen to have an effect on unit cost, but there is nothing like a 35-40 per cent differential between the Netherlands' cost and that for southern France - very little evidence of France's natural advantage remains.

The previous average British figure of £1.38 a bushel now appears high*. Even so, some English growers can show almost equivalent results, notwithstanding typical English yields. At the right-hand margin of Table 11 are two examples of

---

* to postulate a small sample of English growers comparable to those in Table 10 is hazardous indeed. For information, a group of six specialised growers, who are among those submitting figures to Wye College, had an average unit cost, ex packhouse, of £1.15, and this figure is used in Table 11.

successful (not the outright best) English farms, one of which realises an above-average yield at moderate cost, while the other had a below-average yield but capacity for witholding unrequited expenditure on the crop. Neither is disgraced in this presentation.

Perhaps an apt summing up of Tables 10 and 11 would be: (1) there are both successful and less-successful growers in each producing country, and (2) there is no European source of cheap apples and pears for British consumers - that is, of fruit able to be put on the British market after paying all its costs, at prices some British growers cannot attain.

Management on-costs.

Over and above the common resource costs of labour, materials and services in each country there is an involved pattern of dues or rewards to growers which may prove to be as important as location in determining the continuation of fruit production. In the long run, all the factors of production must be rewarded, or they will not be re-engaged. For practical purposes, the most notable distinction is likely to be that between the farm on which management seeks a reward and that on which it does not. Perhaps it should be added that in this context, management is largely the administration of change and progress in the firm. At the risk of over-drawing contrasts for the sake of making a point, the 100-acre English or French farm is a discrete,

considerable business: in its continuing adaptation within a changing economic scene, its proprietor will have a many-sided task: he will need to keep abreast of technical developments (e.g. water resources), land-planning, investment, labour relations, marketing, vertical integration and so, all of which help to keep the business viable. The same proprietor will only work on his orchards occasionally, but he will be kept busy in the office and away from the farm, and will ask for some reward for his managerial efforts - a margin over and above cash costs is necessary. On smaller farms, particularly family farms whose proprietors typically do little but maintain the farm, grow good fruit and accept decisions other bodies make, the need of dynamic management as outlined above is less obvious and is not conventionally paid for out of the price for the fruit. The managerial proprietor represents an on-cost in a milieu of working proprietors. And it is not to be expected that his efforts will be repaid by superior efficiency of production in the narrow sense. If he creates the viable, adjustable unit in tune with the times, his unit costs in the short term are likely to be higher than they would be otherwise.

Cost of Transport.

Just as it is the firm which is making more profit than its competitors which should be expanding output, in international trade (if justice were done) it is the country which finds supply most profitable which should be increasing its

share of the market. This parallel is not quite apposite to apples and pears in Britain, because there is no 'national' supply of west European fruit as such: supply originates with individual firms: but, broadly speaking, nations can be assigned a given climate - which has already been experimentally evaluated - and also a given distance from the U.K. The effects of distance from the market are now tentatively assessed.

In the last two years transport costs have risen relatively to the general level of services' costs. To reach the distribution depot in south London apples and pears imported from Europe have to travel about 160 miles from the Zeeland area of Holland, 680 miles if from the Bouches-du-Rhône region or 870 miles from Emilia/Romagna. In adapting the calculated local costs of production to a delivered price in the U.K., the following transport costs have been used :

from Bologna	38p a bushel
from Nimes	34p a bushel
from Zeeland	19p a bushel

It is a moot point, whether, once in England, the point-delivery of imported apples and pears makes for cheaper subsequent distribution than for the more-dispersed home-grown crop. It is to be expected that if imported apples and pears were to arrive in large quantities on consignment, the subsequent re-routing and so on would tend to bring average transport costs in the U.K. near to those for the English crop. A fairly orderly

process being considered more likely, it has been assumed that initial bulking of the imported fruit wins back 1½p a bushel on an estimated average English crop transport cost of 9p a bushel(in 1969).

That is, the effective additional transport cost foreign senders have to incur in marketing in the U.K. is gross cost per bushel minus 7½p, or -

from Bologna	31½p a bushel
from Nîmes	26½p a bushel
from Zeeland	10½p a bushel

Together with the data on local costs of production already presented, these unit costs of transport enable a notion of a supply price for foreign apples and pears on the U.K. market to be gained.

The results are shown in Table 12, which is based on the previous Table 11. According to Table 10 there is no prospect of the average Dutch or French grower finding exporting to the U.K. profitable at the prices ruling during most of the season, but the more successful growers do have a margin to allow for transport costs. Table 12 is simply Table 11 with (a) additional transport costs for foreign fruit added to the cost ex-packhouse as previously expressed, and (b) an assumed price premium for home-grown apples and pears incorporating, first, a price discount relative to Cox for EEC. Golden Delicious when available in quantity; and secondly, a price discount for Dutch Cox, partly on account of its origin abroad and

TABLE 12

Estimated Average Profit in Supplying the British Market, c. 1970-72

	Netherlands	S.W. France	Italy	England and Wales	
				A	B
Average cost per bushel - ex-packhouse (p)	104	100	85	138	115
Additional transport cost per bushel (p)	10½	26½	31½	-	-
Delivered cost per bushel (p)	114½	126½	116½	138	115
(add) Price discount for equality (p)	6	10	15	-	-
Equivalent cost (p)	120½	136½	131½	138	115
Profit per unit at break-even price for average British grower (p)	17½	1½	6½	-	-
Profit per unit at break-even price Column B (p)	(-) 5½	(-)21½	(-)16½	-	-

partly on account of its inferior quality after storing*. The price discount for EEC Golden has been derived from the estimates for unstored and stored fruit given in a recent report of the Apple and Pear Development Council [9]. In addition, there are two presentations of English-crop data in Table 12. The first, column A, is taken from Table 10, the second, column B, applies to the farms costed by Wye College mentioned in the footnote on page 50.

These two discounts upon the price of imported apples and pears, of course, have the effect of making English growers' average prices higher by comparison, other things being equal, and so somewhat higher average costs per unit are permissible in England within the specification of the study.

On the evidence of Table 12 -

1. Good Dutch growers are better-placed to profit from the U.K. market than French or Italian growers: their assumed profit per bushel is 17½p when the average English grower is only breaking even.

2. Continental growers' prospects are much less bright when set against good (as distinct from average) English performance. Were the small

* See p. 88 for the actual values used.

samples of growers in each county to be truly comparable, good English production could be forecast to remain at least as profitable as good production elsewhere (which is not to forecast English growers finding profits as high as they would like).

In review, we have now passed from a physical-advantage assay to an economic-advantage assay, and found a southern-European location possibly to be far less advantageous economically than naturally. There is prima facie evidence for advantageous use of domestic resources for growing some apples and pears in England.

But as regards the permanence of the economic advantage postulated above there must be doubts. Consider three things. First, the price discounts used in Table 12 may not continue when U.K. consumers have had longer experience of an enlarged EEC market - even if producers are then, by some miracle, receiving their due rewards. Secondly, all English growers will be contending in their home market with progressive growers abroad. Attention was drawn in Chapter 2 to the advances in productivity abroad made during the 1960's. Some such adjustment will be required of some English growers who are not content to operate in the market for lower-quality fruit. Thirdly, the English industry is small, and further withdrawals of acreage are likely to make home growers more vulnerable to large-scale

operation abroad. The last two points are evaluated more fully, along the lines of the Introduction, in preparation for an assay of market shares, in Chapter 5.

4. AN ANALYSIS OF ENGLISH PRODUCTION ORGANISATION

Economic and Uneconomic Production.

Towards the end of the previous chapter it was postulated that high-cost English producers would face a difficult time in fair competition within an enlarged EEC. Competition between home producers within their share of the market will be as much a feature of the market as competition between national groups for a share of the whole market, The relationship between yield and unit cost was also mentioned. This is now looked at more closely, following the two leads given by an analysis of the financial results :-

a) farms with high yields have unit costs which are high relative to yield;

b) farms with low yields are not necessarily priced out of the market for this reason alone.

One of the significant effects of the observed relationship between yield and unit cost was the concentrated distribution of unit cost within the industry, relative to the dispersion of yields. The same circumstance looked at in another way provides an unusual view of the industry. Only on farms having yields of less than 200 bushels an acre in 1969 was frequency

of profitability notably lower than at higher yields. And since the lowest yields were obtained by accident and not design (i.e. they resulted from crop failures on farms normally having good average yields), it follows that low average yield probably does not result in pressure upon profit to the degree expected. Set out in Table 13 are the percentages of profitable farms in each yield-group. Unwelcome though the portent of these figures is, it is apparent that there will not be the expected incentive for the 250 bushel-an-acre grower to wish himself in the 400-bushel an acre grower's shoes, which is not quite the same as having no incentive to increase yield on the farms in question.

As a further test of individual producers' positions their 1969 revenue was reduced by 15 per cent, to simulate Common Market conditions, and percentage profitability re-calculated. After taking this step it becomes apparent (in Column B) that a good yield is associated with a reduced vulnerability to a fall in price. Here again, however, there is not the nice gradation expected and growers could well conclude that once above a yield of 250 bushels an acre - if this yield were obtained economically - their chances of surviving if revenue were to fall are not significantly less than their fellow-growers' having higher yields.

This is a human aspect of English fruitgrowing. It takes no cognizance of the economic importance of the larger firms in the industry or of developments in marketing. It has its uses, however,

TABLE 13

Percentage of Profitable Farms in Each Yield Group.

1969 Crop

Average Yield per acre (bushels)	A Per cent; at ruling price	B Per cent; at 15 per cent lower revenue
Below 150	27	15
151 - 200	28	8
201 - 250	77	37
251 - 300	83	67
301 - 350	93	62
351 - 400	75	57
Above 400	100	75

when individual growers' management decisions have to be anticipated, as in questions of policy for the industry.

Specialisation in fruit-growing is frequently recommended, but in the past fruit-growers specialisedfrom weakness as well as strength, and, as usual, there is successful and unsuccessful specialisation. The official view that "specialist producers ..... alone can hope to maintain a successful commercial production in the long term" is not borne out by the evidence of this one year's results.

Many types of agricultural holding now have a dessert apple and/or pear enterprise. For the purpose in hand some way of classifying enterprises is desirable - say, by acreage, by region, by type of tree or age of tree. Many of these known differences (the so-called 'management variables') were shown, when tested, to have no statistically significant effect upon results in 1969. The most significant differences in yield and in unit cost were obtained when growers were divided into three groups, each indicative of a certain outlook upon dessert apple- and pear production*.

---

* Tests of significance of the mean yield per acre and mean cost per unit for each group gave the following results :

	yield per acre	cost per unit
Group 1	significant(1%)	insignificant
Group 2	insignificant	significant(1%)
Group 3	significant(5%)	significant (0.1%)

These tests of significance were carried out between samples made more homogeneous by the removal of extreme values - i.e. ± two standard deviations from the mean.

This grouping was :

Specialised producers (Group 1).

Horticulturally-inclined producers with a dessert apple or pear enterprise (Group 2).

Farmers with a dessert apple or pear enterprise (Group 3).

Under Group 1, both small and large enterprises are included: the growers have high standards, and expectation of above-average yields and high gross output per acre. Sites and locations must be presumed to be favourable.

In Group 2, the apple and pear orchards are found on holdings which, for whatever reasons, are given over to horticultural crops. Consequently, large acreages of orchard are ruled out, because a large orchard acreage as part of a larger holding would, by definition, constitute a farm enterprise - part of the characteristic of the farm being its scale of operation. A good location is implied, but it does not follow that soil and climate always suit apples and pears particularly.

Group 3, then, has room for large acreages, but in fact farmers have mainly small to medium-sized orchard enterprises. It is implied that the farm has (perhaps limited) opportunity for an apple and pear enterprise, but the grower is not fruit-minded and has an apple enterprise for its value as a constituent of his cropping plan.

This distinction has been used in analysing the efficiency of English apple and pear growing in 1969. As a result, it can be disclosed that -

1. Specialised growers were 40 per cent of the whole sample, produced 53 per cent of the crop, and had -

   a) the largest enterprises,

   b) the highest yields,

   c) the highest costs - both variable and fixed - per acre,

   d) the highest unit cost of production,

   e) the highest marketing costs per bushel,

   f) the highest profit (excluding interest on capital) both per acre and per bushel,

   g) 64 per cent of enterprises profitable before charging interest on capital.

2. Mixed growers were 35 per cent of the whole, produced 30 per cent of the crop, and had -

   a) intermediate results in all the separate analyses,

   b) also 64 per cent of enterprises profitable as above.

3. Farmer-growers were 25 per cent of the sample, produced 17 per cent of the crop, and had -

   a) the lowest level of results throughout,

   b) 67 per cent of enterprises profitable.

The generalised comparative results are given in Table 14.

This comparison is somewhat idealised as a result of the removal of exceptional results: it shows the typical average experience. Because the exceptional results in 1969 were failures in the specialists' group and successes in the other two groups, an average of all results for the one year gives a rather different picture: Table 15.

TABLE 14

Comparative Performance of Three Types of Producer : 1969

	Specialists	Mixed growers	Farmer-growers
Average area of enterprise (acres)	72	52	37
Average yield per acre* (bushels)	322	278	233
Proportion of crop produced (%)	53	30	17
Average age of tree (years)	18	20	19
Proportion of acreage in Cox(%)	50	48	52
Financial results (per acre)	£	£	£
Gross output**	403	388	268
Net output	257	223	165
Variable costs	68	64	51
Gross margin	189	159	114
Fixed costs	145	123	84
Income for management and investment	44	36	30
Financial results (per bushel)	p	p	p
Market value**	140	141	113
Marketing cost	52	50	44
Cost as % of market value	37	35	39
Total cost	125	117	104
Income for management and investment	15	24	9

NOTES : * of bearing and non-bearing orchards

** value of the fruit at point of first sale

TABLE 15

Average Results for

Three Types of Producer

	Specialist	Mixed	Farmer
Income for management and investment per acre (£)	32	30	30
Market value per bushel (p)	142	143	128
Cost per bushel (p)	132	132	115
Income for management and investment per bushel (p)	10	11	13

A crop failure being less disastrous to the farmer-grower, farm-type production showed up well in 1969. It is known, however, that 1969 was a year of abnormal range in individual producers' results. For this reason greater prominence has been given in this study to the findings from the sample of unexceptional results.

Efficiency of Production.

The picture has now emerged of an industry divided into three unequal parts, each nearly uniform but managed according to different conventions.

This situation illustrates very well the theme economists are prone to stress: initially, growers have widely-different ideas about the size and type of a new enterprise, but as time goes on economic pressure makes certain kinds of enterprise unprofitable and growers have either to modify them or give them up. In this way the range of opportunities for success becomes narrowed, and enterprises become more of one type. So long, however, as there are quality differences within quantities of resources some enterprises which seem unsuitably constituted (e.g. too small for the amount of labour engaged) will continue to succeed and confound the prophets.

Applied to English apple- and pear-growing, this approach makes it clear that at past cost/price relationships there was considerable tolerance in the organization of fruit-growing. Farmer-growers operated at comparatively low levels of input and output, specialists at a comparatively high level. Now if there are constant returns to additional inputs the farmers will be as efficient in using inputs as specialists (for if specialists used twice the farmers' value of inputs to produce twice the farmers' value of output, the output per unit of input is unaltered). In practice, there can be increasing returns to additional inputs and decreasing returns, as well as constant returns. If increasing returns applies to dessert apple and pear growing, the specialists have the right policy; if decreasing returns, the farmers.

It is in this light that the three groups' results are now examined, again, first for 1969 and then, because 1969 is not likely to be repeated in the future, in a situation where fruit prices are lower and factor costs higher, than in 1969. The examination consists of determining the apparent productivity of labour and of fixed capital. Labour input, for this exercise, includes the cost of all production (i.e. not marketing) labour other than the earnings of casual pickers, and the amount of variable costs, which is assumed to be a measure of what is spent in an effort to make labour more productive. Ideally, the cost of any harvesting done by regular staff should be deducted from this measure of labour input, but the required information is not available.

Levels of labour (as defined) and capital use, and the apparent average productivity of these two factors (a) with extreme results excluded and (b) overall, are shown in Table 16.

The inference from the above figures is that, notwithstanding a variable level of inputs per acre on the three groups of enterprises, their value-productivity was, for practical purposes, constant. The resources employed in farm-based enterprises were more physically productive but a lower quality of crops and higher proportional marketing cost reduced the efficiency of production on farm enterprises to the same levels as elsewhere.

TABLE 16

Apparent Mean Productivities of Labour and Capital on Three Types of Farm

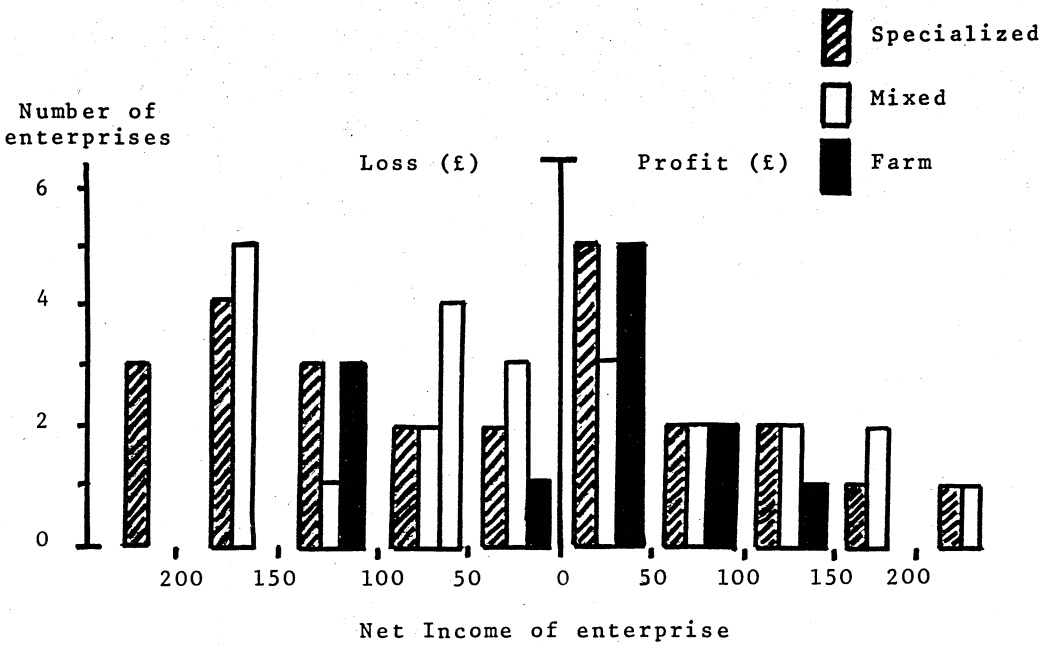
(a) with extreme results excluded.

(b) overall.

	Special-ised		Mixed		Farm	
	a	b	a	b	a	b
Labour input (excl. marketing) (£ an acre)	118	114	91	89	71	71
Fixed investment (excl. marketing) (£ an acre)	803	793	704	725	580	563
Net output per £100 labour (£)	220	212	245	238	233	235
Rate of return on foxed capital (%)	5.4	3.3	5.1	1.8	5.3	6.0
Yield (bushels an acre)	322	302	278	265	233	267
Bushels per £100 labour	273	265	305	298	328	376

FIGURE SIX

Profit or Loss per acre on 1969 Crop,
according to type of production



As regards the future, and the prospect of an economic squeeze on producers, little relative change in the groups' situations can be envisaged. The general economy of the three groups of enterprises is very similar, although farm-type production uses more capital relative to the value of labour. When crudely reconstructed, with labour charged at 50p an hour and net outputs reduced by 10 per cent, discounting any adjustments producers may make as a result of this change, the relevant part of Table 16 now looks like this (Table 17)

TABLE 17

Projected Apparent Productivities of Labour and Capital

	Specialised	Mixed	Farm
Labour input (£ an acre)	152	116	89
Net output per £100 labour (£)	154	173	167
(index value in Table 13 = 100)	70	71	72

None of the three groups of farms, then, will be more severely affected than the others. The inferences are :

i) that if entry to the EEC does compel some withdrawals, they will be made 'across the board', by all sorts of producers;

ii) that Britain will be left with a 'mixed economy' of producers rather than with specialists alone.

Something of what this means is conveyed through Figure Six.

In Figure Six is shown the distribution of profit or loss per acre on apple and pear enterprises in 1969 according to the three types of production. For instance, farm-type production was most notable for moderate profits, specialisation for considerable losses. From the producers' point of view, their financial results are not absolute, but relative. That is to say, specialists produce in the expectation of a higher net income per acre than farmer-growers: and hence they are prepared to spend more in anticipation of a higher net output. Growers will look at their realisations in the light of their expectations, and learn from this experience.

As an experiment, it has been assumed (a) that producers pay attention to the net output per acre of their apple and pear enterprise, and (b) that growers' standard expectation of net output were :

£300 an acre if a specialist

£240 an acre if a mixed grower

£200 an acre if a farmer grower

Now, the percentage realisation of these levels of expectation by the three groups of grower in 1969 was :

Specialists	39 per cent
Mixed growers	40 per cent
Farmer growers	50 per cent

Given a continuation of this situation, it would be logical to expect that a number of retirements will be by specialists.

Methods of Adjustment

In the light of the foregoing analysis the truly uneconomic level of yield becomes a most elusive concept. It would certainly be unwise to attempt to pinpoint vulnerable enterprises by this one physical feature.

Hard as it may seem to the most vulnerable growers, if the situation arises wherein English apple and pear production becomes excessive, the industry as a whole would benefit more from, say, the 5 per cent of least profitable enterprises being removed than by all producers agreeing to reduce their acreage by 5 per cent - to mention two extremes in policy. The latter move would tend to raise the national average unit cost of production.

Per contra, the withdrawal of a hypothetical 5 per cent of sub-marginal enterprises will not improve the national industry's power to compete with the larger European producers. More positive action intended to lift the many second-rate enterprises into the top class is the surest way to set about improving national efficiency.

The national situation in 1969 is expressed in the present context in Figure Seven. When the three groups' output is charted by delivered cost per bushel, very nearly half the total crop is seen to be comparatively high-cost production by specialists, notwithstanding their superior yield per acre. In fact, of course, low-cost producers are supplying different, and probably less-exacting buyers than are high-cost producers; but this cannot disguise the unwelcome point that competition from imported apples and pears is more likely to be directly experienced by high-cost producers rather than by lower-cost producers.

We are now in a position to incorporate this knowledge of different cost levels on different sorts of enterprise, and the findings about unit costs at different levels of yield, into the relative economic advantage principle followed in Chapter 3. Figure Eight shows estimated unit costs, ex-packhouse, for English-grown apples and pears at operative levels of yield on specialized holdings: this has been qualified for the crop as a whole, and displayed as a band, in order to allow for high-cost

FIGURE SEVEN

Structure of Supply : Unit Cost

and type of production

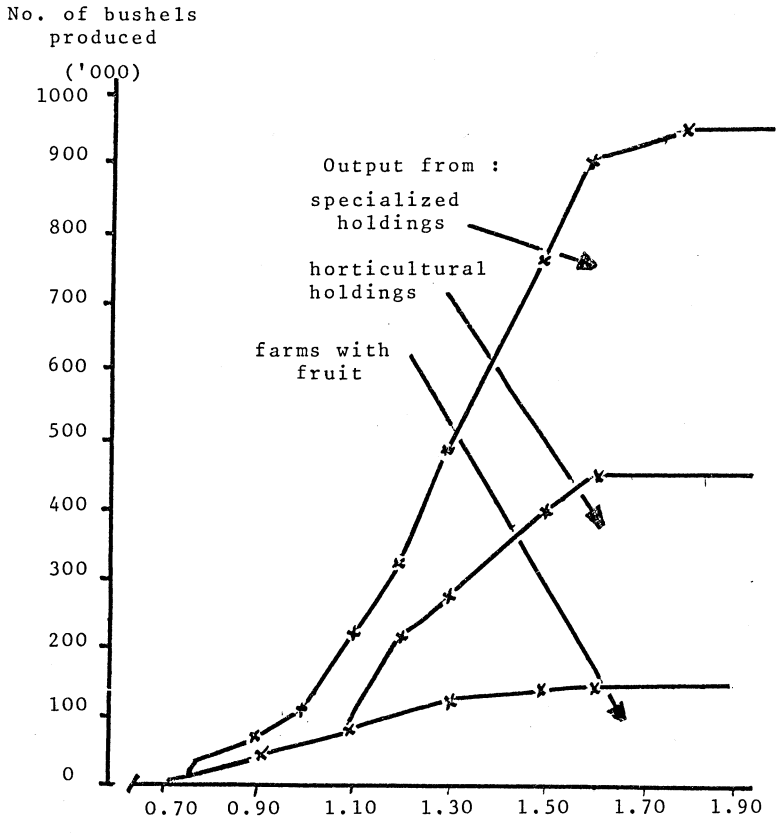
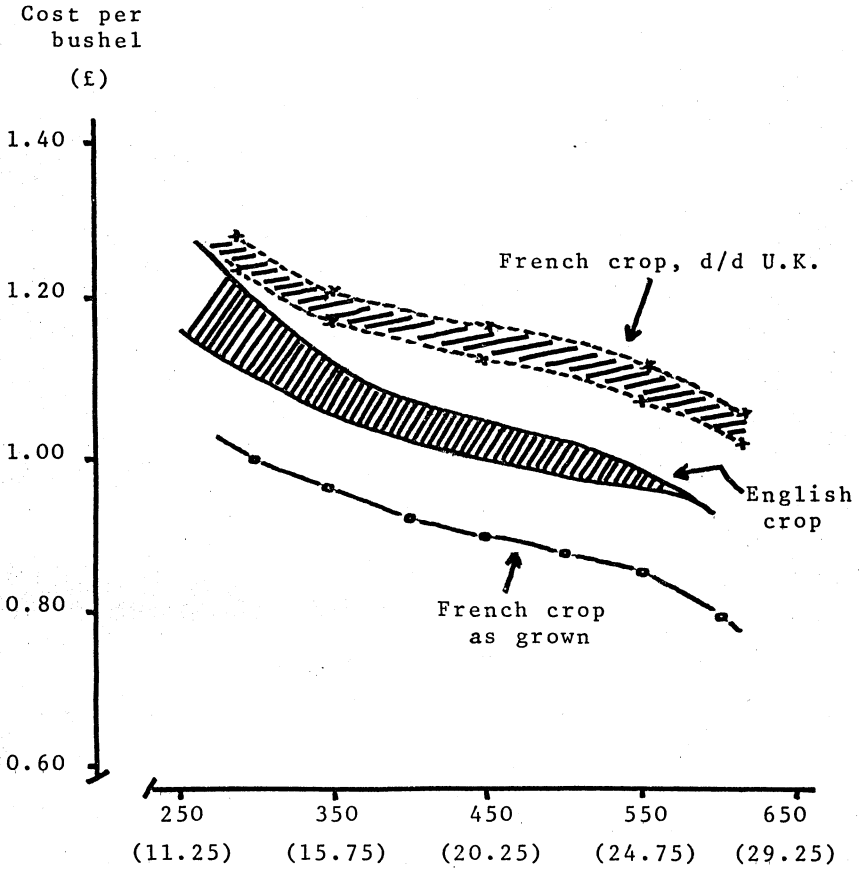


FIGURE EIGHT

A relationship between delivered costs,
British and French production



production on specialized holdings and for low-cost production on mixed holdings. Also shown is the contemporary ex-packhouse cost, of specialized growers in southern France, at a yield on the tree 40 per cent higher than in the U.K. Both fixed and variable costs per hectare have been included, and 50p a bushel added for picking and packhouse operations in each country. A variation of 5p a bushel has been allowed for transport in view of the stored crop in France being closer to the U.K. than the whole crop.

Even if not factually accurate, Figure Eight has a clear meaning for English growers, as follows :

1) the higher their yield, the less the absolute cost advantage of the equivalent French producer (i.e. to reduce cost by raising yields is a good method of defence);

2) French growers, looking at the prospects for exporting to the U.K., can see they will need to be very efficient indeed to outdo the low-cost English grower. With a transport cost of $22\frac{1}{2}$-$27\frac{1}{2}$p a bushel added (see the top line in Figure Eight)much French production is more expensive than English. Point 1 is also reinforced in this way: when English yield is 250 bushels an acre, the

equivalent delivered-cost French yield is represented by 340 bushels an acre; at an English yield of 350 bushels, the equivalent is 615 bushels. So the higher English yields are, the greater is the pressure upon the more distant French growers to do better themselves.

3) Should agricultural wage-levels in the U.K. quickly rise to equal those in France and the Netherlands, English specialized growers will probably need about 420-440 bushels, grown without extravagance, to match the supply cost of French apples and pears grown on specialized holdings.

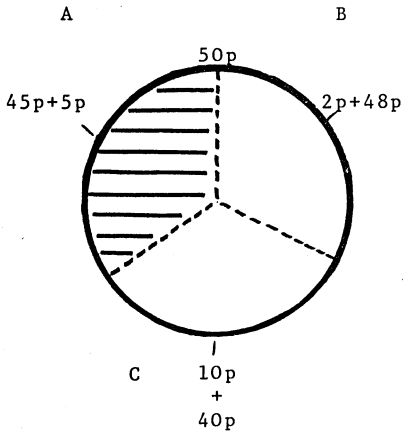
4) For non-specialized growers, policies of low-cost, low-yield production may have served in the past, but seem less pertinent in the future conditions.

FIGURE NINE

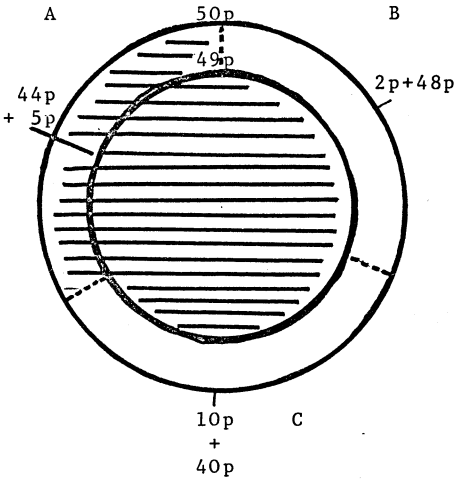
Successive market situations :

a representation

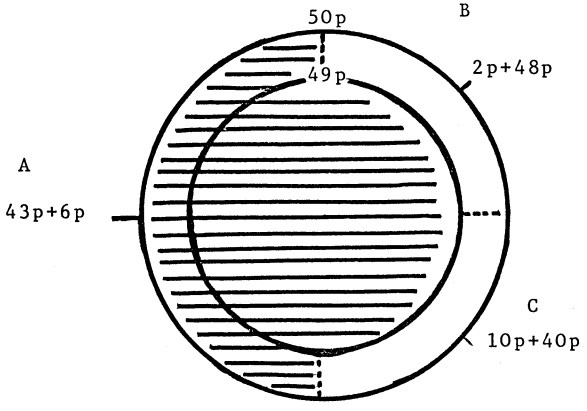
Situation 1



Situation 2



Situation 3



5. A MOCK-UP OF MARKET SHARES

It is in no one's interest to have a debilitated top fruit sector in the British horticultural industry. Having durable production equipment, growers tend to remain in production long after production itself ceased yielding normal profits. But the decision to withdraw is a big one, and growers want to take their decisions in the light of all available knowledge. It is to this end that the cost-of-supply data in Chapter 3 are now formed into a tentative model of the dessert apple and pear market in Britain once physical surpluses are a thing of the past.

The ideas are in part conveyed through a series of diagrams as in Figure Nine, wherein it has been assumed that, when in a rudimentary state, the 'market' or demand for a product is represented by a circle. In Situation 1 suppliers of the market receive 50p a unit for a standard product. Three contending parties all play fair and the result is an equal division of the market between them. The short-term equilibrium is the result of Supplier A having to pay transport costs of 5p a unit, but being well pleased with a net price of 45p a unit. Supplier B is nearer the market, pays 2p for transport and accepts 48p a unit. Supplier C is more distant, has high transport costs to pay, 10p a unit, but can produce relatively cheaply at 40p a unit.

This equilibrium is not long maintained because Supplier A finds the commodity in question more profitable than any other crop and expands production. Situation 2 results. Here, the additional supplies have led to higher consumption (represented by an inner ring) and a lower unit price of 49p. Suppliers B and C retain as much of their most advantageous trade as they can, but prices are less uniform and all the increase in trade has been won by supplier A, Suppliers B and C being unwilling to produce for 47p a unit and 39p a unit respectively.

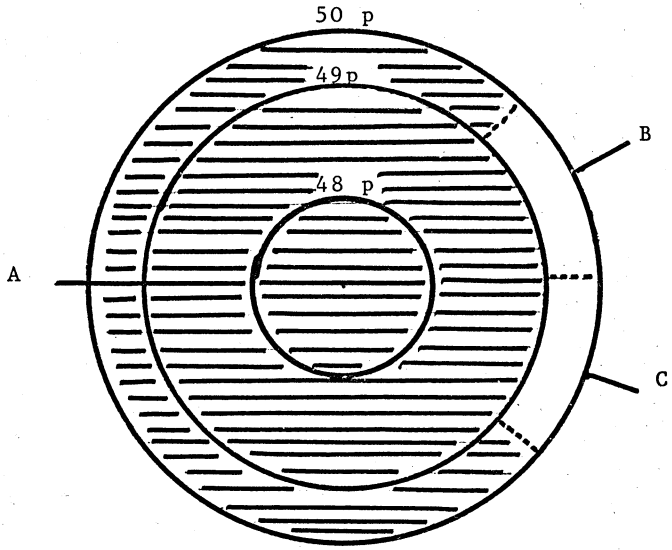
At a further stage, supplier A's produce ramifies further through the market until an assumed new equilibrium is reached. Supplier A's average transport cost has now increased and his price has not altered: as a result his profits are no higher than on other crops and he is not induced to expand. This is situation 3, in which A has become the dominant supplier. There are still areas of the market, however, in which either a higher price or a preferential transport cost results in a (diminished) share of the market for B and C. In effect, assumptions of differentiation in the market have been made in Situation 3. So long as suppliers B and C remain, supplier A cannot have things all his own way, and he will find it difficult to dislodge B and C from their smaller areas of the market where they still have some relative advantages.

Situation 4 (Figure Ten) is a development from Situation 3 and shows the

FIGURE TEN

Dominance of the market : a representation

Situation 4



market further differentiated: there are three areas, each separated by a barrier of 1p a unit extra cost or lower price. Supplier A, content with his average production cost of 43p a unit, has a three-fold hold upon the market - i.e.

1) sales at a new low price of 48p a unit, with 5p for transport,

2) sales at the customary price of 49p a unit, with 6p for transport,

3) a share of the market at 50p a unit, which is now much reduced, and vulnerable to an (43p + 7p transport) attack by supplier A.

Supplier A now dominates the market, and has a firm and economically strong hold upon it. Suppliers B and C would find their outlets much reduced, and if the smaller quantities sold lead to higher unit transport costs, they would find themselves priced out of the market.

Application of the Sharing Principle to Dessert Apples and Pears.

The British market in an enlarged EEC can be described along the lines of Situation 4. In fact, the visual presentation of the postulated market state (if all producers are to make comparable profits) may be more telling than a verbal description.

Home growers' participation in the British market is assessed from the adjusted 1969-crop financial results given in Table 11. In that year, however, the distribution of yield in Britain, and hence of unit cost, was thought to be abnormal. As a first step towards clarifying the future position of the industry the yield peculiarities of 1969 were removed, a more normal distribution of yield postulated*, and the yields of individual enterprises altered in line with the assumed distribution. At the same time the variable costs were adjusted to the new yield, the fixed costs added and a revised unit cost of production obtained. The new distribution of unit cost was subsequently presented as a cumulative curve of output.

The Dutch industry is particularly well-documented, and it would seem from the 1969-crop results that Dutch growers and English growers, as a whole, have something in common. For instance, the distribution of output per unit area in

---

* This was done by applying the distribution for enterprises in East Anglia and the west Midlands to enterprises in the south-east, subsequently deflating all yields to give the estimated 1969-crop output. The result was to concentrate yields more into the band of 300-350 bushels an acre.

the costed samples of about sixty enterprises in each of the two countries* is similar, as shown in Figure Eleven. Some similarity is perhaps to be expected from a combination of northern climate and effective extension services. Judging by Figure Eleven, England has the greater proportion both of low-output and of very high-output growers; and this is shown later to affect English growers' prospects.

Little is known about the distribution of either output or unit cost in the French industry; but from the data available a mean-point on the curve and the spread of the distribution curve were postulated. Cumulative-cost curves for the Netherlands and for France were then prepared**. Transport costs, sale values per unit and consumers' preferences have been left out of account so far.

---

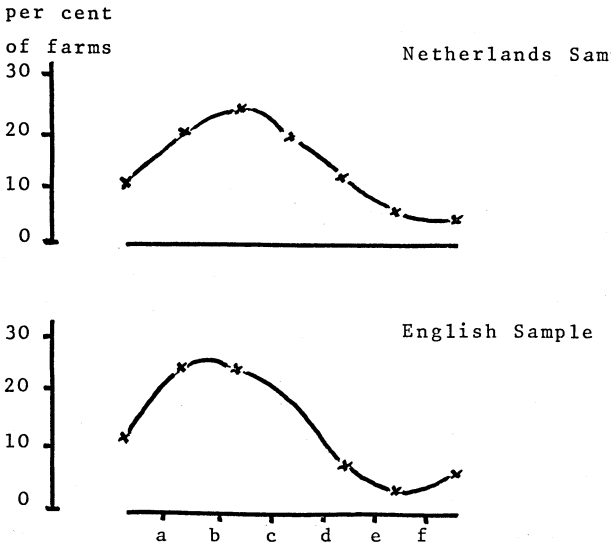
* The Netherlands data were taken from Rentabiliteit van het gespecialiseerde fruitteeltbedrijf (L.E.I.).

** The reduction from the 26½p previously used is in respect of the approximately 16 per cent of the stored crop originating to the north of the Loire (which has lower transport cost but possibly costs marginally more to grow).

See '1)' overleaf.

FIGURE ELEVEN

Similarity of distribution of output per unit area : two national samples.



Comparative values of output

Interval	English sample (£ per acre)	Dutch sample ('00 D fl. per hectare)
a	≤150-275	35-50
b	275-400	50-65
c	400-525	65-80
d	525-650	80-95
e	620-725	95-110
f	>725	110

As the next step, the cumulative unit-cost curves were re-positioned to simulate competition in the U.K. market. In working towards this aim of a comparative competitive marginal profit per unit situation for fruit delivered to a wholesale distribution point in the U.K., the imported fruit was handicapped as follows :

1) a flat rate additional unit transport cost of $25\frac{3}{4}$p a bushel for French, $10\frac{1}{2}$p for Dutch apples and pears;

2) a discount of 10p a bushel for the French crop, and 6p a bushel for the Dutch, to represent the effect of consumers' preference for English produce*;

3) profit per unit at the cut-off point of supplies has to be equal to that postulated for English growers.

---

* this was levied on the nominally English share of the market only. The fact that French Golden may be the only European apple on U.K. markets from April onwards has not been evaluated. The fact that the average price of English Cox may be higher than of Dutch Cox because it earns higher premiums after storage has been evaluated.

As thus amended, and with proportions of crop replaced by actual quantities (to show the effect of size of industry) the actual area of competition can be seen magnified, as it were, in Figure Twelve, wherein also the presentation has been adapted towards that of the theoretical statement about competition in home and export markets made earlier in the Introduction.

The general inferences of this assessment of the competitive position in the U.K. market is that :

a) below a given threshold of price, apples and pears which suffer a high oncost for transport could have only a limited share of the market;

b) above a threshold of price, the scale of production in the more distant countries would be a decisive factor and these countries would tend increasingly to supply all the extra apples and pears consumed.

Referring to Figure Twelve it will be seen that the assumed adjusted delivered-U.K. price of £1.15 a bushel is very close to hypothetical threshold value. Briefly, at prices below £1.15 a bushel France could offer by far the greatest quantities of fruit. This situation is singled out, so to speak, in Figure Thirteen, which shows how the future French crop, estimated at 1,500,000 tons would be hypothetically

FIGURE TWELVE

Postulated Basis of Future Composition of U.K. Supply

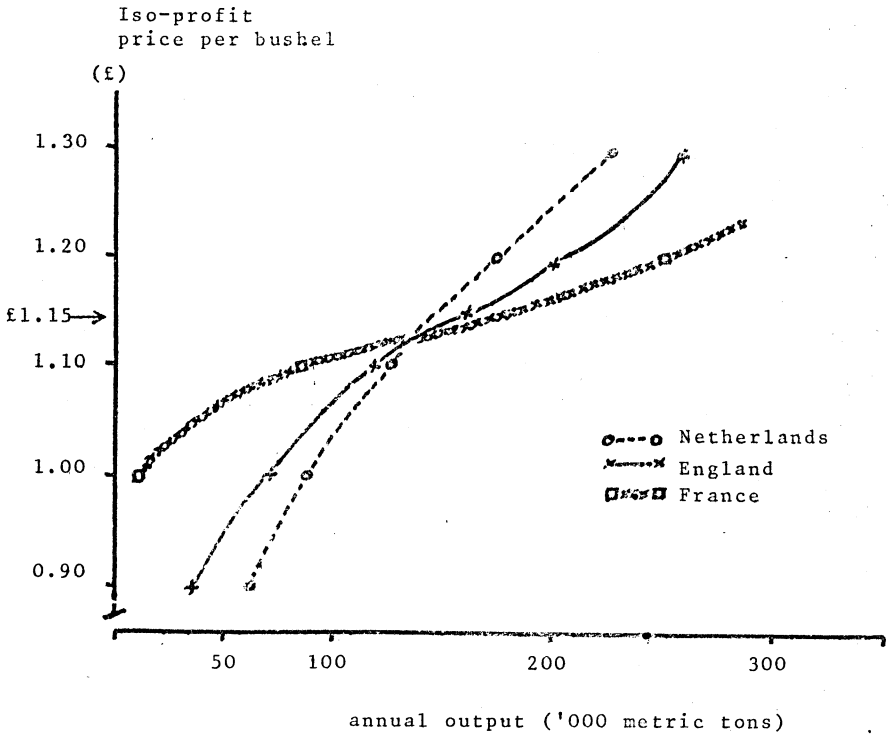
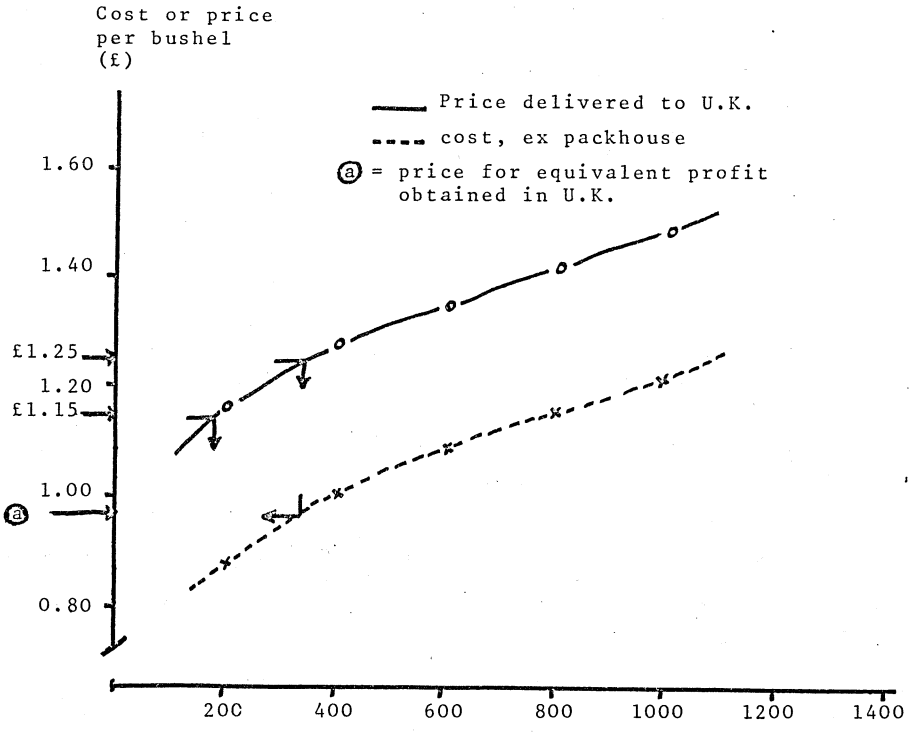


FIGURE THIRTEEN

A Choice for the French producer :

home or export market?



disposed towards the U.K. market. At the threshold price of £1.15 a bushel, the possible inroads into the U.K. market (180,000 tons) would be almost negligible in terms of the whole crop, but at a price of £1.25, 370,000 tons might be available.

It is premature to refer to market shares until the size of the market has been assessed. In this context it is important to note that the specification of a price that covers cost of production implies there will be no 'cheap' apples and pears, and hence physical consumption will not be encouraged by relatively low prices. For this reason the estimated average future consumption in Great Britain of dessert apples and pears between mid-August and end-March each year has been assessed at 550,000-570,000 imperial tons, the rate of economic growth being the same as in the past.

First approximation

The force of the threshold price of £1.15 a bushel can now be seen, because £1.17 is the price at which 560,000 tons becomes available in the three sources, French producers having the largest anticipated share. Without regard for variety the quantities available are as shown in Table 18.

TABLE 18

Estimation of Supplies of Apples and Pears with a £1.15 Threshold Price

	'000 tons
English-grown supplies	180
Dutch-grown	160
French/Italian-grown supplies	220
	560

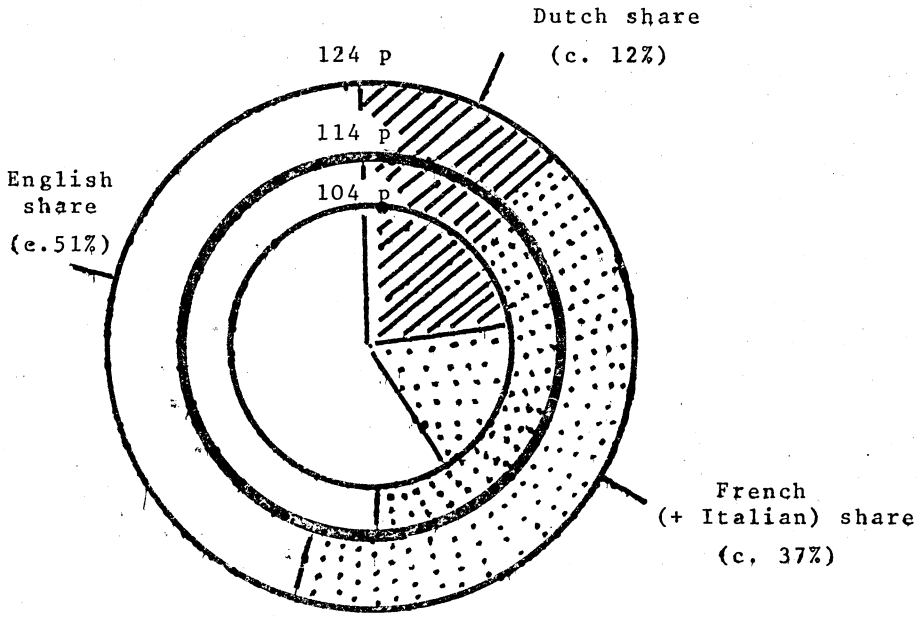
The above sharing of the market, which infers a 32 per cent share for English growers, is a first approximation to the final solution.

Very little of this quantity would, however, move from The Netherlands or France in the circumstances postulated. For example, French growers who were attracted by a price of £1.25 in the U.K. would have the alternative of selling in the home market at £0.96 (Figure Fourteen) and making the same profit. As the assumed average cost of production in France is about £1.12 a bushel, £0.96 is an unrealistic price. French growers would compete first for the profitable home market. And at a ruling price of

FIGURE FOURTEEN

National Market Shares,

assuming equal marginal profit



£1.15 in France, the equivalent in U.K. is £1.43 - at which price home growers would have a larger share of the market. So long as the level of prices in U.K. is not higher than that in France (or elsewhere) by more than the cost of transport, only fruit which will earn a high premium in price will be imported into the U.K. - and the quantity will be relatively small. This is definitely not the case when France, say, has surplus apples and the corresponding value on the French market is the EEC intervention price. The postulated price of £1.17 a bushel is too low.

Second approximation.

For the second approximation, we have to take another look at variety preferences. We now acknowledge that operative relative prices will only sway, not determine, the varieties of apple and pear bought. There is an area of relatively assured sales, as well as an area of uncertain sales, for fruit from all sources. In this way, the basic assumption for anticipated consumption of dessert apples and pears in the U.K. at the onset of a stabilized European market is shown in Table 19.

We can now proceed to parcel out this requirement of British consumers among contending suppliers. According to our assumptions, the Cox and Conference will be shared between English and Dutch producers, the Golden largely between French and Dutch producers: but we must not forget that other countries have their

TABLE 19

Estimated U.K. Consumption of Apples and Pears in a Stabilised European Market

Variety	'000 tons	Per cent share
Cox, Conference } combination of northern varieties	345,000	62
Golden, Williams } combination of southern varieties	200,000	35
Subsidiary, particularly English varieties	15,000	3
	560,000	100

own and other export markets to supply. The Netherlands, for instance, would be unlikely to have 160,000 tons of apples and pears to send to the U.K. Assuming a domestic price of £1.20 - £1.25 a bushel (1969 equivalent) the Netherlands crop would be about 400,000 tons. At the equivalent price of, say, £1.24 in the U.K. market some 195,000 tons would be available. In the same way it can be inferred that French growers would have 270,000 tons qualifying for potential export.

At a domestic price of £1.24 a bushel the opportunity to export is limited by a domestic production of 235,000 tons. Thus there is left a notional import of 325,000 tons - but the English growers' share of their market has risen to 42 per cent.

Third approximation.

One feature of the second approximation is that consumers would not be able to buy the northern varieties of apple and pear on the scale proposed at the price proposed. Partly because the English-grown crop has a big high-cost stratum, the amount of these varieties notionally available at the ruling price is 235,000 tons instead of the 345,000 tons specified. As a consequence, the ruling price of northern-grown varieties would tend to rise at first, permitting increased output in the U.K., encouraging importation, and - incidentally - an encroachment of southern grown varieties in the U.K. market.

On the other hand, not much good French Golden is available at low cost. Once relatively scarce, its price premium will increase, but also, once large amounts come in, average quality will be lower and premiums are likely to be lower. In the third and final approximation, therefore, we have to conjecture relative movements in price as between Cox and Golden and also between the first-conceived and the equilibrium price. A solution of this problem is now attempted along the lines of the 'rational export' hypothesis given in the Introduction.

With demand and supply in EEC as a whole roughly in balance, the relative elasticity of demand in the various countries will be a significant factor in marginally re-distributing supplies. It is most probable that the U.K. will have relatively low price- and income-elasticity of demand*, thus making it one of the least attractive export markets. As one result, the prevailing level of price in the U.K. will be fractionally higher than otherwise and home growers will have a little better opportunity than otherwise.

The analysis is resumed at the point where the U.K. market is short of 110,000 tons (345,000 - 235,000) of first-choice northern varieties. This amount represents about 20 per cent of Cox and Conference production, but only 3 per cent of

---

* This may not be the case at present: but it is an anticipated feature of a west European market in balance.

total E.E.C. production. A 3 per cent increase in demand from the U.K. would be expected to increase the previously thought-of European price by 1.6 per cent and the U.K. price by perhaps 2 per cent or more. Again, the effect on the price of Cox (for example) would be more dramatic. Notwithstanding an additional 50,000 tons (provided in the final solution) from English and Dutch growers, a 17 per cent shortage would still exist relative to the estimates adopted on p.96 In isolation this might lift average price 10 per cent, in the present context a postulated 4 per cent.

So the stage has now been reached where the English crop averages £1.29 a bushel and southern varieties are at an increased discount. The English growers' contribution is now 270,000 tons. Under the same conditions EEC export potential is 600,000 tons (Netherlands 210,000, France 390,000) and at ruling prices intra-E.E.C. demand may be no more than 525,000 tons, excluding Italy. One further development may be noted. The potential export from the Netherlands is half the total production, in France less than one-quarter. Consequently, home needs will impede export from the Netherlands, although the opportunity will exist for traders to sell Dutch apples in the U.K. and import French apples into the Netherlands..... at the same time keeping some southern fruit away from the U.K.

To sum up, a reasonable harmonization between relative prices and quantities, and between home production and export is

given in Table 20. This is the third approximation.

TABLE 20

Estimated Consumption of Apples and Pears by Variety and Country

	England	Nether-lands	France /Italy	Total
Cox/ Conference	215,000	50,000	-	265,000
Southern varieties	35,000	25,000	215,000	275,000
Others	20,000	-	-	20,000
	270,000	75,000	215,000	560,000

The English growers' share of the U.K. market between mid-August and mid-March now comes to 48 per cent. If this postulated future situation is unrecognisable in terms of the past or the near future, part of the explanation is the falsity of present prices. The domestic share is not higher largely because Golden can notionally be offered at a price which influences consumers to buy it instead of, say, Cox at a higher price - the postulated price is now up to within 10p a bushel of that of the actual 1969 apple crop.

Maximum market share.

To the 48 per cent share postulated must be added the gain from the additional annual farm-gate sales realised between 1969 and the year of reckoning - the 1969 sales being built into the results for that year. The amount in question may be of the order of 10,000 to 15,000 tons, and if so the English growers' sales during their period of marketing could rise to 280,000 - 285,000 tons - about a 51 per cent share. This is just over 70 per cent of the officially-estimated output of dessert apples and pears in 1969.

This postulated maximum share is now shown in the diagrammatic form of market analysis outlined at the start of this chapter, so as to give an indication of how well-entrenched English growers would be in the circumstances - a large share might not be worth much if English growers were extremely vulnerable to shifts in efficiency or consumers' tastes. This real-life situation is more complicated even than that shown in Figure Ten for (by way of example) English growers would not be 'priced out' of the market at a given price, they would have either their market share or their profit reduced according to circumstances. Nevertheless, where there are different distributions of cost of supply and one market price we can conceive of perhaps three areas differentiated by price, separated, as it were, by thresholds of 10p a bushel. This is the intention in Figure Fourteen. In the context of the assumed maximum market share (50 per cent) for English growers

the central area is the most profitable, and constitutes 168,000 tons, or 30 per cent of supplies, the middle ring constitutes 162,000 tons and 29 per cent, the outer ring 230,000 tons and 41 per cent. The three suppliers' claims on the market, on the assumed 1969 basis of competition, are also shown.

About one-third of the English crop is well-entrenched, with about the same quantity vulnerable (i.e. in the outer ring) to a secular adverse movement of 10p a bushel, the estimated quantities being:

At a cost :

	Tons
below £1.04 a bushel	95,000
of £1.04 to £1.14 a bushel	85,000
of £1.14 to £1.24 a bushel	105,000
	285,000

The respective roles of Dutch and southern-Europe apples and pears in the U.K. market can also be seen in Figure Fourteen. So long as prices are low, the Dutch are highly competitive and could send 20 per cent of supplies (in the inner circle); as the operative price rises, southern fruit becomes more in evidence and actually has a 48 per cent share at the edge of the market, so to speak, and 37 per cent overall.

Retention of original market share.

Only time will tell whether the broad sweep of some important factors considered in the foregoing analysis accurately represents the balance of advantage between producers in the different countries. For example, one can only guess at whether the English growers' opportunity for direct sales would under- or over-compensate them for a slow change in consumers' preference towards varieties of apple and pears which English growers are less able to supply competitively. Proximity of consumers is a factor in the English growers' favour: other countries cannot compete "at the orchard gate", and retail sales also provide outlets for fruit of less than the best quality. On the other hand, we have seen that the English industry has some catching-up to do; and the variability of the English crop is another factor to be reckoned with. The latter factor is discussed in a postscript.

Recapitulation.

Proceeding largely by qualitative hypotheses - for quantitative measurement is singularly lacking - it is argued that production of apples and pears in southern Europe is not likely to sound the death-knell of production in northern Europe, including the southern half of England, solely by reason of the south's superior climate. Operative yields of marketable fruit are unlikely to be in direct proportion to hours of summer sunshine; and in addition, the faster rate of growth of

trees, and the adaptation of the environment tend to add to the expenses of production. Next, once the fruit is off the tree the effect of superior natural environment is lost and does not necessarily contribute towards an equally low cost per packed box. Economic matters impinge further upon fruit-growing when transport costs have to be borne; and finally, a delivered price in a foreign market has to be really exceptionally low if, when first supplied, it is to attract consumption by changing consumers' former habits. If consumers' preferences are strong enough, little of the originally cheap-to-grow fruit may find a market. Economic barriers turn out to be just as real as natural advantages.

By varying the assumptions about the important variables, British growers can be credited with a large share of the home market, or a little. A goodly number of assumptions have been made in working through to the postulate that English producers can fairly expect an initial 50 per cent share in the U.K. market during their own marketing season when prices are fair to producers, for the duration of the assumed present preference for Cox and at present relative wage rates for fruit-farm workers. By a combination of selective new planting and a mild shake-out on the lines of that which both the French and Dutch growers have experienced, they could reasonably expect to improve upon this. They are, however, vulnerable in the occasional short-crop years, and retention of the original share would seem to be partly conditional upon (a) some more-efficient Cox production replacing

some less-efficient Cox production, (b) successful marginal shifts in variety acreage to match trends in consumers' preference, and (c) no repetition of the years 1971 and 1972. (1969 was a relatively good year.)

Permutation of the original assumptions is not made at this stage, but it seems as if the weather and rapidly-increasing wage rates will be two national handicaps for English growers. Their competitors, on the other hand, will have ageing trees and a longing for higher incomes. Whatever the resulting balance of forces, what happens abroad will be at least as important as what happens at home. The foregoing analysis shows extraordinary sensitivity to import price. For instance, if English growers were to raise yield by 3 tons an acre on 5,000 acres of replacement planting, they could add 15,000 tons to their market share: but if costs abroad were to rise relatively by only 1p a bushel, some 25,000 tons of imports would notionally be cut off.

Both the cost and scarcity of labour, and the natural wastage of growers will tend to result in a smaller English industry than at present: and before the turn of the century questions may well be asked about the viability of an industry of, say, 1500 growers. The larger scale of the southern areas' production must be a factor in the long run. Once a supplier becomes dominant in a market, that supplier tends to retain it in other ways than by superior efficiency - the market is made safe for more-efficient producers,

but they are confined to a small share of it. It seems preferable for an English industry, which can provide at best about 6 per cent of future EEC supplies, always to look to its efficiency and not to its scale.

In closing, it is perhaps necessary to stress the hypothetical nature of this work. Realistic-sounding quantities have been used, but these are intended to convey thoughts rather than facts; and the assumption of equilibrium in the whole EEC apple and pear market is all-important to the conclusions. It should be noted that during the period of transition into EEC, and shortly afterwards, the English industry may not be recognisably like the foregoing prognosis. For example, in the short term the industry will be larger than postulated by the amount of (a) dessert apples and pears exported, and (b) the extent of unprofitable production in England.

To pursue the same ends through an enquiry conducted in wholesale markets, among fruit merchants, using information obtained through trade channels, might well produce a different picture of the future U.K. market. But who knows? If the contending countries all try equally hard to shift demand and supply in their favour, some bedrock features like those sought and tentatively evaluated in this analysis may emerge to importance.

Postscript.

Variability of crop.

In practice, it will be one thing for English growers to begin with a 51 per cent share of their market, and quite another for them to hold on to it. Foreign suppliers are not the villains in this case, but the variability in the English crop. The English output being such a small part of the entire west European market, it will be natural for the larger continental industries to make good any shortfall. In this context, the relative failures of the English crop in the last decade are a serious matter; and the cost of overcoming them merits examination.

A reserve area.

The benefits here of careful siting of orchards, frost protection, supplementary pollination and the withdrawal of the most irregularly-bearing orchards are taken for granted. These are longer-term influences. In the shorter term, the obvious way of overcoming shortages of crop is to have a reserve orchard area, to be drawn on in case of need. A reserve area would have little meaning unless it were associated with supply management, and it is also taken for granted here that, within limits, English producers could find a way of controlling the quantity of dessert apples and pears marketed each year. The main issue then becomes one of whether a reserve area is economic or not.

Historically, fruit industries have met this situation in another way - by having enough excess to foster a processing industry, which, within limits, can survive on a variable annual intake and thus leave a relatively constant amount available for fresh consumption. English dessert apples and pears have always been too costly, and yields too low, to make large-scale processing feasible. A 'reserve area' notion, is more appropriate to Britain than a 'processing surplus' notion, because more fruit of good market quality is needed to make good the shortage: fruit which would normally go for processing but can be switched into fresh consumption if the need arose, would not fulfil the required purpose.

To have to maintain for, say, two years out of five a larger orchard area than is strictly necessary will marginally increase English unit costs on the crop marketed. If the unit cost increases, however, according to the model of the market, the English growers' market share will be eroded at the margin. The best compromise between the cost of the reserve area and the fraction of market share retained is an exercise in itself and is not pursued here, neither is the cost of frost-protection considered as an alternative, but some quick tests will put the matter in economic perspective.

First of all, let us see what is involved in an effort to have 275,000 tons of dessert apples and pears available every year. In a frost year the English crop would be 70,000 tons below requirement: the average yield for that year

being 5 tons an acre, 14,000 acres of reserve orchard would be necessary ..... and in non-frost years, when the average yield was 8 tons an acre, the reserve crop would be 112,000 tons. Growers would not know what to do with it, and it would be considered wasteful. It would seem, then to be too costly to insure against the largest shortfall in the size of the crop by the reserve crop at present referred to.

Even the ordinary 'short' crop may be too expensive to complement: the A.P.D.C. paper[1], for example, shows that in 1968 the English production of dessert apples and pears was only 79 per cent of an assumed normal*. A reserve area equivalent to 26 per cent of the actual area would have made good the shortfall. To maintain this area of orchard (i.e. to produce a stand-by crop) might also add something like £45 an acre, or 10½p a bushel on average, to the effective cost of English crops, thus pricing about 95,000 tons out of the market. So a realistic reserve crop - if only from the supply management standpoint - is likely to be small. A supplementary 50,000 tons, for example, would notionally add about 5p a bushel to the average cost.

If it is postulated that up to 20,000 tons of English dessert apples and pears might occasionally be sacrificed if the crop were short, with minimal damage to the home producers' share, then, without

---

1. Op. cit.

* Normal production = 80 per cent of 'maximum production potential'.

regard to practical questions of quality, fruit size and variety, the requirement to be tested is the cost of ensuring a supply of at least 255,000 tons (275,000-20,000) in all but frost years.

The extent of variation.

Upon further examination, it appears that natural variation in annual output as recently experienced would be a considerable burden to English growers. Growers themselves are prone to point to the effects of frost years on regularity of yield on single farms, but even in the absence of frost a 30 per cent variation in year-to-year yield of single blocks of trees may often be experienced. Spoor[1] has supplied appropriate yield data for a ten-year period for five blocks of Cox and five blocks of Jonathan, on holdings in the Netherlands which were not affected by frost: Table 21.

With variations on this scale, each grower would need about 35-40 per cent of reserve area before he could be sure of a steady annual output - and how else could steady aggregate output be organised initially?

Some of the issues in utilising a climatically marginal location for a crop have been clarified by Burke[19]. On the basis of degree-day analysis of a limited number of weather stations' temperature records he concludes with reference to

---

1. In a private communication.

TABLE 21

Natural Variation in Annual Yield

of Dessert Apple Plantations

	Farm No.									
	1	2	3	4	5	6	7	8	9	10
Mean Yield (tons/hectare)	20.7	18.8	23.0	10.7	19.4	27.5	21.5	19.0	20.4	29.8
Standard obviation	4.9	3.3	6.0	3.8	6.4	5.7	9.2	2.5	9.2	8.9
S.D. as % of mean	23	17	26	35	32	18	42	13	45	29

the Irish Republic :

1) there is a 20 per cent difference in 'growing degree-days' between the most favourable and unfavourable sites;

2) above a base of 40°F, aggregate growing degree-days in a year varied between + 11 per cent and - 12 per cent of the mean in the five-year period 1958-62;

3) above a base of 50°F, aggregate growing degree-days are subject to annual variations exceeding 12 per cent.

That is, the experience of a producer on a marginal site is not likely to be consistently unsatisfactory: he must expect a certain frequency and level of unsatisfactoriness, and the more marginal he is the greater the effect. The worst effects of what appears as a lower annual average yield in a marginal situation are (a) the big year-to-year fluctuations experienced and (b) the resulting uncertainty in expectations and possible errors in managing the crop.

Variations on individual holdings tend to even each other out, with the result that aggregate annual output has relatively lower variations. Even so, over the last ten years, the mean annual gross production of dessert apples and pears in the U.K. has been estimated to be 296,000 tons, with the standard deviation

42,400 tons (14 per cent). Using past experience as a guide to the future, it seems that about 13 per cent more bearing orchard acres would be required to satisfy the requirement of a minimum crop of 255,000 tons in all but frost years. Enormous wastage in four years out of ten is implied by such a policy. Apart from that, producers' costs would be increased by roughly 9 per cent and a large slice of the market would have been surrendered to Dutch growers.

The conclusion is that protection of the English producers' best market share by a 'reserve area' policy would be self-defeating, and too costly to adopt.

Room for Improvement

The two factors of prevalence of high cost and variability in the English crop point in the same direction - towards the scope for improvement in English growers' performance. On existing farms perhaps most improvement is looked for by converting to intensive systems.

Some improvement in average performance is possible by this means, even if only by reducing the time-into-bearing of replacement orchards. The scientific evidence available does not build up into a convincing economic case for cheaper production from spindle-type trees, particularly for Cox; but if moderate-cost intensive orchards were to displace high-cost bush plantations the industry as a whole would benefit, because what is

required is greater output, preferably of superior quality, at below-average cost.

What is clear so far is that in the last decade the Dutch industry has "gone intensive" and contemporaneously made notable progress. According to Chapter 2 English growers lost ground between 1960 and 1965; and, by 1969 - to judge by available results - the highly-efficient element of growers in the Netherlands was larger than the English element. The economic progress in the Dutch industry is referred to again here not as a model for English growers to follow, but as a guide to feasible improvement in England and its probable effect upon market share. Between 1959 and 1967 'good practice' raised average farm yield by about 25 per cent. What we do not know is by how much, in 1959, typical Dutch practice was inferior or superior to English practice in 1969.

Looking to the future, Dutch economists are inclined to favour an intensive plant of small bush-type trees over the more-publicized 'spindle' forms, on account of the superior productivity of labour it affords. A recent comparison of performance [11] is shown in Table 22.

In the present context, some estimate of an aggregate, industry-wide effect arising from conversion to intensive systems may be desirable. For example, assuming (a) an area constituting three-fifths of the present area of dessert apples and pears could justifiably be intensified, and (b) the effort to intensify were made by replacement of two-fifths

TABLE 22

Comparison of Dutch Production Costs,
Spindle and Small Bush

	Spindle type	Small bush
Planting distance (m)	4 x 2	$3\frac{1}{2}$ x $1\frac{1}{2}$
Cost per acre	£	£
Fixed-type costs	242	228
Cultural costs: Labour	86	70
Other	81	87
Harvesting	53	56
	462	441
Yield (bushels/acre)	560	660
Cost per bushel at foot of tree (£)	0.85	0.68
Cost ex-packhouse (incl. 3 months' storage)(£)	1.43	1.26

of this area, and (c) as a result yield on the intensified area were increased by 25 per cent at an acceptable unit cost, the English industry would, on paper, win another 20,000 - 25,000 tons.

The remaining area of comparatively high cost in the English industry is one which there may well be most resistance to relinquishing. This is the managerial status of proprietorship. To a considerable degree, events of the last five years have forced proprietors both in the Netherlands and in France back on to the land, as it were. While sympathizers would like to see growers' rewards abroad move up to English standards, rather than vice versa, this is too much to expect in the foreseeable future. The scale of this feature is somewhat as follows. Assuming some 1,500 growers in England, having 50,000 acres of orchard, with each producer having an expectancy of £2,000 a year more than elsewhere in terms of status, the management 'load' would be £3m. Spread over 275,000 tons' output this would average £10.9 a ton, equivalent to almost 0.5p a lb - not much less than the average amount of extra transport cost on the imported crop.

Finally, it is worth checking back to the copious references to physical productivity on fruit farms - particularly labour productivity - in Chapter 2 to see whether the predictions of a threshold value of 250 bushels a man-hour are borne out by the subsequent examination of the English growers' position.

In the third approximation English growers were afforded a break-even (with total cost) price of £1.28-29 a bushel. This is considered to equate with £0.70 on the farm. From this basis we can advance to the following break-even costs per acre :

at 250 bushels harvested....£180

at 350 bushels harvested....£252

at 450 bushels harvested....£324

at 550 bushels harvested....£396

Further assuming the proportion of labour cost accounted for by labour to be 40, 38, 36 and 34 respectively, then at average wage rates of 50p, 75p and 100p an hour, the minimum permissible hours and associated labour productivity are as in Table 23.

Reference to this table will show that with labour at 50p an hour there is a good margin in most circumstances. Once labour cost had risen to 75p an hour, yields and prices being unchanged, 250 bushels per 100 man-hours would be insufficient for profitable working.

TABLE 23

Required labour productivity in certain conditions

Yield per acre (bushels)	Labour cost per acre (£)	Permissible hours per acre at 50p (and related bushels per 100 man-hours)	75p	100p
250	70	140 (179)	94 (238)	70 (357)
350	93	186 (190)	124 (250)	93 (380)
450	113	226 (200)	151 (265)	113 (400)
550	131	262 (210)	175 (281)	131 (420)

6. SUMMARY

A look beyond the present unstable market situation: the prospects of English apple and pear growers are examined against a background of the enduring physical and economic factors determining location and contributing to intra-European trade in apples and pears.

It is postulated that the fruiting tree works almost as efficiently on the most suitable sites in northern Europe as in the chosen sites in southern Europe, although the greater capacity of a southerly location makes for lower unit cost where the higher capacity is realised.

Because at least two-thirds of the retail price of apples and pears is incurred between the tree and the consumer, and the natural advantage of a higher yield does not necessarily persist as an economic advantage beyond the orchard gate, there will be less difference in comparative supply-prices on the U.K. market from different areas than there was originally in yield per hectare.

Using cost of production data for 1969, the supply capability of English, Dutch and French producers in the U.K. market is assessed. When the cost of transport and the present degree of consumers' preference for English varieties are taken into account, some 70 per cent of the English output was shown to be competitive in the home market.

The English industry is then analyzed on a unit-cost basis, and a weakness observed in the form of a thick stratum of 'second best' results. Specialized production did not show up well in the year in question.

According to their performance in 1969, and assuming a break-even situation on marginal farms in each country, British growers would have 43 per cent of the market during their own season as of right. Reasons are given for British growers being thought unlikely to retain their original market share: neither intensive nor a reserve area of orchard seem to constitute adequate safeguards by themselves.

7. REFERENCES

1. Roosje, G.S. (1970) Experience with high-density fruit plantings in Holland. Proc. N.Y. State Hort. Soc. Vol. 115 pp. 21-36.

2. Cambra, R. (1966) Economia de la Produccion Frutal. Expt. Stn. Aula Dei, Zarogoza.

3. Cabirol, J-L. (1967) Prix de Revient en Arboriculture Fruitière Centre d'Études et de Modernization Agricoles. Purpan.

4. Folley, R.R.W. (1971) Dessert Apples and Pears : Financial Results for the 1969 Crop. Wye College Ashford.

5. Lauret, F. (1971) Coûts, prix et equilibre sur le marché des fruits. École Nationale Superieure, I.N.R.A., Montpellier.

6. Loustau, P et Massot, M. (1972) La pomme de table. C.T.I.F.L.. Paris.

7. Spoor, P.A. (1971) Het fruitteeltbedrijf in de toekomst (1980) L.E.I. Den Haag.

8. Mainié, P. et al., (1966) Politique de Financement et Choix de Investissements. I.N.R.A, Paris

9. The English Apple and Pear Industry and the EEC. (1971) Apple and Pear Development Council, Tunbridge Wells.

10. Burke, W. (1968) Growing degree-days in Ireland. Irish Journ, Agric. Res. Vol. 7. pp 61-71.

11. Goedegebure, J. (1971) Cost of Production of Apples by Different Marketing Methods. Fruitteelt, 16th Oct. pp. 982-3.

AGRICULTURAL ADJUSTMENT UNIT
PUBLICATIONS

		Price	P&P
BULLETINS			
1	Farmers and the Common Market. B.H. Davey and S.J. Rogers.	25p	3p
2	Efficiency in Agriculture and the Share of the Domestic Market. J. Ashton.	25p	3p
4	Elements of Agricultural Adjustment. S.J. Rogers	25p	3p
5	Farming Systems and the Common Market. C.S. Barnard, H. Casey & B.H. Davey.	50p	5p
6	Farm Size Adjustment : A Workshop Report.	25p	3p

		Price	P&P
BULLETINS			
7	Capital Adjustment in Agriculture : Workshop Report.	25p	3p
8	A Discussion of Current Policies and the Future Structure of Agriculture : A Symposium.	50p	5p
9	Stability and the Beef Market : A Unit Study.	50p	5p
10	The Changing Agricultural Labour Force : Implications for Training. C.E. Heath & M.C. Whitby.	50p	5p
11	A Comparison of Structural Policies in Agriculture. S.H. Lane.	50p	5p
12	Economic Aspects of the Dairy Manufacturing Industry; A Workshop Report.	50p	5p

		Price	P&P
BULLETINS			
13	Hill Sheep Farming Today and Tomorrow : A Workshop Report.	50p	5p
14	Structural Change in Northern Farming : Studies in Structural Change. T.P. Phillips & S.J. Rogers.	50p	5p
15	F.E.O.G.A. The Agricultural Guidance and Guarantee Fund of the EEC, Francois Muller.	50p	5p
16	Grass Conservation and Dairy Farming: A Workshop Report.	50p	5p
17	Agriculture in the UK. B.H. Davey. (replaces Bulletin No. 3).	50p	5p

			Price	P&P
TECHNICAL PAPERS				
TP	1	Organisational Possibilities in Farming and Types of Business Organisation. M.A. Gregory & I.S. Stephenson.	15p	3p
TP	3	Management Techniques for Reducing Costs or Increasing Revenues. R.W. Helme.	15p	3p
TP	4A	Current Taxation & Some Future Possibilities. R.H.L. Herdman & I. Weir.	15p	3p
TP	5	Insurance in Agriculture. C.T. Jameson & J. Rawlings.	15p	3p
TP	6	Budgeting and Budgetary Control. J.C. Cole.	15p	3p
TP	7A	Estate Duty and Capital Gains Tax in Agriculture. C. Townsend.	15p	3p

		Price	P&P
TECHNICAL PAPERS			
TP 8	Modern Management. J.R. Gemmell.	15p	3p
TP 9	Agricultural Co-operative Activities and Case Histories of Co-operatives. D.G. Bailey and E.T. Gibbons.	15p	3p
TP 10	Human Factors in Agriculture. J.D.G. Troup.	15p	3p
TP 11	The Role of Ergonomics in the Efficient Utilization of Agricultural Labour. J. Matthews.	15p	3p
TP 12	Efficient Labour Organisation. N.W. Dilke.	15p	3p

		Price	P&P
MONOGRAPHS			
1	Models of Population and Income : Economic Planning in Rural Areas. K,G. Willis.	50p	5p
2	Recreation Benefits from a Reservoir. R.C. Lewis & M.C. Whitby.	50p	5p
3	Economic Policy Determination and Evaluation in the North Pennines K.G. Willis.	50p	5p
4	The Long-Term Future for English Dessert Apple and Pear Growing.	50p	5p

	Price	P&P
BOOKS		
Economic Change and Agriculture : Edited by J. Ashton & S.J. Rogers. Oliver & Boyd 1967.	£2.10p	23p
Research, Education and Extension in Agriculture: Edited by J. Ashton & R.F. Lord. Oliver & Boyd 1969 (05 001710 1)	£1.50	15p
The Economic Prospects for Horticulture : Edited by E.D. Sargent & S.J. Rogers. Oliver & Boyd 1970 (1SBN 0 05 002242 3)	£1.50	15p
Irish Agriculture in a Changing World. Edited by I.F. Baillie & S.J. Sheehy. Oliver & Boyd 1971 (1SBN 0 05 002344 6)	£2.50	23p
International Trade in Temperate Zone Products. F.O. Grogan (with contributed chapters) Oliver & Boyd 1972 (1SBN 0 05 002372 1)	£2.50	23p

	Price	P&P
BOOKS		
The Remoter Rural Areas of Britain. Edited by J. Ashton and W. Harwood Long. Oliver & Boyd 1972 (1SBN 0 05 002471 x)	£2.50	23p
The Common Agricultural Policy and Britain. Edited by S.J. Rogers and B.H. Davey. Saxon House 1973 (1SBN 0 347 01012 1)	£3.50	23p

---

Obtainable from :

The Agricultural Adjustment Unit,
Department of Agricultural Economics,
The University,
Newcastle upon Tyne, NE1 7RU.

- - - - - - - - - - - -

Details of a subscription scheme can be obtained from the Administrative Officer of the Unit.