Agricultural Enterprise Studies
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Report No. 11

WYE COLLEGE
(University of London)

Early Tomato Production

Fourth Report on
The British Isles Tomato Survey
1969 and 1970

J. A. H. NICHOLSON

SCHOOL OF RURAL ECONOMICS
AND RELATED STUDIES
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EARLY TOMATO PRODUCTION

Fourth Report on the British Isles Tomato Survey - 1969 and 1970.

The first two sections of this report summarise the information collected in the fourth and fifth years of this national enterprise study. The results of early tomato crops are analysed according to their location. Detailed tables present data which may be used as output standards for sales analysis.

The third section is devoted to a discussion of some trends evident in the practices and performance of a common sample of some twenty-two nurseries, for which data have been provided in each of the years from 1966 to 1970 inclusive. Moderate results from nursery expansion were indicated in many cases, and the fourth section of the report analyses the possible reasons for this, and outlines the factors a grower should take into account before investing further capital in early tomato production.

March 1972.

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FOREWORD

University departments of Agricultural Economics in England and Wales have for many years undertaken economic studies of crop and livestock enterprises. In this work the departments receive financial and technical support from the Ministry of Agriculture, Fisheries and Food. A recent development is that departments in different regions of the country are now conducting joint studies into those enterprises in which they have a particular interest. This community of interest is being recognised by issuing enterprise reports in a common series entitled "Agricultural Enterprise Studies in England and Wales", although the publications will continue to be prepared and published by individual departments. Titles of recent publications in this series and the addresses of the University departments are given at the end of this report.

Whilst published as a contribution to the Enterprise Studies series, this report is in fact the fourth which Mr. Nicholson has prepared since he embarked in 1966 on a major long term enquiry into economic aspects of tomato production. This work covers several different regions in Britain, as well as the Channel Islands, and throughout this time Mr. Nicholson has co-ordinated the efforts of economists at various other Universities together with the States of Guernsey Advisory Service. This project can thus be said to have pioneered the way for the other joint studies which have since been successfully undertaken by the Agricultural Economics Departments.

The data discussed in this report were coded and processed at Wye College, as before with the aid of an original computer programme written for this purpose by Dr. J. P. McInerney. The staff of the Statistical Unit at Wye College rendered invaluable assistance with this part of the work.

Once again we extend our warmest thanks to those colleagues who contributed data for their regions, and to every one of the growers who has allowed his results to be used in this research. We are grateful for all their help, and for their comments and criticisms.

Ian G. Reid

Director, Centre for Management Studies

CONTENTS

PART I

Further Records from Early Tomato Nurseries.

The British Isles Tomato Survey is a long-term research project which is concerned with the early crops grown in various districts in mainland Britain and the Channel Islands. Early tomato crops are regarded for this purpose as those picked first:

a) in March or April or still earlier in the Channel Islands and southern England,

b) in April or May or still earlier in more northerly districts such as Lancashire.

Surveys of the performance of relatively large numbers of nurseries were completed in the three years from 1966 to 1968. [1,2,3] As conceived in 1966, the aim of the project was twofold. In view of the experimental and advisory effort then devoted to early tomato production, it seemed appropriate to examine the economic aspects of cultural and organisational management on early nurseries. A need for a full study of the affect of locational factors on profitability had also been shown, as the result of a preliminary assessment of the limited information then available by Dr.R.R.W. Folley and R.A. Giles.[4] Their analysis of the data from five mainland regions had suggested that the comparative climatic advantages enjoyed by growers in southern England were much offset by the selling advantages open to those in northerly districts.

Further research on the locational issue is still being undertaken, making use of the information collected in the first three years' surveys. In 1969, it seemed desirable to widen the time-span over which information would be available for this purpose. A smaller-scale investigation, on similar lines to the earlier work, was made possible by the goodwill of the growers who had participated in the earlier years, and this was repeated in 1970. By thus continuing this research, it has been possible to measure certain trends on early tomato nurseries more satisfactorily.

TABLE 1.1 COMPOSITION OF SURVEY SAMPLES

Region	Number of Records 1969	1970
Jersey	3	4
Guernsey	6	6
Central South	8	6
South East	6	7
East Anglia	6	6
Lancashire	6	6
South West	2	1
	37	36

If compared with the earlier reports in this series, it will be found that the present study does not refer to nurseries in the Lee Valley or the Clyde Valley. A breakdown of the results into different categories of earliness was also a feature of the earlier studies, but the number of records which were collected in 1969 and 1970 were too small to justify this.

THE SURVEY SAMPLES

Seven regions were represented in the latter two surveys, and Table 1.1 shows the numbers of holdings in each of these regions. In 1969, 2,648,000 sq.ft. of tomatoes were recorded, and in 1970, when there was one fewer co-operator, the total area of glass was 2,604,280 sq.ft.

The small sample numbers present an obvious pitfall in the interpretation of the results of these crops. It is important to stress this point, because up-to-date information about economic aspects of tomato production is not easily found elsewhere. Inevitably some readers may need to put the survey results to uses for which they were not really intended. It should also be emphasized that the data are not intended to be representative of all growers' results in the areas concerned. Indeed, a deliberate bias has been built into the samples, to emphasize the results of the nurseries which were believed to be the most successful in their locality.

The reader must contend with a further difficulty in interpretation. It is not known precisely, except perhaps to local advisers, how many early growers are to be found in the regions concerned. Nor can the acreages of early tomatoes grown in them be stated confidently, as they are not distinguished in the published statistics (except in Jersey). It is widely known, however, that there is some concentration of early growers in the areas to which reference will be made here.

TABLE 1.2 HEATED TOMATO AREAS IN THE SURVEY REGIONS

Region		1969 Acres	1970 Acres
Jersey		52	52
Guernsey		787	780
Central South:	Hampshire	45	52
	Isle of Wight	9	9
	Dorset	9	9
	Devon	31	31
		94	101
South East:	Kent	33	33
	Surrey	25	24
	E.Sussex	19	16
	W.Sussex	83	115
		160	188
East Anglia:	Essex	139	142
	Hertford	52	45
	Cambridge	28	30
	Norfolk	37	37
		256	254
Lancashire		143	143
South West:	Gloucester	26	29
	Somerset	27	28
		53	57

Sources: Agricultural Statistics, Department of Agriculture, States of Jersey.

Guernsey Horticultural Censuses

July Glasshouse Censuses, Ministry of Agriculture, Fisheries & Food.

Table 1.2 therefore is as close a guide to the acreages of early tomatoes in the seven survey regions as is possible. The Jersey data refer to crops planted before February 1st in each year. The Guernsey data refer to specialist enterprises and to crops interplanted with others, such as asparagus fern. In acreage terms, the overall situation was stable in the Channel Islands.

It will be seen that there were important increases in the acreages in Hampshire and in West Sussex between 1969 and 1970, and it is understood that much of this extra glass was built for early production. The acreage in 1967 in West Sussex had merely been 69, and it should also be mentioned that the acreage in Lancashire increased from 108 to 143 between 1967 and 1970.(5) It should be emphasised that the definition of heated crops used by the M.A.F.F. in 1970 would embrace many acres of mid-season tomatoes, i.e. "plants being grown with the aid of artificial heat during the whole or part life of the planted out crop".

As each year unfolds, home-based competition for the earliest nurseries in the British Isles develops first from such

TABLE 1.3 TOMATO PRODUCTION IN THE CHANNEL ISLANDS

	1969 Acres	1970 Acres
Jersey		
Glasshouse Crops:		
Planted before 1st February	52	52
Planted after 1st February	20	20
Planted after 1st June	2	1
Outdoor Crops:		
First Crop	811	822
Second Crop	282	302
Guernsey		
Glasshouse Crops:		
Heated	787	780
Unheated	131	104

later plantings of heated tomatoes. Crops grown in unheated houses or plastic film structures then come into production, and finally the outdoor crops grown in Jersey. Tables 1.3 and 1.4 therefore show the overall acreages of tomatoes grown in the Channel Islands, and England and Wales (based on the same sources as Table 1.2). The regions quoted in Table 1.4 are those of the M.A.F.F. classification, however, and not those used for the purpose of the survey. It is understood also that about 200 acres of tomatoes were grown in heated glass in Scotland at this time.

Table 1.4 shows a clear increase in the area of heated tomatoes in 1970, with a corresponding drop in the later crop.

TABLE 1.4 TOMATO PRODUCTION IN ENGLAND AND WALES

	1969 Acres	1970 Acres
Heated Crops		
Eastern Region	391	396
South Eastern Region	238	272
East Midland Region	46	45
West Midland Region	102	105
South Western Region	132	135
Northern Region	31	30
Yorkshire & Lancashire	206	214
Wales	21	22
	1,167	1,219
Unheated Crops		
Eastern Region	291	272
South Eastern Region	221	186
East Midland Region	33	32
West Midland Region	110	109
South Western Region	82	79
Northern Region	20	22
Yorkshire & Lancashire	247	244
Wales	24	17
	1,028	961

GROWING AND SELLING TOMATOES IN 1969 and 1970

In spite of the high degree of environmental control which is now possible, both the ease of management and the profitability of early tomatoes are associated with the prevailing weather at each season. Early on, light intensity is critical, as growers seek to ensure that the bottom truss of each plant is 'set'. Perhaps it should be added that financial success does not necessarily follow achievement in this respect - difficult seasons can prove to be profitable ones.

If temperature levels are lower than expected, additional heating costs will ensue, and some growers may find difficulty in maintaining the cultural regimes they require. Temperatures which are too high while the crop is ripening are also harmful, as fruit quality and hence realised prices can be impaired. Demand for fresh tomatoes is very much linked with the incidence of sunny weather, with the British tendency to eat salads most often at such times. However, prolonged spells of warm weather may generate heavy flushes of ripe fruit on all nurseries, with consequent disruption of the market.

As the result of experimental work conducted at various centres by the Agricultural Development and Advisory Service (formerly the National Agricultural Advisory Service), and the States Advisory Service in Guernsey, growers throughout the British Isles may choose to follow cultural 'blueprints' which specify the temperatures at which they should aim, whether by heating or ventilation, at appropriate stages in the crop cycle.

The following notes outline the main features of the weather at four locations in 1969 and 1970.

Guernsey 1969 The weather was extremely variable and the crop generally was the latest since 1964.(6) Sunshine in January was below average but temperatures above average. February was unusually cold, and for most of March sunshine and temperatures were less than usual. There was a long spell of weather between April and June which was colder than normal.

Guernsey 1970 January and February gave a good start to the season with better sunshine and temperatures than usual. However there were occasions in March and April when temperatures for prolonged spells were 10 - 12°F below normal. Between June and August, temperatures were lower than average on 71 out of the 92 days, and 120 hours less sunshine than usual was recorded in these months.

Hampshire 1969 As in Guernsey, there was a poor start to the season.(7) Between January and May, the daily sunshine hours averaged 4.0 against a thirty-year average of 4.7, and only February and April were slightly better than usual in this period. March was the dullest month for fifteen years. However, there followed the best summer for some ten years. Between January and May, temperatures also had been lower than expected. Frosts were recorded on nineteen consecutive days in February.

Hampshire 1970 January was again very dull, but sunshine in February was better than usual. April was dull, but thereafter early summer was marked by above average sunshine. Temperatures between January and April were lower than normal, March's being the lowest since 1962 and April's the lowest since 1956.

Lincolnshire 1969 Sunshine in the locality of several of the nurseries in the survey was much below average in the first half of the year.(8) In May, it was about 100 hours less than usual. Temperatures were better than usual in January, but lower than usual in February and March.

Lincolnshire 1970 Weather here was fairly similar to that on The Solent. January was very dull, but sunshine in February was as much as 182.5% of normal. From April to August higher than average sunshine hours were recorded. February and March were unusually cold, but temperatures were above average from May onwards.

Lancashire 1969 January was mild on The Fylde, but the next three months were cold.(9) Sunshine was better than usual in April and June, but below average in May.

Lancashire 1970 January was again mild. In February there was more than an hour a day of sunshine than usual, and June was another month with above average sunshine.

TABLE 1.5

SUPPLIES OF TOMATOES GROWN IN THE BRITISH ISLES

Tons of Fresh Tomatoes

1969	March	April	May	June	July	August	September
Production of:							
Jersey	140	702	880	935	1,007	1,870	8,580
Guernsey	432	3,269	8,627	12,206	14,593	6,876	4,933
United Kingdom	300	2,400	7,500	15,600	22,300	22,200	15,800
Total British Isles	872	6,371	17,007	28,741	37,900	30,946	29,313
1970							
Production of:							
Jersey	82	522	862	1,152	702	2,207	7,526
Guernsey	563	3,820	9,354	15,428	9,673	7,169	4,933
United Kingdom	200	1,600	6,200	15,500	24,400	30,800	17,500
Total British Isles	845	5,942	16,416	32,080	34,775	40,176	29,959

Table 1.5 outlines the overall supplies of home-grown tomatoes in 1969 and 1970, between the months of March and September, when the most substantial quantities of tomatoes from the early nurseries would have been available. In this table, Jersey data relate both to glasshouse and to outdoor supplies (August and September). All the Channel Island data are calculated only to the nearest week, and the M.A.F.F. has only been able to give estimates for United Kingdom production.

The slow build up of Guernsey supplies in 1969 was noted above. The Guernsey Tomato Marketing Board reported that under half the total crop grown in the island had left by the end of June (45.9%) compared with an average bulk of 55% for the four previous years. However, a period of very heavy shipments followed this, and the final total number of packages to leave the island (not shown in the table) proved to be the highest ever. In 1970, there was a much more favourable build-up of supplies, which evidently were associated with the more helpful weather conditions (since the acreage of heated tomatoes was more or less stable). Shipments after June proved to be rather light, and the total crop eventually was the lowest since 1966.

The reverse of this pattern can be seen in the United Kingdom figures. Mainland crops bulked faster to the end of June in 1969, but late summer supplies were heaviest in 1970 (notably in August). In spite of the high sunshine hours recorded on the mainland in February in 1970, the build up of English-grown supplies presumably was restricted by the generally cold spring conditions. The extra competition which early growers might have expected from the increased acreage of heated glass thus did not materialise until late into the marketing season.

It is not possible to say to what extent the different supply pattern in 1970 reflected growers' planned decisions to produce a later crop on the mainland. No small or domestic grades were shipped from Guernsey for some days in August 1970, in view of the very heavy supplies of tomatoes then available on the United Kingdom market.

A further feature of the 1970 season may be noted. Strikes of dock workers are a periodic hazard for Channel Island growers, for whom it is normally most economic for their crops to be transported to England by sea. A national dock strike commenced in July 1970 and lasted for a month. During this time the G.T.M.B. succeeded in shipping their tomatoes into English ports without excessive difficulty. The tomatoes grown in Jersey were flown to England; only one grower, who had the foresight to book space in advance on scheduled flights, got his tomatoes away from the start of the strike. Subsequently other Jersey tomatoes were moved on chartered air planes at more than double the freightage charged on scheduled services.

Imports

There is no stage in their season when early growers in the British Isles enjoy a monopoly position in the market. At all times there are competitive imports available of the round type of tomatoes which generally are favoured in northern Europe. Table 1.6 outlines the levels of these imports in 1969 and 1970. It can be seen that under current trading conditions, before there is any modification to the present levels of tariff protection, Canary Island tomatoes predominate in March and April, and those from the Netherlands thereafter.

In 1970, imports to the end of June exceeded those in 1969, but imports later in the summer proved to be lighter than in the previous year.

Competition between the earliest home-grown crops and the tail end of Canary supplies is relatively short-lived. At times, even so, this competition is quite considerable. For instance, the G.T.M.B.'s marketing bulletin for April 23rd 1970 referred to the quantity and quality of Canary tomatoes delaying retailers' interest in new supplies of glasshouse-grown tomatoes.

A characteristic of the Canary trade is the variable quality of the produce. In a recent review of the Canary

TABLE 1.6 SUPPLIES OF TOMATOES IMPORTED INTO THE UNITED KINGDOM

Tons of Fresh Tomatoes

1969	March	April	May	June	July	August	September
Imports from:							
Netherlands	297	2,269	10,966	12,056	10,299	4,099	2,716
Canary Isles	16,474	11,075	1,667	3	-	-	-
Spain	106	79	2	1	-	-	28
Other Countries	27	44	275	569	786	466	295
Total Imports	16,904	13,467	12,910	12,629	11,085	4,565	3,039
1970							
Imports from:							
Netherlands	33	3,039	11,521	15,201	9,390	2,147	2,406
Canary Isles	15,596	13,961	1,583	6	-	71	-
Spain	587	118	52	31	7	15	81
Other Countries	47	350	557	958	1,028	569	466
Total Imports	16,263	17,468	13,713	16,196	10,425	2,802	2,953

industry this was attributed to the quota system which is imposed on exporting growers by the Spanish National Fruit Syndicate.(10) In seeking orderly marketing, the Syndicate issues eighteen weekly quotas to the growers. When suitable quality for export is scarce, they may therefore be tempted to achieve their quota with sub-standard tomatoes. Inadequacies in the island's grading inspectorate and in the Spanish shipping services (which are allowed to monopolise the distribution of the Canary crop) further compound the situation. But for these factors, competition from this source might be felt all the more by the earliest growers in the British Isles.

In 1969 Canary imports fell away earlier than in some years, and supplies of Guernsey tomatoes, as was pointed out above, were unusually backward in April and May. In consequence, supplies from the Netherlands (where the weather had been less difficult) were attracted to Britain on a heavy scale. The heaviest tonnage for some five years came into the United Kingdom from this source. There were further heavy imports from the Netherlands in June, July and August.

April imports of Canary tomatoes were rather higher in 1970, but Dutch imports in that month were the highest ever to date. And in spite of the high level of tariff in May and June, the volume of Dutch imports in those months created a further record in 1970. In due course, it was not possible for Dutch tomatoes to be shipped to England during the dock strike, but about ten per cent of normal supplies were flown into the country from Rotterdam.(11)

Exports from 'Other Countries' to Britain included those from the Republic of Eire and various Balkan countries. In recent years, the industry in Eire has grown considerably, largely as the result of assistance in various ways by the Irish government.(12) In 1956 the then duty of 2d per lb. on foreign (but not U. K.) supplies was trebled, and the periods of import restriction were extended. Subsequently there has been a vigorous research and educational programme, while in 1967 substantial capital grants were introduced. By 1969 the acreage of glasshouse tomatoes was treble that in

1959, and further expansion was under way.

Given such an increase in production, Eire has become self-sufficient in tomatoes at earlier and earlier stages in recent years. This has affected growers both in Guernsey and mainland Britain. Inevitably there has been a major increase in trade across the border with Northern Ireland, in consequence of which Guernsey supplies have been displaced from this part of the United Kingdom as well as the Republic itself. In 1967 the G.T.M.B. reported shipping 650,000 packages to Belfast; in 1970 only 250,000 boxes went to that market. No doubt more Guernsey tomatoes were dispatched to mainland centres as the result of this.

While Eire's market was protected both by a quota and a tariff (admittedly at a preferential rate) against imports from the British Isles in 1969 and 1970, Irish tomatoes were exempted from duty on entry to the United Kingdom. At peak periods they were sent not only to Northern Ireland, but to some towns in England and Scotland as well. The G.T.M.B. reported competition of this nature in both years.

British growers have watched developments in the Balkan countries with a weather eye for several years. State-sponsored building programmes for glasshouses have been reported from Bulgaria, Rumania and Hungary. Observers are widely agreed that the main reason for this investment lies in the opportunity it has created to earn foreign currency. This in turn has been needed to purchase equipment needed to expand these countries' industrial capacity. The Rumanians perhaps present the greatest threat, for over three quarters of their produce is consigned to the West.(13)

In Rumania the glasshouse area expanded five-fold between 1964 and 1969, from 100 to 510 hectares. But in the same period, the glass area in the Netherlands expanded from 6020 to 7120 hectares.(14) The extent to which further expansion is possible or likely is not easily judged at a distance, or even by visitors to Eastern Europe at close hand! But it now seems generally agreed that the advantages of production there have been overstated; that losses from their export trades cannot indefinitely be accepted even to secure currency; and that further rapid growth therefore is now less likely in this quarter.

TABLE 1.7 TOTAL SUPPLIES OF TOMATOES ON UNITED KINGDOM MARKET

Tons of Fresh Tomatoes

1969	March	April	May	June	July	August	September
Production of British Isles	872	6,371	17,007	28,741	37,900	30,946	29,313
Imports	16,904	13,467	12,910	12,629	11,085	4,565	3,039
Total Supplies	17,776	19,838	29,917	41,370	48,985	35,511	32,352
1970							
Production of British Isles	845	5,942	16,416	32,080	34,775	40,176	29,959
Imports	16,263	17,468	13,713	16,196	10,425	2,802	2,953
Total Supplies	17,108	23,410	30,129	48,276	45,200	42,978	32,912

Sources of Tables 1.5, 1.6 and 1.7

Fruit Intelligence, Vol. XX 1970, and Vol. XXI 1971, Commonwealth Secretariat.
Private Communication, Ministry of Agriculture, Fisheries and Food.

In 1969 and 1970, Rumania exported tomatoes to the United Kingdom under the following quota agreements :

October 1968	-	May 1969	600 tons
October 1969	-	May 1970	2,000 tons

In terms of volume, these agreements may have seemed quite innocent. As the G.T.M.B has explained, however, the problem was that delivery of the full quota could occur within a phase of several weeks. The early market in March and April always is particularly sensitive to sporadic deliveries of extra supplies.

Evidently the market was disrupted in this way towards the end of April in 1970. A deputation from the National Farmers Union protested to the Board of Trade that some 12,000 trays of good quality tomatoes from Rumania (and Bulgaria) had arrived in one week, and that these had depressed the price for home-grown tomatoes from 3s. 6d. to 3s. per lb.(15)

Total Supplies

Table 1.7 summarises the two preceding tables. Except for March and July, the total monthly supplies of fresh tomatoes were heavier in 1970. Some relationship between the overall supplies available and the unit prices realised for them was to be expected, and it will be seem below in Table 1.10 that the growers in the survey generally did obtain lower prices in 1970. In spite of the heavy supplies available on the market in July 1969 (the greatest quantity in any one month) growers obtained better prices than they did a year later.

Consumption

Taking these years as a whole, the demand for fresh tomatoes appeared to be more or less static, as is shown in Table 1.8. Consumption of tomatoes had been similar in the three preceding years. There was a slight drop in the consumption both of tomatoes and salads in 1970, but there was a proportional increase in consumption of canned tomatoes.

In compiling these data, which are estimates prepared by the M.A.F.F., the produce of gardens and allotments was taken into account, and consumption was assessed both in private households and in various types of catering establishments. Use was made for this purpose of the conclusions from the National Food Survey.

TABLE 1.8 MOVEMENT OF SUPPLIES INTO CONSUMPTION IN THE UNITED KINGDOM

	lb. per head	
	1969	1970
Fresh Tomatoes	13.6	13.3
Canned Tomatoes	6.4	6.8
Leafy Salads	4.7	4.3

Source Fruit Intelligence, Vol. XXII, 1972, Commonwealth Secretariat.

The Market for Tomatoes

According to estimates prepared by the M.A.F.F., the value of output of heated tomatoes grown in the United Kingdom in 1969 was £13,985,000.(16) This compared with £4,402,000 for cold crops and £54,873,000 for the glasshouse industry as a whole. At the time of writing, only provisional data are available for the 1970 crop, the respective values being £15,037,000, £4,043,000 and £56,561,000. Corresponding estimates of the total values of supplies (heated, cold and outdoor) from the Channel Islands were £11,984,000 in 1969 and £10,315,000 in 1970.

Estimates are also available of the total value of imported fresh tomatoes, namely £24,450,000 in 1969 and £27,863,000 in 1970. These include imports over the winter months, mainly from Spain and the Canary Islands, as well as those discussed in Table 1.6.

METHOD OF ANALYSIS

Having thus described the conditions in which the growers in the surveys were operating in 1969 and 1970, the remainder of this chapter is devoted to a description of the procedures used in this research and the results of the samples in national terms. It should be noted that all the average data which are quoted below, and in Parts II and III, are weighted to the total output or the total area of the groups of crops to which they relate. The following terminology should be followed if any of the data are to be used for comparative purposes.

Gross Output is the value of sales net of commission, market handling charges, carriage, the hire of returnable containers or the cost of non-returnable packages. Where significant, the costs of the growers' own transport have been deducted. The costs of freight by sea or air have been deducted to calculate the output of Jersey crops. Guernsey data are net of the levies imposed by the Tomato Marketing Board, but they have not been readjusted to allow for the small rebates paid at the end of both the 1969 and 1970 marketing seasons. Labour costs for grading have not been included in the deductions from gross revenue.

This definition varies from that which is normally used, by the inclusion of package costs. Understandably, many readers may not find it convenient for immediate comparative use, but it has been proved necessary in order to be able to express the results of each of the crops in the sample in exactly like-with-like terms. To many laymen, the economist's notion of gross output is a rather perverse example of professional jargon, where 'net output' would seem to be a more obvious term. Unfortunately, economists speak of net output in a rather different sense. It is a concept which no longer seems significant in the management of tomato crops, but should any reader wish to calculate net output data from the tables in this report, this can be done by deducting the costs of seeds and plants from gross output.

Average Net Realised Prices have been calculated by dividing gross output by the number of 12 lb. units marketed. All price data are shown in decimals, as in the earlier reports.

Margin over Heating Costs (commonly abbreviated to "margin" in the following text) is gross output less the costs of seeds, rootstock seeds, purchased plants, fuel used for heating (but not steam sterilisation), propane or other sources of carbon dioxide, and the electricity used in boiler operation, circulating pumps and with propagation equipment. These costs necessarily had to be estimated on many nurseries, and minor differences between individual nurseries or regions cannot be regarded as being at all meaningful.

More detailed costings were not collected in the surveys, nor is the method of analysis intended to determine the profit or net income of the nurseries concerned. In the absence

of supporting data, it may be inferred that the nurseries with the highest margins over heating costs were the most profitable. Earlier studies have suggested that such an assumption generally can be justified. However, it will be realised that these margins more correctly can be said to show the potential rather than the absolute profitability of the tomato crops in the surveys.

Broadly, it is true to say that there are three factors which are most likely to determine the profitability of an early tomato enterprise :

a) the relationship between output and heating costs, expressed here as 'margin over heating costs',
b) the total costs of the labour employed,
c) the annual capital charges on the firm.

When the performance of outwardly similar businesses is examined, any one of these factors will be found to vary between high and low levels. They are not necessarily correlated, i.e. very high margins may be associated with high or medium expenditure on labour on different nurseries according to the individual growers' attitudes to and expertise in labour management, and the extent to which they have substituted capital for manpower.

On any one nursery, one factor may be high but another low in level. Thus the combination which obviously is ideal, a high margin associated with low labour costs and low capital charges, is possible both in theory and practice. So also is the opposite extreme of a low margin, high labour costs and high capital charges!

While generally a high margin indicates able management, it should also be said that the converse does not necessarily follow. The profitability of the early tomato crop may not be the only issue in many nurseries. A grower who generates a relatively low margin may nonetheless achieve a very profitable succession or combination of crops, with productive overall use of his resources. It should also be appreciated that some of the lower margins recorded may nonetheless have represented fine achievements by the growers concerned, in view of the quality of the resources at their disposal, in those situations where further investment may not be feasible or where the growers deliberately had refrained from it.

TABLE 1.9 AGGREGATE AVERAGE RESULTS

		1969	1970
Number of Records		37	36
Tons per Acre			
To July 31st		45.9	49.6
To September 30th		60.6	65.4
Average Net Realised Prices per 12 lb.		£	£
To July 31st		1.20	1.10
To September 30th		1.03	0.94
Per Acre			
Gross Output			
To July 31st		10,247	10,223
To September 30th	(A)	11,650	11,478
Costs of			
Seeds and Plants		40	36
Heating Fuel		1,807	1,714
Carbon Dioxide		218	268
Electricity		193	191
	(B)	2,258	2,209
Margin over Heating Costs (A-B)		9,392	9,269

RESULTS OF THE WHOLE SAMPLES

Table 1.1 indicated that there was a net loss of one co-operator from the 1970 sample compared with that of 1969. In fact three growers dropped out of the survey in 1970 and two new co-operators were recruited, the remainder being common to each year. It can therefore be said that the samples were so similar as to highlight clearly the different character of the two crop cycles under review.

Table 1.2 summarises the results of all the crops recorded in each year. The main points to note are that:

a) yields were rather heavier in 1970,
b) realised prices were rather higher in 1969,
c) gross output was fractionally higher in 1969,
d) the recorded costs were fractionally lower in 1970, due mainly to less outlay on heating fuel,
e) margins were higher in 1969, on average, but only by some £123 per acre.

Output data are given both to the end of July and the end of September in each year. Every grower would have been selling tomatoes at least to the first of these dates, although a few crops were then cleared for successional planting. Growers were not asked to contribute records after the end of September, as generally it was believed that they did not have significant quantities of tomatoes left for sale after that time.

In Table 1.3 the tonnages and prices recorded by the whole samples are analysed in greater detail. Period I in this table (and others in subsequent sections of the report) refers to tomatoes sold in March or earlier. Each subsequent period relates to the next half month, so that period 13 is the latter half of September.

With the exception of the latter half of June, yields were higher in each of the periods 2 - 10 inclusive in 1970. Prices, as has been noted earlier, were higher in ten periods in 1969, notably between periods 5 - 12.

The rather lower level of costs recorded in 1970 might not have been expected. Probably the cost increases reported in July 1970 would not much have affected results in that year.(11)

TABLE 1.10 AGGREGATE AVERAGE PRICES AND YIELDS BY PERIODS

	Tons per Acre		Average Net Realised Prices per 12 lb.	
	1969	1970	1969	1970
			£	£
Period 1	0.4	0.4	2.10	2.29
2	1.4	1.7	2.12	1.79
3	2.8	3.2	1.82	1.48
4	4.1	5.4	1.52	1.54
5	6.1	6.6	1.46	1.26
6	6.9	7.7	1.26	1.22
7	8.9	8.1	1.04	1.02
8	7.5	8.5	0.95	0.84
9	7.8	8.1	0.73	0.58
10	5.2	5.9	0.58	0.40
11	3.9	3.7	0.50	0.41
12	2.7	3.1	0.51	0.44
13	2.9	3.0	0.40	0.49
WHOLE SEASON	60.6	65.4	1.03	0.94

Perchance growers in three regions recorded lower costs of oil per gallon in 1970. Weather conditions in the spring of 1970 generally appear to have been cold and it is possible therefore that some growers attempted to economise by burning less fuel and maintaining lower temperatures. A tendency towards later sowing dates was recorded in East Anglia and Lancashire, which also would have contributed to lower heating costs.

Part II

Results and Output Standards for Seven Regions

In the first seven sections of this part of the report, there is an account of the results of the small numbers of nurseries recorded in each region for the 1969 and 1970 surveys. A commentary on their marketing and cultural practices is included. The tables of data include the averages of the regional groups and the results of the best crop in each group. The latter data refer to the crops with the highest margin over heating costs, and not necessarily the crops with the highest value or heaviest weight.

Some tables of standard data for Sales Analysis are also given. This is a very simple technique which can be used for assessing the output of tomato crops in order to locate possible opportunities for improved management. Both cultural and economic factors are brought together in the appraisal, the procedure for which was described fully in the first report on the British Isles Tomato Survey. (1) The technique is a comparative one in which the performance of the crop under scrutiny is judged against an appropriate local standard on a simple worksheet. Yields and realised prices over each month or fortnight of the marketing season must be taken into account. The greater detail of the latter is to be preferred, for the point of this exercise is to trace when crop performance was defective, should this have been so.

The following abbreviations are used in the tables of output standards included below:

Gross output to September 30th is per 1,000 sq.ft.of glasshouse.

Price is average net realised price per 12 lb.

Yield is the number of 12 lb. units marketed per 1,000 sq.ft.

These measures have been calculated as described on p.18. Output and yield data have been rounded off. The term period is used as

defined on p.21.

Although the tables of standards are based on the 1,000 sq.ft. measure of unit area, it is sometimes more convenient to handle 'per acre' figures. One acre comprises 43,560 sq.ft. and gross output data can be converted to an acreage basis by multiplying them by 43.56. Similarly, yield data can be converted to 'tons per acre' by multiplying '12 lb. per 1,000 sq.ft.' by 43.56, and then dividing the product by 186.7.

JERSEY

Although the acreage of glasshouse tomatoes in Jersey was stable in 1969 and 1970, as shown in Table 1.3, it had expanded in marked fashion earlier in the 1960's. Extra glass was acquired then by some of the specialist glasshouse growers on the island, several of whom occupied long-established nurseries. At the same time, a number of the most progressive growers of the traditional outdoor tomato crop built glasshouses for the first time. These growers were anxious to counteract the notorious yield and price uncertainty of the outdoor crop, the area of which has been shrinking steadily over the last decade. By building glass, these growers were able to intensify their farms, which previously were typical of the small units found in the island, and also to become less dependent on a large number of casual workers for a short period. Within a few years, some of these farmer-growers have become very efficient early tomato producers, as their results testify.

Marketing

Only one of the growers involved in the survey had a substantial local outlet on the island. The Jersey crops generally were consigned to mainland wholesale markets. One grower, who participated in the survey for the first time in 1970,

was a member of Jersey Growers (Gro-pak) Ltd., a new co-operative which had evolved from the merger of two established groups. In 1970, this organisation handled about one-third of the total exports of indoor and outdoor tomatoes from Jersey; tomatoes were shipped to the mainland on pallets, having been packed on the members' holdings; this co-operative's function was essentially to rationalise distribution to the mainland and to create economies of scale for its members; a very small staff was required for this method of operation. Having tried unsuccessfully to trade with some direct buyers in 1970, the group relied thereafter on selling tactics in a range of wholesale markets.

Each of the other growers made extensive use of a commission salesman in Birmingham, where all had an established reputation. One of these growers had also used Liverpool market in the past, but he had abandoned this as his consignments too often failed to arrive without delay. Later in the season, two of the independent growers customarily switched their allegiance to southern markets, following the onset of the midland industrial holidays and the increase in local grown supplies.

As in 1968, the growers in Jersey expressed concern about the rising costs of freight and carriage by sea and overland to their chosen markets. For most of the time under review, the independent growers took advantage of the cheaper rates they could obtain by bulking their supplies to certain markets through a St. Helier shipping agency. By doing this they could convey tomatoes to Birmingham for 1/5½d. per 12 lb. in 1969 and 1/6d. in 1970. (The normal charge in 1969 would have been 1/8d. over the same route). It was understood that the new Gro-pak group were able to negotiate still lower charges in 1970, when they could move tomatoes to Birmingham for 1/3d. a tray. An alternative

arrangement was used by some growers in the island, following the establishment of a sica-type group in 1968 for containerised transportation of produce to certain mainland markets. (17)

The need for Jersey growers to make temporary use of air freight in 1970 was mentioned in Part I (p. 11). The one grower who secured space on scheduled flights was able to reach Birmingham and Brentford markets for 2/9d. and 2/2d. per 12 lb. respectively. Subsequently other tomatoes were flown from Jersey to Birmingham on chartered flights at 6/0d. per tray.

The use of Dutch type wooden trays continued. In 1969 the cost of these, with covers, varied from 1/0½d. to 1/1½d. each for the 12 lb. size; in 1970 the cost to some growers had risen to 1/2¼d.

Glasshouses

All four of the nurseries concerned in the survey had some glasshouses of the traditional wooden Channel Island vinery type, built to modern specifications of glass width and height. In one case some old houses with 14" panes of glass had been re-built; two of the growers had some modern alloy structures as well. None of these growers built glass during 1969 or 1970. The smallest block of tomatoes in this group was 22,148 sq.ft., and the largest was 38,640 sq.ft., i.e. these nurseries were family-scale units between a half-acre and one acre in size.

Equipment

Each nursery was heated by oil-fired boilers burning 200 secs. oil. This cost approximately 11d. per gallon in Jersey in 1970. Supplementary carbon dioxide was used in each case. Propane was the most popular source of this, but one of the growers used mains gas (butane).

TABLE 2.1 TOMATO CROPS IN JERSEY

	1969		1970	
	Average Results of 3 Crops	Best Result in Group	Average Results of 4 Crops	Best Result in Group
Results to July 31st				
Average net realised price per 12 lb.	£1.33	£1.41	£1.15	£1.15
Tons per acre	61.0	64.7	66.1	73.1
Gross Output per acre	£15,203	£17,036	£14,204	£15,647
Results to September 30th				
Average net realised price per 12 lb.	£1.13	£1.30	£0.99	£0.99
Tons per acre	78.0	74.1	82.7	91.7
Gross Output per Acre (A)	£ 16,462	£ 18,011	£ 15,213	£ 16,902
Costs of:				
Seeds and plants	52	46	40	24
Heating fuel	2,131	2,580	1,982	2,217
Carbon dioxide	433	598	518	766
Electricity	266	126	229	146
Costs per acre (B)	2,882	3,350	2,769	3,153
Margin over heating costs per acre (A-B)	13,580	14,661	12,444	13,749

TABLE 2.2 OUTPUT STANDARDS FOR JERSEY

	1969				1970			
	Average Results of 3 Crops		Best Result in Group		Average Results of 4 Crops		Best Result in Group	
Gross Output to September 30th	£ 378		£ 413		£ 349		£ 388	
Period	Price £	Yield 12 lb.	Price £	Yield 12 lb.	Price £	Yield 12 lb.	Price £	Yield 12 lb.
1	2.03	9	1.91	16	1.89	8	1.95	10
2	2.11	25	2.24	34	1.64	18	1.10	19
3	1.85	33	1.78	34	1.32	34	1.37	44
4	1.51	37	1.49	35	1.53	48	1.53	61
5	1.34	49	1.39	43	1.16	52	1.15	60
6	1.21	33	1.20	36	1.25	33	1.29	26
7	0.95	23	1.01	26	0.89	32	0.85	32
8	0.86	26	0.94	33	0.62	32	0.70	31
9	0.48	28	0.58	21	0.44	25	0.46	31
To July 31st	1.33	262	1.41	277	1.15	283	1.15	313
10	0.50	25	0.55	40	0.25	24	0.28	26
11	0.33	16	-	-	0.39	20	0.42	24
12	0.42	16	-	-	0.28	15	0.36	18
13	0.29	16	-	-	0.41	12	0.44	12
To September 30th	1.13	334	1.30	317	0.99	354	0.99	393

Cultural Details

Eurocross BB was the only cultivar grown on these nurseries. Plant populations of over 14,000 per acre were chosen by each of the growers. Sowing dates varied between 4th and 18th November in the years preceding each crop; marketing commenced between 7th and 29th March in 1969, and between 14th March and 4th April in 1970. In 1969 none of the growers used supplementary carbon dioxide after April 30th, but in 1970 one continued to use it until 15th May. Very little use was made of heating systems after the middle of June in either year.

Range in Performance.

Table 2.1 shows average and best results in each year. Margins over heating costs were slightly higher in 1969. The margin of each of the crops exceeded £10,000 per acre, both in 1969 and 1970.

GUERNSEY.

Whereas the acreage of heated tomatoes expanded in Jersey in the 1960's, it declined in Guernsey. (18) In 1961 there were 874 acres in Guernsey, while in 1970 there were 780 acres, as shown in Table 1.3. The area of unheated tomatoes had declined to two-thirds of its 1961 level by 1970. The overall scale of the industry in Guernsey none the less remains much greater than that in Jersey. It is likely that the most successful early tomato growers in Guernsey can stand comparison with growers anywhere. It must be appreciated, however, that the results discussed below are far from typical. The majority of heated tomato growers in Guernsey arguably are less well prepared to stand more rigorous trading conditions than their counterparts in Jersey.

During the last decade, there has been very little investment activity in Guernsey. Between 1960 and 1970, less than two per cent of the glass in the island was replaced each year. There is an unfavourable size structure among the nurseries, many of which appear too small to be viable in the long-term. There also is an ageing community of growers, although it should be added that the horticultural industry on the whole still is

responsible for about 80% of Guernsey's visible exports, yet only 25% of the male working population are directly employed full-time in horticulture.

Marketing.

The entire 'export' crop of tomatoes is distributed by the Guernsey Tomato Marketing Board. In recent years this Board has steadily modernised its operations in many respects, resulting in speedier distribution and a better service for buyers. In 1969 and 1970, the Board remained active in its efforts to maintain personal contacts both in the wholesale markets and among retailers; it sought to publicise and promote 'Guernsey Toms'; it increased the proportion of its consignments to be delivered by road, in order to eliminate delays and damage on the mainland; and it increased the proportion of the export crop shipped on pallets.

Unfortunately, recent annual reports suggest that the Board could have been better supported by the majority of the island's growers. Whereas over 76% of the total export crop in 1966 had consisted of tomatoes in the four top grades, less than 63% of the 1969 crop and less than 66% of the 1970 crop came into these grades. May in 1969 was a particularly poor month in this respect, when for a time less than half the total shipments were of these top grades. In parallel to this, there was a fourfold increase in the number of trays detained by the States Inspector of Produce between 1966 and 1969; as many were withdrawn in July 1969 as in the whole of 1966. And at the end of both the 1969 and 1970 seasons the Board expressed its concern, by no means for the first time, that growers were not prepared to pick their tomatoes on the days which would ensure the pattern of delivery which could best match the requirements of the mainland tomato trade. It is now many years, of course, since tomato growers in Guernsey have had any personal contact with this trade; some growers can never have had any; it is possible that the very presence of the Board, for all its expertise, now conceals the current realities of marketing tomatoes from many growers.

Both in 1969 and 1970, the Board incurred increases in its

operating costs. Dutch type wooden trays so far have proved the most suitable container for export to the mainland. Growers bought these from traders on the island at what appeared to be fixed prices: the 12 lb. size invariably cost 1/3.3/8d. each in 1969 and 1/4¼d.each in 1970. Such prices compared unfavourably with those pald by the growers in Jersey, although it should be added that the Guernsey prices included a small levy towards the costs of operating the island's advisory facilities.

One of the growers in the survey made use of a storepacker's services for grading, packing and delivering tomatoes to the G.T.M.B's warehouse. The cost of this service in 1969 was 10d. per 12 lb. and in 1970 it was 1/3d.

Glasshouses

There was no significant change in the area of glass recorded on the six nurseries in the survey between 1969 and 1970. The most extensive single unit was large by Guernsey standards, with more than ten acres of vineries. Two of the other growers had over an acre of glass,and all the remainder had over half an acre. The smallest scale crop was of some ∠5,000 sq.ft.

Wooden vineries of the traditional Channel Island type were much the most common structures, sometimes standing singly and elsewhere in blocks. Four of the nurseries had modern versions of these, with relatively tall 'fronts' and 24" panes of glass. By contrast, modern metal houses were recorded only on two nurseries.

In 1969, three of the nurseries still had small areas of low standing vineries of the most obsolete type, with 12" panes of glass. Such structures are still predominant on the less progressive nurseries on the island. At the end of the 1969 crop two of the growers in the survey completed modernising their nurseries by replacing the very old vineries with up to date houses of the same genre, with the aid of the Horticultural Loans Scheme.

TABLE 2.3 TOMATO CROPS IN GUERNSEY

	1969		1970	
	Average Results of 6 Crops	Best Result in Group	Average Results of 6 Crops	Best Result in Group
Results to July 31st				
Average net realised price per 12 lb.	£1.15	£1.27	£1.14	£1.12
Tons per acre	57.1	65.8	58.6	74.8
Gross Output per Acre	£12,258	£15,640	£12,463	£15,683
Results to September 30th				
Average net realised price per 12 lb.	£0.99	£0.99	£0.99	£0.97
Tons per acre	72.3	96.7	73.0	97.2
Gross Output per acre (A)	£13,329	£17,868	£13,535	£17,572
Costs of:				
Seeds and plants	57	24	61	64
Heating fuel	2,043	2,904	1,766	1,706
Carbon dioxide	412	568	463	402
Electricity	184	257	174	163
Costs per acre (B)	2,696	3,753	2,464	2,335
Margin over heating costs per acre (A-B)	10,633	14,115	11,071	15,237

Equipment

Each nursery was heated by oil-fired boilers burning 200 secs. oil; in one case some 35 secs. oil was also used. Costs per gallon of 200 secs. oil between 11d. and 1/0d. were quoted in each year. Each of the growers burned propane as a source of carbon dioxide.

Cultural Details

One grower tried a range of the hybrids produced at the Glasshouse Crops Research Institute, during 1969, but otherwise the cultivar Eurocross BB was these Guernsey growers' mainstay. Plant populations varied between 12,000 and 14,000 per acre. Seeds were sown between 28th October and 18th November in the years preceding each crop; one grower paid another to propagate plants to his specification. Each grower was able to start picking in March in both years. One grower used additional carbon dioxide until the middle of May in each year, but otherwise the practice was to cease burning propane by the end of April. Only one of the growers made significant use of his heating system after the end of June.

Range in Performance

Table 2.3 shows average and best results in each year. Margins improved in 1970, unlike those in Jersey. The lowest margins per acre were £9,121 in 1969 and £10,311 in 1970. Four growers had margins higher than £10,000 in 1969, and all achieved this in 1970. Although not spectacularly high, the margins on the largest nursery exceeded £10,000 in each year.

CENTRAL SOUTH

Early tomato growing has become increasingly important in

TABLE 2.4 OUTPUT STANDARDS FOR GUERNSEY

	1969				1970			
	Average Results of 6 Crops		Best Result in Group		Average Results of 6 Crops		Best Result in Group	
Gross Output to September 30th	£ 306		£ 410		£ 311		£ 403	
Period	Price £	Yield 12 lb.	Price £	Yield 12 lb.	Price £	Yield 12 lb.	Price £	Yield 12 lb.
1	2.11	5	2.47	20	2.31	4	1.94	2
2	2.17	14	2.20	21	1.85	15	1.69	17
3	1.72	26	1.85	26	1.38	23	1.42	30
4	1.41	31	1.39	35	1.54	41	1.55	48
5	1.28	39	1.33	38	1.11	44	1.13	56
6	1.14	32	1.17	37	1.19	41	1.18	62
7	0.83	38	0.83	36	0.84	32	0.86	43
8	0.74	30	0.75	33	0.73	29	0.74	34
9	0.43	30	0.48	36	0.39	23	0.40	28
To July 31st	1.15	241	1.27	282	1.14	251	1.12	320
10	0.44	21	0.47	30	0.32	19	0.29	22
11	0.33	17	0.34	37	0.44	15	0.44	26
12	0.43	14	0.48	28	0.34	15	0.52	24
13	0.29	13	0.29	38	0.54	12	0.54	23
To September 30th	0.99	310	0.99	414	0.99	313	0.97	417

this region. In part this may be attributed to the publicity enjoyed by a number of successful growers, and to the promotional efforts of Efford Experimental Horticulture Station during the 1960's. Winter light in the region generally is of higher intensity than in inland areas; and often there is less fog around the Isle of Wight than in the Channel Islands. All the nurseries in the survey were close to the sea; two were located in the Isle of Wight; three in the Titchfield district in Hampshire; and one near Bournemouth. In addition, two records from the Plymouth area were available in 1969.

Marketing

Each of these crops in Devon was marketed by Tamar Valley and Elburton Growers, a co-operative which was in its second year of operation in 1969.

The growers on the Isle of Wight both used distributing wholesalers on the island. One of them also sent tomatoes to a commission salesman in Southampton market. Of the remainder, one sold all his crop to retailers direct; the three others were members of the New Forest Growers co-operative, but they had 'wayleaves' for a proportion of sales to local shops.

New Forest Growers adhered to the use of Dutch type wooden trays, which cost their members about 1/3d. for the 12 lb. size with liners and covers, in each year. As well as supplying towns in the south of England, the co-operative sent produce to various midland markets. Various types of cardboard non-returnable containers were used on the other nurseries, costing about 8d. each in both years.

Glasshouses

There were some pronounced contrasts in the quality of the

glasshouses used by this group of growers. Wide-span alloy houses were used on four of the nurseries; all the other growers had some modern alloy houses of intermediate or narrow span. However there were also some extensive blocks of very old and low glass of the English vinery and aeroplane types. This group thus had some of the finest and some of the poorest glass recorded in the survey. In 1969 the ratio of new to old glass in the sample was about 3.2, but in 1970 it had improved to 3.1. None of the growers built additional glass for the 1970 crop.

The largest enterprise in this group was of some 178,000 sq.ft. of old and new glass. The four smallest crops were each about half an acre in scale.

Equipment

Each of the nurseries had oil-fired boilers. The full range of fuel from 35 secs. gas-oil to 3500 secs. heavy oil was burned. Costs per gallon (net of rebate) were of the following order:

	1969	1970
35 secs.	9d. - 1/1d.	$8\frac{7}{8}$d. - 11d.
200 secs.	$9\frac{7}{8}$d.	9d.
960 secs.	$7\frac{3}{8}$d. - $8\frac{3}{8}$d.	$7\frac{7}{8}$d.
3500 secs.	$6\frac{7}{8}$d.	6d.

A downward drift can be discerned in these figures, and indeed half the growers involved in each year were able to secure lower quotations in 1970, at a time, perhaps, when there was some competition between oil suppliers to gain business.

Propane was used as a source of carbon dioxide on five crops in 1969 and four in 1970. One grower used liquid pure carbon dioxide in each year.

Cultural Details

Eurocross BB was the most popular cultivar. It was recorded on five nurseries in 1969 and four in 1970. The preference otherwise was for Kingley Cross (recorded on two nurseries in each year) and in one case in 1969 for Selsey Cross. Average Plant populations of about 14,000 per acre were recorded in each year. Wide-span glass seemed to be associated with slightly lower densities than this.

Seed was most commonly sown between 10th and 24th November in the year preceding each crop. One grower preferred late October, and another aimed at a slightly later crop than the remainder (which suited his retailer customers), hence he was content to sow just before Christmas. Picking started between 10th March and 25th April in 1969, and between 3rd March and 1st May in 1970. It was the usual practice for the heating system to remain in use throughout the season on these nurseries. Carbon dioxide generally was applied well into April, if at all. One grower in the Isle of Wight used it until the end of May in each year.

Range in Performance

Table 2.5 shows average and best results in each year. One margin was as low as £5,773 in 1969, this crop having been produced in very old glasshouses. The lowest result in 1970, with a smaller sample, was £8,772 per acre. Although good modern glass was available to them, two growers were unable to achieve its full potential owing to severe attacks of soil-borne fungal diseases. Margins in excess of £10,000 per acre were achieved on four nurseries in 1969 but only on two in 1970.

TABLE 2.5 TOMATO CROPS IN THE CENTRAL SOUTH

	1969		1970	
	Average Results of 8 Crops	Best Result in Group	Average Results of 6 Crops	Best Result in Group
Results to July 31st				
Average net realised price per 12 lb.	£1.22	£1.25	£1.11	£1.16
Tons per acre	42.8	51.4	52.0	57.8
Gross Output per acre	£9,748	£12,008	£10,811	£12,527
Results to September 30th				
Average net realised price per 12 lb.	£1.03	£1.05	£0.94	£0.97
Tons per acre	57.5	72.6	70.2	77.6
Gross Output per acre (A)	£11,031	£14,173	£12,291	£14,104
Costs of:				
Seeds and plants	36	66	39	39
Heating fuel	2,002	2,602	1,960	2,520
Carbon dioxide	303	294	301	286
Electricity	298	276	327	482
Costs per acre (B)	2,639	3,238	2,627	3,327
Margin over heating costs per acre (A-B)	8,392	10,935	9,664	10,777

TABLE 2.6 OUTPUT STANDARDS FOR THE CENTRAL SOUTH

	1969 Average Results of 8 Crops		Best Result in Group		1970 Average Results of 6 Crops		Best Result in Group	
Gross Output to September 30th	£ 253		£ 325		£ 282		£ 324	
Period	Price £	Yield 12 lb.	Price £	Yield 12 lb.	Price £	Yield 12 lb.	Price £	Yield 12 lb
1	2.10	1	2.19	1	3.16	1	2.67	1
2	1.98	5	2.03	4	1.93	7	1.46	15
3	2.06	12	2.01	17	1.59	21	1.46	15
4	1.46	24	1.76	10	1.40	29	1.45	37
5	1.44	31	1.48	30	1.33	29	1.45	37
6	1.18	32	1.41	38	1.14	34	1.11	40
7	0.97	34	0.98	48	1.01	35	1.11	40
8	0.91	23	0.98	30	0.73	34	0.69	31
9	0.71	21	0.94	43	0.63	34	0.69	31
To July 31st	1.22	184	1.25	220	1.11	221	1.16	248
10	0.56	18	0.83	33	0.36	25	0.42	27
11	0.47	14	0.58	20	0.44	19	0.42	27
12	0.43	15	0.26	21	0.43	18	0.44	15
13	0.39	15	0.31	17	0.56	15	0.44	15
To September 30th	1.03	246	1.05	311	0.94	301	0.97	332

SOUTH EAST

Two nurseries in Kent, one in Surrey, one in East Sussex, and two in West Sussex participated in each year of the survey. An additional record from West Sussex was available in 1970. Only one of these nurseries was more than twelve miles from the sea and they enjoyed climatic advantages which were essentially similar to those in the Central South. There is probably a greater acreage of truly early tomato crops in the South East than in any other part of mainland Britain.

Marketing

As in previous years, little use was made by the growers in the survey of the various co-operatives in the South East. One decided to join Farmers and Growers Industries in 1970, primarily to resolve labour difficulties on his nursery. Another sent small quantities to the East Sussex Growers' packhouse each year, but his main business was with local retailers. One grower sold his tomatoes each year to an agent, who also packed them at his own premises before distribution. Otherwise, the usual practice was to supply commission salesmen, either in the London markets or in various coastal towns in Sussex, with some direct sales to retailers. Such business was almost invariably confined to local shops which would trade consistently, order and call for the produce, and pay promptly.

The following charges for carriage to London markets were quoted by growers, per 12 lb. package:

	1969	1970
from East Kent	8d.	9d.
from West Sussex	11½d.	1/1d.

Cardboard non-returnable packages were used by all the growers. The cost of these varied from 7½d. to 1/0d. each per 12 lb. in 1969, and from 8½d. to 1/0d. in 1970.

Glasshouses

A large proportion of the modern glasshouses in Britain are concentrated in the South East. In 1969, however, only one survey nursery had entirely modern glass. In 1970, a further completely modern unit came into the sample, with the only wide

span houses in this group. The houses used on the other nurseries included intermediate and narrow-span metal structures, English vineries and some Dutch light structures. Only one of the growers added to the glass he had available in 1969. In 1969 the proportions of new and old glasshouses were about equal, but in 1970 the ratio was about 3.2.

The largest glasshouse enterprises in the South East were not represented in the sample. The greatest area covered by one unit in the survey was 99,000 sq.ft. in 1969, which was increased to 130,700 sq.ft. in 1970. Two other growers had more than an acre of glass, and the two smallest units were of about one half-acre.

Equipment

Each of the nurseries had oil-fired boilers, and the full range of oils was burned. Costs were very similar to those in the Central South, per gallon. All the growers in Sussex obtained their oil through Farmers and Growers Industries, and by taking advantage of bulk purchase in this way, they had to pay slightly less for their oil in 1970 than in 1969. This concession did not appear to apply to the other growers in the region.

Pure carbon dioxide was used in each year on one nursery, and propane was burned on the remainder.

Cultural Details

Eurocross BB was a less dominant cultivar in the South East. Only two growers relied on it as their main type in each year, but some BB was grown on two other nurseries. Maas Cross was favoured by one grower, who achieved the highest margin each year. Otherwise, hybrids raised at the Glasshouse Crops Research Institute were grown, particularly Kingley Cross and the unnamed G.C.R. 93.

The density of planting on these nurseries varied from 12,000 to 14,700 plants per acre. Only one grower planted more than 14,000 to the acre. The average density was about 13,600. Sowing dates varied from 15th November to 5th December for the 1969 crop, with very little change in 1970. It was interesting to note that the grower who sowed latest of all for his 1969 crop was the earliest to pick, on 10th March. His 1970 crop was sown

TABLE 2.7 TOMATO CROPS IN THE SOUTH EAST

	1969		1970	
	Average Results of 6 Crops	Best Result in Group	Average Results of 7 Crops	Best Result in Group
Results to July 31st				
Average net realised price per 12 lb.	£1.29	£1.62	£1.26	£1.44
Tons per acre	49.0	53.1	52.8	56.0
Gross Output per acre	£11,779	£16,035	£12,386	£15,092
Results to September 30th				
Average net realised price per 12 lb.	£1.12	£1.44	£1.09	£1.24
Tons per acre	63.3	67.1	66.3	76.8
Gross Output per acre (A)	£13,221	£18,014	£13,518	£17,789
Costs of:				
Seeds and plants	115	46	63	39
Heating fuel	1,847	2,511	1,953	2,581
Carbon dioxide	296	140	473	168
Electricity	193	188	189	194
Costs per acre (B)	2,451	2,885	2,678	2,982
Margin over heating costs per acre (A-B)	10,770	15,129	10,840	14,807

on 7th December and first picked on 20th March, just four days later than the earliest crop of all in that year (which had been sown on 17th November). In all, five growers started picking in March in 1969 and four did so in 1970; none of the others was later than the first week in April in either year.

Two growers used no heat after July in each year, but otherwise the usual practice was to keep heating systems in operation throughout the season. The normal practice with carbon dioxide enrichment was to use the equipment to the end of April, but one grower continued to burn propane until the end of May.

Range in Performance

Table 2.7 shows average and best results in each year. The lowest margins over heating costs per acre were £9,325 and £6,848 in 1969 and 1970 respectively. Two nurseries were consistently less successful than the remainder, being the only cases in which a margin over £10,000 was not obtained in both years. One of these nurseries was the largest in this group, on which additional glass was built for the 1970 crop; the other was a modern unit in which there was a high incidence of 'teething' troubles, together with unresolved soil problems.

EAST ANGLIA

As might be supposed from Table 1.2, the nurseries in this group were more widely scattered than those in the other regions covered by the British Isles surveys. All were located in areas well removed from poor light intensities, industrial pollution, competition for labour, and planning uncertainties, which are all now associated with the once pre-eminent Lee Valley district. As has been shown in earlier studies, the results of these East Anglian nurseries have greatly exceeded those of Lee Valley nurseries in recent years.

There were six nurseries in the sample: two were in Hertfordshire, one in Essex, one in Cambridgeshire, and two in West Norfolk.

Marketing

The two Hertfordshire nurseries made use of the Nursery Trades co-operative's packhouse at Cheshunt in the Lee Valley,

TABLE 2.8 OUTPUT STANDARDS FOR THE SOUTH EAST

	1969				1970			
	Average Results of 6 Crops		Best Result in Group		Average Results of 7 Crops		Best Result in Group	
Gross Output to September 30th	£ 304		£ 414		£ 310		£ 408	
Period	Price £	Yield 12 lb.	Price £	Yield 12 lb.	Price £	Yield 12 lb.	Price £	Yield 12 lb.
1	2.71	1	2.83	1	2.53	1	3.00	1
2	2.05	8	2.80	9	1.62	12	2.03	7
3	1.85	18	2.00	22	1.58	19	1.99	27
4	1.65	21	1.69	34	1.52	29	1.84	34
5	1.57	31	1.79	43	1.45	33	1.64	42
6	1.29	38	1.58	48	1.20	42	1.38	48
7	1.10	38	1.27	45	1.20	35	1.03	45
8	0.90	28	0.89	14	1.09	26	1.09	16
9	0.74	27	1.30	11	0.68	29	0.72	21
To July 31st	1.29	210	1.62	228	1.26	226	1.44	240
10	0.58	18	0.81	9	0.39	20	0.59	14
11	0.56	20	0.75	9	0.48	16	0.66	19
12	0.50	14	0.75	19	0.44	12	0.67	25
13	0.48	10	0.76	23	0.54	10	0.76	31
To September 30th	1.12	271	1.44	287	1.09	284	1.24	329

although they were some miles distant from the Valley. Otherwise, independent commission sales were predominant. The nurseries to the south of the region supplied salesmen in London and Chelmsford in the main, and those in the Fens consigned their tomatoes to the markets at Manchester, Sheffield, Castleford, Nottingham and Lincoln. Wooden returnable boxes were still used to supply some northern towns, as by certain growers in Lancashire. Generally, however, the East Anglian nurseries used cardboard non-returnables, which cost much the same as in the Central South or South East.

Glasshouses

The greater part of the glass in this region was of traditional English vinery and aeroplane designs. Modern alloy structures were standing only on three of the nurseries. One nursery had several wide-span houses, but most of the modern glass was of the venlo type.

The sample included one very large nursery indeed, with about nineteen acres of glass. One other nursery had more than an acre of tomatoes, but three had less than half an acre. Only one of these growers added to his glass between 1969 and 1970.

Equipment

Oil fired boilers were used on each of these nurseries, burning oil in the heavy grades in four cases. Costs per gallon of oil (net of rebate) were of the following order:

	1969	1970
200 secs.	11¼d.	9⅝d.
960 secs.	9¼d.- 11¼d.	7¾d.- 10⅞d.
3,500 secs.	7d.	6¾d.

These costs appeared to be slightly higher than those paid in southern districts; there was a gradation in the cost of 960 secs. oil with increasing distance from the coast, as might be expected. It was interesting to note further evidence of a downward swing in oil prices in 1970.

Three of the growers, including the largest-scale producer, used no additional carbon dioxide. Dry-ice was used on three nurseries in 1969, but one was converted to propane in 1970.

Cultural Details

In this region Eurocross BB was the cultivar preferred by four growers in each year. Unnamed G.C.R.1. hybrids of the 'J. series' were used for the smallest scale crop, and Carrick was retained on the largest nursery.

Four of the growers, whose glass consisted almost entirely of English vineries, favoured a density of crop about 14,500 plants to the acre; otherwise, lower numbers of plants were recorded. The average density overall was about 11,700 per acre, a figure much influenced by wide spacings on the largest nursery of all.

On five of the nurseries, sowing dates varied from November 13th to 29th for the 1969 crop, and from 27th November to 15th December for the 1970 crop. This was a decided shift in emphasis. The remaining crop was sown on January 1st each year, this grower being content to pick early in May. With this exception, the nurseries in this group all started picking in April in each year. The later sowing dates evidently had little bearing on this in 1970, perhaps because of the excellent growing weather in February (see p.8). In 1969 three growers did not use heat after July, but in 1970 five of them heated their tomatoes throughout the season. When it was used, carbon dioxide was applied until late in April or early in May in each year.

Range in Performance

Table 2.9 shows average and best results in each year. The lowest margin was £5,912 per acre in 1969 and £6,496 in 1970. Average results in this region were very much influenced by events on the largest scale nursery. In 1969, the margin here was £8,504 per acre, i.e. it was above average for these nurseries, this being the outcome from a crop of 54 tons per acre sold for £1.00 per 12 lb. over the whole season. In 1970, the margin was the lowest recorded; the yield harvested was slightly higher at 57 tons per acre, but the average price fell to £0.76.

On the remaining five nurseries, the average margins per acre were £8,070 and £10,250 in 1969 and 1970 respectively.

TABLE 2.9 TOMATO CROPS IN EAST ANGLIA

	1969		1970	
	Average Results of 6 Crops	Best Result in Group	Average Results of 6 Crops	Best Result in Group
Results to July 31st				
Average net realised price per 12 lb.	£1.15	£1.29	£0.95	£1.23
Tons per acre	39.1	49.8	40.7	64.1
Gross Output per acre	£8,426	£11,987	£7,230	£14,670
Results to September 30th				
Average net realised price per 12 lb.	£1.00	£1.27	£0.80	£1.11
Tons per acre	54.2	50.9	57.4	80.7
Gross Output per acre (A)	£10,145	£12,057	£8,607	£16,728
Costs of:				
Seeds and plants	7	39	7	35
Heating fuel	1,494	1,441	1,413	1,732
Carbon dioxide	29	-	26	204
Electricity	135	228	138	70
Costs per acre (B)	1,665	1,708	1,584	2,041
Margin over heating costs per acre (A-B)	8,480	10,349	7,023	14,687

TABLE 2.10 OUTPUT STANDARDS FOR EAST ANGLIA

	1969				1970			
	Average Results of 6 Crops		Best Result in Group		Average Results of 6 Crops		Best Result in Group	
Gross Output to September 30th	£ 233		£ 277		£ 198		£ 384	
Period	Price £	Yield. 12 lb.	Price £	Yield. 12 lb.	Price £	Yield. 12 lb.	Price £	Yield 12 lb
1	-	-	-	-	-	-	-	-
2	2.50	1	-	-	2.08	1	2.00	1
3	1.37	1	1.14	8	1.66	1	1.65	20
4	1.90	4	1.83	19	1.74	4	1.85	29
5	1.75	13	1.90	35	1.35	13	1.53	38
6	1.38	24	1.63	32	1.24	25	1.12	30
7	1.16	42	1.01	52	1.05	37	1.14	62
8	1.06	40	1.03	40	0.88	48	1.05	38
9	0.86	44	0.69	27	0.60	47	0.82	57
To July 31st	1.15	168	1.29	214	0.95	174	1.23	275
10	0.64	27	0.33	5	0.45	32	0.61	27
11	0.61	18	-	-	0.35	15	0.58	15
12	0.69	8	-	-	0.57	11	0.72	14
13	0.48	11	-	-	0.41	14	0.78	16
To September 30th	1.00	232	1.27	219	0.80	246	1.11	346

One grower achieved a margin higher than £10,000 per acre in 1969, and two did so 1970.

LANCASHIRE

The glasshouse businesses in the coastal districts of Lancashire are an important element in the mainland industry. There are concentrations of nurseries in the Fylde and Hesketh Bank areas, which lie in the hinterland of Blackpool and Southport respectively. Other nurseries are scattered to the south and north of these areas at much the same distance from the sea. Several aspects of these growers' production methods, marketing practices, and personal attitudes to business impart a quite distinctive character to the customs of this region. (See the discussion on investment behaviour in Lancashire in Part IV).

Of the six nurseries in the survey two were situated in the countryside north of Liverpool, two were in the Hesketh Bank area, one in the Fylde, and one in the countryside near Lancaster.

Marketing

One of the growers in the survey was a founder member of the now defunct Fylde Growers co-operative, and he supported this with all his output in both 1969 and 1970. One of the Hesketh Bank growers contracted half of his production with another co-operative in 1969, which now also is defunct. Two of the growers almost entirely sold direct to retailers in Liverpool. The others relied on commission salesmen or country merchants, who make an important contribution to the wholesale vegetable trade in the north-west. The tomatoes grown on these nurseries were thus sold in a wide range of towns, including Liverpool, Manchester, Chester, Bolton, Bury, Rochdale, Lancaster, Morecambe and Kendal.

Wooden returnable boxes were used by the growers who depended on direct sales, but also by one other grower who used only commission salesmen. Cardboard non-returnables, costing 10d.-11½d. were used otherwise.

None of the growers in the survey sold any tomatoes to the expanding marketing agency, located near Southport, which is

understood to be bulking supplies to meet the requirements of supermarkets and other very large-scale buyers. The independent growers appeared to use a high number of market outlets, in relation to the output of their nurseries, apparently for reasons connected with their lettuce trade.

None of the Lancashire crops was especially early, in national terms, either in 1969 or in 1970. Yet, as in previous surveys, the prices obtained generally were very high. Conceivably, this indicated an undersupply of local-grown tomatoes in the heavily populated areas which these growers serviced. The term 'Blackpool Tomatoes' is widely used by retailers to promote the sales of fruit grown on any Lancashire nurseries, and this may indeed play on the emotions of customers with idyllic memories of this resort!

Glasshouses

Glasshouses of the aeroplane type have long been popular in Lancashire, although the area of Dutch light structures in the county is possibly as great. There was some fairly new glass of both kinds on the nurseries in the sample.

As with modern variants of the wooden vinery favoured by Channel Island growers, the aeroplane houses which growers have recently built (or rebuilt) have taller 'fronts' and 24" panes of glass.

The crops recorded varied from 2,700 sq.ft. to 36,000 sq.ft. the latter being the only one greater than half an acre in extent. The aim in the survey has been to record only the earliest houses on each nursery, and while these holdings were very much of a family-scale, this meant that substantial later plantings of tomatoes have not been taken into account. No additional glass came into the survey in 1970.

Equipment

One of these growers was still using solid fuel, in the form of coal singles. These cost £11.18s. per ton in 1969 and £13.1s. in 1970.35 secs. oil was the most popular fuel on the other nurseries, but one grower used 960 secs. heavy oil.

Oil prices in the north-west shifted upwards in 1970:

	1969	1970
35 secs.	$9\frac{5}{8}$d. - $10\frac{1}{2}$d.	$9\frac{1}{2}$d. - 1/$2\frac{1}{2}$d.
960 secs.	$8\frac{3}{8}$d.	$9\frac{5}{8}$d.

Two growers burned propane in 1969 and three did so in 1970. Two of them used carbon dioxide only during propagation. Supplementary illumination with mercury vapour lamps was not recorded on any of the nurseries in the sample.

Cultural Details

One grower used Amberley Cross in both years. On the other nurseries various modern Dutch cultivars were predominant; Eurocross BB was grown the most, but Eurocross A and B, Happy and Asix were also recorded.

The average number of plants per acre was 13,400, the range being from about 12,500 to more than 15,000. The sowing dates chosen by these growers varied between November 15th and December 14th each year, but three growers sowed for their 1970 crop rather later than for 1969. Where there was no change in sowing dates, the 1970 crop was first picked between two and seventeen days earlier than in 1969.

Picking started between April 17th and May 26th in 1969, and between April 15th and May 9th in 1970. The cautious use of carbon dioxide has already been noted. In a similar way few growers were prepared to heat their crop throughout the season; only two and three did so in 1969 and 1970 respectively. Conversely, one grower never heated after 14th June, and it was interesting to find that he achieved the highest margin per acre of any of the nurseries in 1970.

Range in Performance

Table 2.11 shows average and best results in each year. The lowest margins in 1969 and 1970 were £4,132 per acre and £3,763 respectively. Only one grower achieved a margin over

TABLE 2.11 TOMATO CROPS IN LANCASHIRE

	1969		1970	
	Average Results of 6 Crops	Best Result in Group	Average Results of 6 Crops	Best Result in Group
Results to July 31st				
Average net realised price per 12 lb.	£ 1.37	£ 1.62	£ 1.47	£ 1.64
Tons per acre	32.2	34.5	33.2	35.0
Gross Output per acre	£8,224	£10,410	£9,127	£10,729
Results to September 30th				
Average net realised price per 12 lb.	£ 1.20	£ 1.33	£ 1.27	£ 1.25
Tons per acre	41.6	52.0	43.2	54.4
Gross Output per acre (A)	£9,355	£12,957	£10,272	£12,729
Costs of:				
Seeds and plants	68	95	54	48
Heating fuel	1,962	2,162	2,025	968
Carbon dioxide	74	-	123	-
Electricity	193	243	196	194
Costs per acre (B)	2,297	2,500	2,398	1,210
Margin over heating costs per acre (A-B)	7,058	10,457	7,874	11,519

TABLE 2.12 OUTPUT STANDARDS FOR LANCASHIRE

	1969				1970			
	Average Results of 6 Crops		Best Result in Group		Average Results of 6 Crops		Best Result in Group	
Gross Output to September 30th	£ 215		£ 297		£ 236		£ 292	
Period	Price £	Yield. 12 lb.	Price £	Yield. 12 lb.	Price £	Yield. 12 lb.	Price £	Yield. 12 lb.
1	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-
3	2.35	2	3.20	1	2.54	4	-	-
4	2.21	7	2.61	7	2.21	13	2.18	14
5	1.88	16	2.28	17	1.75	20	1.79	21
6	1.66	22	1.96	22	1.63	28	1.78	52
7	1.30	27	1.56	30	1.49	26	1.36	32
8	1.24	27	1.29	31	1.19	22	1.13	17
9	0.91	37	1.21	40	0.87	30	1.59	14
To July 31st	1.37	138	1.62	148	1.47	142	1.64	150
10	0.78	18	0.92	35	0.66	22	0.60	30
11	0.50	12	0.60	25	0.53	10	0.45	23
12	0.65	6	0.73	10	0.58	7	0.52	19
13	0.48	4	0.75	5	0.64	4	0.71	11
To September 30th	1.20	178	1.33	223	1.27	185	1.25	233

£10,000 in each year, and although not producing the best result of all in 1970, he none the less achieved a higher margin then than in 1969.

The improvement in the result of the crop which was best in 1970 is of interest; in 1969 the margin on this nursery was only £5,478 per acre, mainly through lack of earliness; in that year the average net price per 12 lb. to July 31st was only £1.17 and the yield until then was 26 tons per acre. In 1970 picking started seventeen days earlier than in 1969.

Two points of interpretation should be noted here. In the first place, there was probably a higher proportion of green tomatoes still to be marketed off these nurseries after September 30th, than in any other region. The survey may thus have understated the potential of tomato production in Lancashire. The other point to be borne in mind is that the Lancashire growers generally produced a crop of lettuce in succession with their tomatoes, whereas the other growers in the survey were almost entirely monocrop producers.

SOUTH WEST

Two records from the Bristol locality were available in 1969, and one further one in 1970. These results have not been included with those of any other region, as the nurseries were using market outlets not otherwise concerned in the surveys, and they were not located anywhere near the other holdings which were involved.

One nursery participated each year; most of the crop was sold to a commission salesman in Bristol market, with some direct trade with local shops; the records related to a quarter acre of mainly modern alloy glass, oil-fired, and equipped with propane burners in 1970; this grower favoured the cultivar Moneymaker, and picking started each year in the first week of April.

The more successful nursery in the 1969 survey was a member of the Gloucester Marketing Society; the crop was about half an acre in scale, produced in a modern wide-span house which was oil-fired but not equipped for carbon dioxide treatment; Eurocross BB was

TABLE 2.13 TOMATO CROPS IN THE SOUTH WEST

	1969 Average Results of 2 Crops	1969 Best Result in Group	1970 Results of 1 Crop
Results to July 31st			
Average net realised price per 12 lb.	£ 1.44	£ 1.49	£ 1.32
Tons per acre	52.3	53.5	49.6
Gross Output per acre	£14,083	£14,877	£12,201
Results to September 30th			
Average net realised price per 12 lb.	£ 1.28	£ 1.29	£ 1.22
Tons per acre	63.0	66.3	56.3
Gross Output per acre (A)	£15,077	£15,997	£12,828
Costs of :			
Seeds and plants	43	52	-
Heating fuel	2,044	2,010	2,896
Carbon dioxide	-	-	248
Electricity	224	201	316
Costs per acre (B)	2,311	2,263	3,460
Margin over heating costs per acre (A-B)	12,766	13,734	9,368

TABLE 2.14 OUTPUT STANDARDS FOR THE SOUTH WEST

	1969				1970	
	Average Results of 2 Crops		Best Result in Group		Results of 1 Crop	
Gross Output to September 30th	£ 346		£ 367		£ 294	
Period	Price £	Yield. 12 lb.	Price £	Yield. 12 lb.	Price £	Yield. 12 lb.
1	-	-	-	-	-	-
2	2.82	1	2.88	1	2.42	2
3	2.11	17	2.08	21	1.96	10
4	1.88	21	1.86	23	1.93	17
5	1.68	38	1.69	43	1.74	27
6	1.57	42	1.59	47	1.61	45
7	1.27	45	1.27	42	1.26	36
8	1.14	29	1.17	26	0.87	37
9	0.78	30	0.78	26	0.66	38
To July 31st	1.44	224	1.49	229	1.32	213
10	0.66	16	0.64	14	0.49	18
11	0.42	9	0.40	11	0.53	10
12	0.52	10	0.52	14	0.50	1
13	0.31	11	0.31	15	-	-
To September 30th	1.28	270	1.29	284	1.22	241

the principal cultivar, and picking started early in April.

LOCATIONAL ADVANTAGES IN 1969 AND 1970

The foregoing is summarised in four tables below, which show the average results of each of these small groups of nurseries and the results of the best-known crops in each region. These tables are arranged in league table form. In several regions the average results were weighted somewhat by the performance of large enterprises, as has been mentioned, and the reader should not attach undue significance to positions in the leagues. As has also been shown, differences within regions were often greater than those between regions. Broadly, the tables correspond to similar analyses of the earlier British Isles surveys.

The tables are more or less self-explanatory. Attention is briefly drawn, however, to the evidence of locational effects on yields and realised prices. There is a fairly clear gradation in total yields from south to north, the heaviest crops being picked in each year in the Channel Islands, and the lightest in Lancashire. Conversely, the prices obtained on average in Lancashire were much the highest. Comparing them with the aggregate averages in Table 1.10, the Lancashire premium was £0.17 in 1969 and £0.33 in 1970.

In conclusion, the relatively low position of nurseries in the Central South is of interest. Invariably South East crops appeared to be the more successful. If the data for these regions are compared, generally it would be true to say that the yields obtained and the costs of production were essentially similar; each year the prices obtained by the Central South growers were inferior to those obtained in the South East.

TABLE 2.15

REGIONAL AVERAGES IN 1969

	Jersey	South West	South East	Guernsey	East Anglia	Central South	Lancashire
Order	1	2	3	4	5	6	7
No. of Records	3	2	6	6	6	8	6
Tons per acre	78.0	63.0	63.3	72.3	54.2	57.5	41.6
Average net realised price per 12 lb.	£ 1.13	£ 1.28	£ 1.12	£ 0.99	£ 1.00	£ 1.03	£ 1.20
Gross Output per acre	16,462	15,077	13,221	13,329	10,145	11,031	9,355
Costs of seeds, heating fuel, CO_2 and electricity	2,882	2,311	2,451	2,696	1,665	2,639	2,297
Margin over heating costs per acre	13,580	12,766	10,770	10,633	8,480	8,392	7,058

TABLE 2.16

REGIONAL AVERAGES IN 1970

	Jersey	Guernsey	South East	Central South	Lancashire	East Anglia	South West
Order	1	2	3	4	5	6	7
No. of records	4	6	7	6	6	6	1
Tons per acre	82.7	73.0	66.3	70.2	43.2	57.4	56.3
	£	£	£	£	£	£	£
Average net realised price per 12 lb.	0.99	0.99	1.09	0.94	1.27	0.80	1.22
Gross Output per acre	15,213	13,535	13,518	12,291	10,272	8,607	12,828
Costs of seeds, heating fuel, CO_2 and electricity	2,769	2,464	2,678	2,627	2,398	1,584	3,460
Margin over heating costs per acre	12,444	11,071	10,840	9,664	7,874	7,023	9,368

TABLE 2.17 CROPS WITH HIGHEST MARGINS IN REGIONS IN 1969

	South East	Jersey	Guernsey	South West	Central South	Lancashire	East Anglia
Order	1	2	3	4	5	6	7
Tons per acre	67.1	74.1	96.7	66 3	72.6	52.0	50.9
	£	£	£	£	£	£	£
Average net realised price per 12 lb.	1.44	1.30	0.99	1.29	1.05	1.33	1.27
Gross Output per acre	18,014	18,011	17,868	15,997	14,173	12,957	12,057
Costs of seeds, heating fuel, CO_2 and electricity	2,885	3,350	3,753	2,263	3,238	2,500	1,708
Margin over heating costs per acre	15,129	14,661	14,115	13,734	10.935	10,457	10,349

TABLE 2.18

CROPS WITH HIGHEST MARGINS IN REGIONS IN 1970

	Guernsey	South East	East Anglia	Jersey	Lancashire	Central South	South West
Order	1	2	3	4	5	6	7
Tons per acre	97.2	76.8	80.7	91.7	54.4	77.6	56.3
	£	£	£	£	£	£	£
Average net realised price per 12 lb.	0.97	1.24	1.11	0.99	1.25	0.97	1.22
Gross Output per acre	17,572	17,789	16,728	16,902	12,729	14,104	12,828
Costs of seeds, heating fuel, CO_2 and electricity	2,335	2,982	2,041	3,153	1,210	3,327	3,460
Margin over heating costs per acre	15,237	14,807	14,687	13,749	11,519	10,777	9,368

PART III

Trends in The Results of a Common Sample over Five Years

With the completion of the 1969 and 1970 surveys, information about the performance of some twenty-two nurseries over five consecutive years is now available. In retrospect, the late 1960's may come to be seen as a most interesting period in the history of the glasshouse industry. These years have been notable in two respects. First, for the wave of nursery modernisation and new glasshouse building which has occurred, particularly in the South of England, but also to some extent in the Channel Islands and other mainland regions; and secondly, for the onset of a new and critical cycle of inflation which is widely believed to have affected glasshouse growers more than most agricultural producers.

It seems appropriate therefore to place on record all the information which has been collected about this common sample of nurseries during these five years, and to examine the trends which can be discerned in their results. Some preliminary analyses of these data have been published in the trade press. (19)

Of the common sample, all but one was under the same management and ownership throughout, and in the remaining case the grower sold the nursery to his then foreman after the 1966 crop. Only one grower moved to a new site during the years concerned. Five of the nurseries were in the Channel Islands (three in Jersey), nine were located south of the Thames (mainly in Hampshire and Sussex), six were in East Anglia, and two in Lancashire.

Throughout the time of this enquiry, growers in England could take advantage, if they so chose, of the substantial capital grants which were provided under the terms of the Horticulture Improvement Scheme. The States of Guernsey introduced a Horticultural Loans Scheme in 1968. This was followed by a Grant Aid Scheme in Jersey, introduced in October 1968 and terminated in April 1970. Capital Loans have been available to approved applicants in Jersey since January 1969, and this scheme is still in operation.

As was thus to be expected, many of the growers in the common sample were actively engaged in modernising or expanding their glass. Table 3.1 shows an increase of some thirteen acres between 1966 and 1970. In fact thirteen growers acquired more glass for tomato growing, eight did not add to their area (although some of these made various improvements) and only one reduced his area of tomatoes.

It is interesting to note that less than one acre of the glass recorded in 1966 was no longer being used for tomatoes in 1970. To the writer's knowledge, only about 10,000 sq.ft. of the glass used in 1966 was actually rebuilt, on a nursery where some very old Channel Island vineries were replaced with an alloy structure, by a grower who had very little spare land for further building. Two mainland growers ceased growing tomatoes, but grew other crops instead, in blocks of English vinery houses which were still standing in 1970.

Table 3.1 shows that except in the Channel Islands, there was a clear preference for building metal rather than modern houses. Wide-span houses were the least popular, and more modern glass of the Venlo type was built than any other. The The effect of these changes certainly was to improve the size-structure of the sample, as is shown in Table 3.2. Unfortunately there is other evidence, which will be quoted in Part IV, which suggests that the growers who had built extra glass failed to maintain their previous standard of performance.

Table 3.3 refers to the heating fuels in use in the first and last years of the enquiry. This table is a slight over-simplication (as are some subsequent ones) as more than one system was used on several holdings. At the start of the investigation, only one grower was dependent on solid fuel, and he converted to 35 secs. oil after the 1966 crop. Two other growers converted to this oil from the rather heavier 200 secs. grade, but in another case there was a conversion from 200 secs. to a still heavier grade, 960 secs. Even so, the greatest number of growers continued to use 200 secs. oil, including all in the Channel Islands, where heavier grades could not be obtained.

TABLE 3.1 TYPES OF GLASSHOUSE IN USE

	Acres of Glass		Number of Records	
	1966	1970	1966	1970
Wooden Structures				
Channel Island Vineries	11.4	13.1	5	5
English Vineries	20.5	19.8	11	10
Aeroplane Houses	3.7	3.7	4	4
Alloy Structures				
Wide Spans	-	2.3	-	2
Intermediate Spans	0.8	2.7	3	6
Narrow Spans	-	5.8	-	4
	36.4	47.4		

TABLE 3.2 SIZE STRUCTURE OF SAMPLE

	Number of Records	
	1966	1970
Acres of Glass		
10 and over	2	2
1 - 10	3	4
½ - 1	6	9
¼ - ½	6	5
0 - ¼	5	2
	22	22

TABLE 3.3 TYPES OF HEATING FUEL IN USE

	Acres of Glass		Number of Records	
	1966	1970	1966	1970
Solid Fuels				
Coal Singles	0.4	-	1	-
Oil Fuels				
3,500 secs.	16.7	21.9	2	2
950 secs.	3.8	5.9	5	6
200 secs.	15.4	18.2	13	10
35 secs.	0.1	1.4	1	4
	36.4	47.4		

TABLE 3.4 SOURCES OF CARBON DIOXIDE IN USE

	Acres of Glass		Number of Records	
	1966	1970	1966	1970
Pure Sources				
Liquid	-	4.7	-	2
Dry-ice	2.7	2.6	4	2
Fuel Sources				
Propane	2.8	18.5	6	11
Town-Gas	9.6	0.9	1	1
No Use of CO_2	21.3	20.7	11	6
	36.4	47.4		

TABLE 3.5 PLANT POPULATION IN GLASSHOUSES

	1966	1970
Twenty-Two Nurseries		
Acres of Glass	36.4	47.4
Total Number of Plants	465,567	605,263
Plants per Acre	12,790	12,770
Eleven Nurseries with Glasshouses of One Kind Only		
Acres of Glass	15.1	17.1
Total Number of Plants	204,918	223,242
Plants per Acre	13,520	13,060

Some indication of the use of carbon dioxide enrichment is given in Table 3.4. Propane clearly was the most widely used source of CO_2. Working through the records of the growers who used CO_2, it appears that three converted to propane from other sources, and that two others who were adopting this practice for the first time installed propane systems after 1966. The use of mains-gas was confined to the Channel Islands, where the public supply is in the form of butane which is sufficiently pure for combustion in tomato houses. Of the growers who did not use CO_2, five were in business north of the Thames, and these included the grower with the largest area of glasshouses of all in the sample.

CULTURAL PRACTICES AND SALES OUTLETS

Turning from the equipment on these nurseries to how it was used, Table 3.5 shows the numbers of plants grown to the acre in 1966 and 1970. The upper section of the table shows the records of the common sample of nurseries, and this suggests that there was no change in growers' ideas on this point. However this conclusion needs qualification. There was a much wider range of glasshouse designs in use in 1970 than five years

TABLE 3.6 MAIN CHOICE OF CULTIVARS

	Number of Records	
	1966	1970
Eurocross BB	8	13
G.C.R. Series	4	5
Eurocross B	2	-
Moneymaker	2	1
Eurocross A	1	1
Maas Cross	1	1
Ailsa Craig	1	-
Carrick	1	1
Superlative	1	-
Ware Cross	1	-
	22	22

TABLE 3.7 CHANGES IN THE CHOICE OF CULTIVARS

Number of Records	1966	1970
6	Eurocross BB)	
2	Moneymaker)	
1	G.C.R. Series)	
1	Eurocross B)	Eurocross BB
1	Maas Cross)	
1	Ailsa Craig)	
1	Superlative)	
2	G.C.R. Series)	
2	Eurocross BB)	G.C.R. Series
1	Ware Cross)	
1	Eurocross A	Eurocross A
1	Carrick	Carrick
1	Eurocross B	Maas Cross
1	G.C.R. Series	Moneymaker

before, and the overall density of planting reflected the amount of croppable space in them, as well as the growers' choices of distances between plants. Modern houses tend to have more croppable space than older designs, but some growers are known to have been trying out lower plant populations in order to reduce labour peaks. These factors in combination could account for the apparent stability in plant numbers. There is some support for this explanation in the lower section of Table 3.5, which indicates a drop in the density of planting on some eleven nurseries, on which either no extra glass was built, or any additions were similar to the houses already in use in 1966.

The next two tables refer to the cultivars preferred by the twenty-two growers in the common sample, and to changes in their preferences over the five years. Minor plantings of cultivars on trial, or cultivars particularly suited to certain glasshouses, have been ignored for this purpose. Eurocross BB not only remained the most popular choice, but indeed gained further ground. The wide range of new cultivars released by the Glasshouse Crops Research Institute (called here the G.C.R.I. Series) together were the next most popular, although the extent of their adoption could not be said to be spectacular. Carrick and Moneymaker were the only two traditional cultivars remaining in use in 1970.

Tables 3.8 to 3.12 bear on various aspects of earliness. To add some point to these analyses, most of these tables differentiate between three broad regions of latitude, although the sample numbers are very small in each. In each region there was a slight shift towards later sowing dates in the autumn of 1969 (i.e. for the 1970 crop) in comparison with the practice five years before. On the other hand production, as measured by the date of the first consignment for sale, was slightly earlier in each region in 1970.

TABLE 3.8 SOWING DATES FOR 1970 CROP COMPARED WITH 1966 CROP

	Channel Islands	South of Thames	North of Thames
	No.	No.	No.
Sowing Date			
Earlier for 1970	2	3	-
No Change	-	1	2
Later for 1970	3	5	6
	5	9	8
Earliest Sowing Date			
For 1966 Crop	Nov. 5	Nov. 18	Nov. 15
For 1970 Crop	Nov. 4	Nov. 10	Nov. 15
Latest Sowing Date			
For 1966 Crop	Nov. 20	Dec. 23	Dec. 23
For 1970 Crop	Nov. 18	Dec. 23	Jan. 1

TABLE 3.9 DATES OF FIRST SALE IN 1970 COMPARED WITH 1966

	Channel Islands	South of Thames	North of Thames
	No.	No.	No.
Date of First Sale			
Earlier in 1970	3	7	4
No Change	-	1	3
Later in 1970	2	1	1
	5	9	8
First Crop Sold			
1966	March 11	April 1	April 13
1970	March 11	March 14	April 9
Last Crop Sold			
1966	April 12	April 28	May 9
1970	April 4	May 1	May 9

It would be reasonable to suppose that these growers collectively were more skilled in early tomato growing at the close of the five-year period than they were at the start. In several cases, furthermore, their nurseries were much better equipped for propagation by the 1969-1970 winter. However, it should also be remembered that weather conditions during the propagation of the 1966 crop were exceptionally difficult. Growers from Guernsey north to Lancashire struggled to save their earliest trusses in poor light intensities. Weather conditions early in 1970 generally were much easier, particularly in February (p.8.).

The first crops to be sown were not necessarily the first to be picked. There was some reduction in the number of days between seed sowing and sending the first load for sale. It is particularly interesting to note that the fourteen growers who actually chose a later sowing date in the autumn of 1969 generally had tomatoes ready for sale in fewer days, with no loss of earliness in the market, compared with their experience in 1966. Growers who moved to an earlier sowing date generally were able to sell tomatoes slightly sooner in 1970, but their plants were growing longer for this to be possible. However, there was an exception to this where one grower had acquired an east-west propagation house and also wide-span crop houses, with a resultant saving of thirteen days.

Between 1966 and 1970, therefore, there was some increase in technical efficiency on many of these nurseries, although not all of this may have been attributable to the growers' direct efforts. No doubt the wider use of carbon dioxide was one of the contributory factors. Table 3.12 indicates the periods in the marketing season (as defined in Part II) into which growers used their CO_2 equipment. In 1966 four out of eleven growers had stopped using CO_2 before the end of April, and the remainder continued into May. In 1970 nine out of sixteen growers chose to cut off CO_2 before April 30th.

TABLE 3.10 DAYS BETWEEN SOWING AND FIRST SALE in 1970 COMPARED WITH 1966

	Channel Islands	South of Thames	North of Thames
	No.	No.	No.
Number of Days			
Fewer for 1970	2	6	5
No Change	-	-	2
More for 1970	3	3	1
	5	9	8
Shortest Time			
1966	121	117	132
1970	119	103	121
Longest Time			
1966	148	147	148
1970	137	141	156
Average Number of Days			
1966	130	131	140
1970	128	127	134

TABLE 3.11 INFLUENCE OF SOWING DATES FOR 1970 COMPARED WITH 1966

	Number of Records	Average Number of Days Between Sowing and First Sale	
		1966	1970
Crops sown more than 7 Days Earlier for 1970	4	130	132
Crops sown less than 7 Days Earlier for 1970	1	122	125
No Change	3	145	146
Crops Sown less than 7 Days later for 1970	11	136	129
Crops Sown more than 7 Days later for 1970	3	142	129
	22		

TABLE 3.12 USE OF CARBON DIOXIDE IN 1970 COMPARED WITH 1966

	Number of Records		
	Channel Islands	South of Thames	North of Thames
1966 Crop			
Into Period			
2	-	1	-
3	3	-	-
4	-	2	1
5	1	2	1
No Use of CO_2	1	4	6
	5	9	8
1970 Crop			
Into Period			
2	1	2	-
3	2	2	2
4	2	3	1
5	-	1	-
No Use of CO_2	-	1	5
	5	9	8

If there was a tendency to use CO_2 for less time, there was greater inclination to keep heating systems in operation throughout the season in 1970, as shown in Table 3.13. It remained the practice in the Channel Islands to cut off heating systems quite early in the summer. Of course, it has been shown repeatedly in this series of reports that high heating costs are inherent in the islands.

TABLE 3.13 USE OF HEATING SYSTEMS IN 1970 COMPARED WITH 1966

	Number of Records		
	Channel Islands	South of Thames	North of Thames
1966 Crop			
Into Period			
4	-	1	-
6	1	-	1
7	2	-	-
8	2	2	1
9	-	-	1
All Season	-	6	5
	5	9	8
1970 Crop			
Into Period			
6	3	-	1
7	1	-	-
8	1	-	1
9	-	1	-
All Season	-	8	6
	5	9	8

The foregoing discussion gives some measure of the lively interest taken by these growers in modifying their cultural management to get the best out of their various resources. Certain other changes in management, which were not recorded for the purposes of the survey, are also known to have been introduced. The adoption of new systems of training, particularly those involving some form of layering, was quite widespread in southern England. Several growers gained experience of soil sterilisation with methyl bromide, applied by a contractor.

By way of contrast, the pattern of distribution and marketing was remarkably stable. Established and successful tomato growers tend to deviate little from satisfactory trade channels, and during the five years of the survey it would be true to say that the writer has been aware of very few cases of 'market-chasing' by any growers who were responsible for their own selling.

The only changes in the marketing arrangements among the common sample occurred in three cases south of the Thames. In 1966 the twenty-two nurseries had used the following principal channels of sale:

Channel Islands	-	Guernsey Tomato Marketing Board	(2)
		Commission Salesmen in England	(3)
South of Thames	-	Commission Salesmen	(4)
		Distributing Wholesalers	(2)
		Direct Sales to Retailers	(3)
North of Thames	-	Commission Salesmen	(5)
		Direct Sales to Retailers	(1)
		Marketing Co-operatives	(2)

One grower forsook each type of outlet in southern England to join a co-operative. The distribution of the produce of the five growers who were thus dependent on group selling in 1970 was not known. There were no material changes in the quantities supplied to particular markets and towns by the growers who remained independent.

YIELDS, PRICES AND MARGINS

In 1966, at the start of the British Isles Tomato Survey, it was exceptional to find early nurseries on which there was a worthwhile weight of crop to be sold after the end of September. It has therefore been the practice for the first five years of this investigation to collect output data only to September 30th. Table 3.14 indicates the changes in the yields recorded by the common sample since 1966, in terms of their early and total bulk. The rate of increase in the total weight has been roughly of the order of a ton per annum per acre.

It is likely that the real improvement in average total yield of the common sample was greater than this. It has become clear in the last year or two that some growers are keeping their crops in bearing later into the season than was their custom in the mid-1960's. One reason may well have been some decline in the profitability of the natural-season direct-planted chrysanthemums which certain growers then grew in succession with their tomatoes. This can be inferred from the rising cost of cuttings, a major input, and the likelihood that the market standing of merely seasonal suppliers of flowers has weakened (when compared with that of year-round growers who can offer continuity of business).

The adoption of modern methods of training tomatoes also would account for this tendency towards longer production cycles. The various layering methods, or the variants on traditional Guernsey arch training, all involve keeping the 'head' of the plant upright (hence in the light) more of less continually. The resultant more complete setting and greater vigour have paid off in heavier production over a longer season. Layering can lead to particularly marked improvements in the tonnages which can be grown in English-type vinery houses with low-standing 'fronts'. Where a crop in such a house is layered, there is no need to stop the plants in the fronts early in the season, and conceivably there will be better ventilation. By adopting layering, and maintaining very high cultural standards, one grower in southern England achieved a yield increase of about 25 tons per acre in one quarter-acre block of vinery glass during the years under review.

During this time there was a marked increase in the numbers of growers who achieved yields of 70 tons per acre or more to the end of September, as is shown in Table 3.15. However, attention should again be drawn to the divergent trends in the performance of nurseries with and without extra glass, which are discussed in Part IV.

TABLE 3.14 CHANGES IN YIELDS

Twenty-Two Nurseries

	1966	1967	1968	1969	1970
Tons per Acre					
To July 31st	43.5	46.1	45.2	45.0	47.5
To September 30th	57.7	58.2	58.0	59.7	63.1

TABLE 3.15 DISTRIBUTION OF YIELDS

Twenty-Two Nurseries

Tons per Acre To September 30th	1966 No.	1967 No.	1968 No.	1969 No.	1970 No.
0 - 39.9	1	1	2	-	-
40 - 49.9	5	3	1	4	1
50 - 59.9	7	7	9	7	7
60 - 69.9	6	7	5	4	4
70 - 79.9	2	3	4	5	5
80 - 89.9	-	1	1	2	3
90 and over	1	-	-	-	2
	22	22	22	22	22

Whereas yields tended to increase, net prices really remained rather stable. For the common sample as a whole, 1970 saw the lowest aggregate prices up to September 30th. But, as can be seen in Table 3.16, they were only £0.11 higher in 1969, which was the best year in the series. Seasonal prices, with the exception of late June, were very much more variable from year to year. Many growers expressed disappointment with the prices they received in 1970, and it should be pointed out that their average prices in April, May and early June in 1967 had been even lower.

On May 13th 1968, the Ministry of Agriculture, Fisheries and Food introduced statutory grades for tomatoes sold at wholesale in England, Wales and Scotland. Growers had been able to gain some experience of the standard required on a voluntary basis in the previous season. The declared object of this scheme is to improve the competitive position of home produced supplies and to speed up their distribution. The two years following the

TABLE 3.16 CHANGES IN NET PRICES

Twenty-Two Nurseries

Average Net Realised Prices per 12 lb.	1966	1967	1968	1969	1970
	£	£	£	£	£
March	2.91	2.28	2.10	1.90	2.25
Early April	1.63	1.62	1.97	2.14	1.78
Late April	1.75	1.23	1.90	1.81	1.47
Early May	1.82	1.29	1.08	1.53	1.55
Late May	1.45	1.15	1.07	1.48	1.26
Early June	1.23	1.01	0.99	1.28	1.21
Late June	1.02	1.02	1.06	1.05	1.01
Early July	0.83	0.94	0.92	0.97	0.82
Late July	0.68	0.71	0.93	0.74	0.58
To July 31st	1.16	1.05	1.08	1.19	1.07
Early August	0.56	0.71	0.92	0.59	0.41
Late August	0.51	0.62	0.56	0.51	0.40
Early September	0.51	0.36	0.61	0.53	0.46
Late September	0.58	0.54	0.78	0.41	0.48
To September 30th	1.00	0.96	1.00	1.02	0.91

introduction of the statutory grades were markedly different in character, whole-season prices first being the highest and then the lowest of the five year period under review. From their introduction, many observers have been sceptical about statutory grades, and the evidence to date can only increase their doubts about the impact of this legislation.

Total gross output was lower to September 30th in 1967 than in any other year (Table 3.17). The fluctuations in output from year to year, however, were not extreme, if compared with the uncertainties faced by some other horticultural producers. In view of the general concern over rising costs, the distribution of expenditure in Table 3.17 may seem surprising. As was to be expected, costs were lowest in 1966. But the highest expenditure on heating costs was recorded in 1968, and not in 1970. The combination of two adverse factors could explain this, for there happened to be some very cold weather during the winter of 1968, and oil costs were increased substantially in the previous autumn,

TABLE 3.17 CHANGES IN MARGINS PER ACRE

Twenty-Two Nurseries

	1966	1967	1968	1969	1970
Gross Output	£	£	£	£	£
To July 31st	9,391	9,053	9,098	9,980	9,471
To September 30th (A)	10,802	10,384	10,794	11,420	10,727
Costs of: Seeds and Plants	20	21	31	26	25
Heating Fuel	1,404	1,537	1,802	1,706	1,586
Carbon Dioxide	92	202	200	198	214
Electricity	163	156	173	184	170
Total (B)	1,679	1,916	2,206	2,114	1,995
Margin over Heating Costs (A-B)	9,123	8,468	8,588	9,306	8,732

when a 2d. per gallon surcharge was imposed after the closure of the Suez Canal.

Taking the various strands of this discussion into account, it can thus be concluded that average margins over heating costs per acre changed very little in these five years, notwithstanding growers' active efforts to improve their efficiency. The results of individual nurseries, of course, showed a much more varied pattern. Four individual growers achieved margins in excess of £10,000 per acre in each of these five years, while another two only failed to do so once.

The distribution of margins per acre is set out in Table 3.18. As with yields, it can be seen that this distribution improved during the period under review, facts which doubtless were associated. In spite of the low prices prevailing in 1970, more growers generated margins in excess of £10,000 in that year than any other. The conflicting experience of those who had increased their scale of operation, and those who had not, should again be noted below.

TABLE 3.18 DISTRIBUTION OF MARGINS

Twenty-Two Nurseries

Margin over Heating Costs per Acre	1966	1967	1968	1969	1970
£	No.	No.	No.	No.	No.
0 - 5,999	1	2	2	2	-
6,000 - 7,999	4	4	5	3	2
8,000 - 9,999	8	9	8	5	7
10,000 - 11,999	3	6	5	7	9
12,000 - 13,999	4	1	2	2	2
14,000 and over	2	-	-	3	2
	22	22	22	22	22

SOME NOTABLE CASE STUDIES

At this point, brief reference can be made to two exceptionally interesting achievements by particular growers.

Case A. Table 3.19 shows the results of the nursery which was most successful of all, in the sense that it generated the highest average margin over heating costs of any in the common sample. This is a half-acre unit in the Channel Islands. During the five years, this grower improved his yields markedly, partly as the outcome from rebuilding his oldest glass, but largely through his cultural skill and capacity to learn from his experience. Each year the prices he obtained were somewhat higher than the island average, as he was able to sell part of his crop to local stores and retailers.

Case B. This was an example of a different feat, which was accomplished only by two growers involved in the common sample. Table 3.20 highlights the most spectacular of these two achievements, in which there was a progressive increase in margin per acre each year after 1966. The nursery concerned was also of

TABLE 3.19 RESULTS OF THE MOST SUCCESSFUL NURSERY

Case A

	1966	1967	1968	1969	1970
Tons per Acre	67.9	63.2	69.3	74.2	91.7
Average Net Realised Price per 12lb.	£ 1.17	£ 1.10	£ 1.19	£ 1.30	£ 0.99
Gross Output (A)	14,876	12,968	15,336	18,011	16,902
Costs of:					
Seeds and Plants	56	56	56	46	24
Heating Fuel	1,815	1,784	1,606	2,580	2,217
Carbon Dioxide	432	589	688	598	766
Electricity	87	133	173	126	146
Total (B)	2,390	2,562	2,523	3,350	3,153
Margin over Heating Costs (A - B)	12,486	10,406	12,813	14,661	13,749

TABLE 3.20 THE NURSERY SHOWING THE GREATEST IMPROVEMENT

Case B

	1966	1967	1968	1969	1970
Tons per Acre	59.1	63.0	69.6	84.8	93.3
Average Net Realised Prices per 12 lb.	£ 0.74	£ 0.97	£ 1.02	£ 1.03	£ 1.01
Gross Output (A)	8,198	11,458	13,224	16,355	17,508
Costs of:					
Seeds and Plants	15	18	31	18	21
Heating Fuel	1,482	1,504	2,672	3,593	3,114
Carbon Dioxide	-	-	-	335	391
Electricity	290	253	298	434	419
Total (B)	1,787	1,775	3,001	4,380	3,945
Margin Over Heating Costs (A - B)	6,411	9,683	10,223	11,975	13,563

about one half-acre, situated in the south-east. The only major capital improvements were to the heating system in 1967, and the installation of carbon dioxide equipment in 1969.

The considerable increase in yield here again could be attributed to painstaking attention to every cultural detail. The grower devised his own system of layering during the five years illustrated in the table, and his final total yield in 1970 (including fruit sold after 30th September) exceeded 100 tons per acre for the first time. (At the time of writing it is understood that he has produced a still higher tonnage in 1971). There was also an improvement in earliness, reflected in the better average prices he obtained in the last three years.

PART IV

Investment in Early Tomato Production

Recent British research in horticultural economics seems rather to have neglected many aspects of investment. In particular, little evidence has been collected systematically to show how growers generally have been able to benefit from the grant-aided or capital loans schemes which were noted in Part III. Some recent findings by Dr. R. R. W. Folley are almost the only source of information about this.(20)

Dr. Folley has described a retrospective investment study of some twenty glasshouse holdings in Kent. All of these had taken action under the Horticulture Improvement Scheme, but not all were growing tomatoes. One of his conclusions was not altogether surprising; that growers are commonly satisfied if a higher cash income is generated by their business after investment. In other words, growers and economists may not measure an increase in production efficiency by the same yardsticks. Dr. Folley has put forward the following hypotheses on the strength of this study: that growers' first concern is to re-equip their holdings; that investments which more than double the value of fixed assets on single holdings will not immediately be fully productive, and that two or three seasons may elapse before they are so; and that over-investment is endemic at times of investment activity.

These conclusions and propositions are important. The sums of social capital disbursed under the H.I.S. are not inconsiderable, and it is in the industry's interests to demonstrate that it has been wisely supported. And if growers have not benefitted from investment as they might, it is worthwhile to pursue the reasons for this. Accordingly, the experience of the growers who have contributed data to the British Isles surveys is examined in the following pages to see what further light can be thrown on the consequences of their investments. Emerging from this discussion, there follow some practical recommendations for growers and their advisers who are contemplating further investment in tomato production at the present time.

Due to the nature of the surveys and the absence of some of the appropriate information, the following discussion

necessarily relies heavily on the writer's inferences. Comment is confined to the consequences of investment for purposes of nursery expansion. With the advantage of hindsight, the following deductions can reasonably be drawn:

a) commonly there is a drop in overall production efficiency after new glass comes into use, at least in the initial years,
b) expansion at too fast a pace or with unsuitable funding can lead to financial difficulties,
c) very large-scale enterprises established over a few years are especially vulnerable in each respect,
d) the problems which follow expansion are mostly predictable.

RESULTS FOLLOWING EXPANSION

Because of the limited nature of the British Isles surveys, unfortunately it is not possible to comment on the extent to which growers succeeded in controlling or spreading wider their fixed costs of production, such as the wages of regular labour. But by turning again to the results of the identical sample discussed in Part III, some other effects of nursery expansion can be seen.

Since five of these nurseries were located in the Channel Islands, where different provision for supporting horticulture applied, the following tables reflect the impact of investment incentives in general, rather than the H.I.S. in particular. Tables 4.1 and 4.2 illustrate changes in the distributions of yields and margins over heating costs respectively, on those nurseries which had and had not expanded their areas of tomatoes between 1966 and 1970.

These tables suggest that higher performance was most often associated with the nurseries which had not been extended. On the nurseries without additional tomatoes, the average increase in margin was over £3,000 per acre. Only one of this group failed to improve on its performance at the start of the series, and here there was no significant slipping back. It will be noted that the two outstanding nurseries to which attention was drawn

TABLE 4.1 YIELDS OF 1970 CROP COMPARED WITH 1966 CROP

Tons per Acre Difference	Nurseries with Additional Glass	Nurseries with No Additional Glass
	No.	No.
(+)25 - 34.9	1	2
(+)15 - 24.9	2	4
(+) 5 - 14.9	4	3
(-) 4.9 -(+)4.9	3	-
(-)14.9 - 5	1	-
(-)24.9 - 15	2	-
	13	9

TABLE 4.2 MARGINS OF 1970 CROP COMPARED WITH 1966 CROP

Margin over Heating Costs per Acre Difference	Nurseries with Additional Glass	Nurseries with No Additional Glass
£	No.	No.
(+)5,000 - 7,999	-	2
(+)3,000 - 4,999	-	2
(+)1,000 - 2,999	-	3
(-) 999 -(+) 999	7	2
(-)2,999 - 1,000	4	-
(-)4,999 - 3,000	2	-
	13	9

in Tables 3.19 and 3.20 were among those which had become no larger by 1970. Of course, it would be true to say that many of the growers who had not expanded their glass had nonetheless rebuilt or modernised the facilities they originally had in 1966.

Admittedly, three of the nurseries with additional glass would point to a marked increase in yield: in each of these cases performance was very low in 1966, and in two of them only some extremely old-fashioned glass was then standing on the nurseries. Of the thirteen holdings with more glass, only five achieved higher margins (per acre) in 1970 than in 1966 (an average increase of £740 per acre) whereas eight had lower margins (having decreased by £1,816 per acre).

Two points of interpretation should be mentioned in fairness to the growers with additional glass. Where a larger area of tomatoes is grown, it is sometimes found convenient to spread planting dates, even though there is some overall loss of early bulking. It must also be appreciated that not all of those growers who had built extra glass did so at the same point in time: perhaps in another two years or so the performance throughout their nurseries would have seemed more favourable.

As it was, these growers were not necessarily dissatisfied themselves with the outcome of their expansion. Generally the evidence above supports Dr. Folley's findings, and it should be recalled that these tomato nurseries, unlike the holdings in Dr. Folley's sample, were chosen deliberately for the survey on the strength of their reputations as successful enterprises. If the common sample results hardly point to greater economic efficiency on those nurseries which had been enlarged, it may be some consolation to the growers that investments do not always work out well in other industries (even in those where horticulturists suppose that management is highly sophisticated in relation to their own) as has been shown in a recent study by the Centre for Business Research at Manchester University.(21)

FINANCIAL DIFFICULTIES FOLLOWING EXPANSION

To the writer's knowledge, two of the nurseries in the common sample experienced worrying financial difficulties. These

took the form of over-trading, following the construction of additional glasshouses. A firm is said to be over-trading when it has funds (which may have seemed adequate beforehand) 'locked away' in fixed assets or stock in hand, but insufficient liquid assets to meet short-term liabilities. If there is no call for the payment of short-term liabilities, the condition may pass unnoticed. However, if there is a call for payment and further credit cannot be negotiated, there may be no choice but to realise some assets, and thus dispose of resources which were available for production, together with the opportunity for future profits.

Common causes of over-trading are first, the failure of expected cash flows to materialise, e.g. through crop failure, inflation, depressed markets; and secondly, an unsuitable source of finance for the project. It is a classical investment error to 'borrow short to invest long', although it is clear that many growers do so, by using bank loans or overdrafts to establish glasshouses. The problem arises if, thereafter, the bank requires a grower's indebtedness to be reduced, or places a ceiling on his further borrowings, as can happen, say, following Treasury directives to banks to restrict their lending in view of the state of the national economy.

In the two particular examples known from the British Isles surveys, neither of the growers met with any undue difficulty in operating over a larger area of glass and their crops were reasonably satisfactory: but both of them had borrowed short-term from their banks to fund quite ambitious programmes of expansion, over two or three years. In each case, the bank applied pressure for their indebtedness to be reduced substantially. One of the growers solved this problem by refinancing his project with a twenty-year mortgage, thus conforming to the sounder principle of 'borrowing long to invest long'. The other, who was not only growing tomatoes, succeeded in negotiating an overdraft ceiling and in re-organising some other aspects of his business so as to reduce his need of cash.

It is not suggested, of course, that these growers' experiences were the fault of the H.I.S. or that their intention to expand was misconceived. But their difficulties may well have been

exacerbated by their desire to press forward rather too enthusiastically, a pitfall which is masked by the generous terms of the H.I.S.

CONTRASTS IN INVESTMENT BEHAVIOUR

It is apparent from the British Isles surveys that the opposite extreme in investment strategy is still preferred by some growers. In spite of the availability of grants under the H.I.S., the recent investment decisions taken on many established nurseries in Lancashire, in particular, still demonstrate considerable caution. The history of many of the nurseries in The Fylde and the Hesketh Bank localities has been one of piecemeal development. Traditionally growers there have increased their productive resources only on a scale determined by their available savings, or by their wish to confine indebtedness to the least extent and shortest duration which was tolerable. With such a philosophy, they have tended not to erect new glass on a scale beyond their capacity to manage the whole of their resources to the fullest effect.

In the recent past, many of the nurseries in the Lancashire industry have appeared to be prosperous (although little information about their incomes is available to confirm this point). Many of the growers have aspired no further than to be successful self-employed businessmen, and in this context there has been little incentive for a more vigorous approach to re-investment. Perhaps, in a slightly different way, it has come about that the relative success in business of so many Land Settlement Association tenants, on the predominantly glasshouse estates, has derived from their financial circumstances, which have obliged them not to over-invest at any one time.

It would thus seem that what has been described here as the traditional Lancashire approach to expansion has served growers well in their rather distinctive social context. It has to be conceded, however, that established firms in Lancashire may also have lost opportunities. New units are now under construction, or have recently been commissioned, in the Hesketh Bank locality, which are much larger in scale than the established nurseries nearby. Doubtless their erection has been undertaken with a view to trading with the larger-scale buyers

of the North West, where the structure of retail trading is now changing.

So far, however, these newer glasshouse developments in Lancashire themselves remain dwarfed by the rapid expansion on a hitherto unprecedented scale which several firms have undertaken in other regions, with the aid of the H.I.S. It is a feature of this scheme that unlimited expansion is open to those growers with the apparent means and inclination. There is no limit to the number or scale of the applications which an eligible grower can submit and have approved. Several companies are thus known to have built more than twenty acres of new or additional glasshouses for tomato production in this way, and to have further plans for expansion before the expiry of the scheme. Both 'push' and 'pull' factors can be discerned in this trend. The former lies in the availability of capital from sources to which the majority of growers could never turn, and the latter in the new opportunities which are being created by market forces. Obviously, very large enterprises are more likely to be able to supply the large volumes of particular grades needed by the most exacting buyers in the wholesale tomato trade, such as supermarkets and chain stores.

From the marketing viewpoint, the emergence of very large-scale nurseries must therefore be seen as a step forward. But to what extent investments of this order, implemented at a forced pace, can yield satisfactorily seems a much more open question.

Unfortunately the available evidence rather suggests that these enterprises must become progressively more vulnerable as they expand, both to declining production efficiency and to financial difficulties. This is not to say, of course, that these pitfalls cannot be avoided. But the British Isles surveys have shown wide differences between the results of the largest holdings and the remainder. Similar observations have been recorded by A. P. Mitchell (formerly of the States of Guernsey Advisory Service) on the strength of the complete financial information available from the islands' Costed Vineries Scheme.(22) However, it may be unfair to draw the analogy tooclosely between the new giants in the industry and long established large firms, which have been handicapped by their extensive areas of rather obsolete glass. But it does seem that even small-scale growers, of the

highest intelligence and technical ability, have found difficulty in maintaining their former level of output after building additional glasshouses.

CAUSES OF LOWER EFFICIENCY AFTER INVESTMENT

Why was this so? Broadly there were two respects in which growers in the British Isles surveys became less efficient:

a) they experienced 'teething troubles' with their new assets,

b) they did not manage their additional resources to the fullest advantage.

Growers could not be criticised for the occurrence of problems of the first type, which were not really predictable.

At the same time they were not particularly surprising. The technology of glasshouse design and equipment recently has evolved at an unprecedented pace. Clearly, also, many manufacturers and their sub-contractors have been inundated at times with growers' orders, as a wave of investment activity has swept through the industry. This situation has encouraged new firms in the ancillary industries, some of which have been prone to managerial problems of their own.

Those who adopted innovations therefore have had to accept that they were taking risks. Understandably, also, growers who had purchased modern glasshouses, with a high level of automation, needed some while to gain the 'feel' of their new resources.

Nonetheless, many growers have reported various inadequacies in their newly acquired capital assets in recent years. Weaknesses can be quoted with regard to designs and specifications, manufacture of components, and installations by manufacturers or their sub-contractors. The components of heating systems (other than the boilers themselves), ventilating equipment and cladding seem to have received the most frequent criticism. Delays of several weeks have often been quoted. The consequences of such delays often could be considerable, in view of the changes in seasonal prices obtained for early tomatoes.

Causes within the Control of The Firm

Difficulties which occurred in other ways generally could have been anticipated. Many of the growers who have participated in the surveys have frankly drawn attention to their own mistakes and the problems they have found in cropping additional tomato plants: generally they have been careful to avoid any recurrence.

Some problems could be traced to the fact that after expansion the grower could do relatively less manual work himself. His own skill in handling plants, which usually would have been of a high order, was thus confined to a portion of his glass, or spread more thinly over all his area. And by working among his plants less, a grower would be less able to observe them at the closest quarters, e.g. for the first botrytis symptoms.

Where extra workers were needed, growers had a further threshold to cross. Stricter supervision was thus required of such key operations as steaming, watering and trimming, where the difference between good and poor work could be measured by as many as ten tons per acre of tomatoes at the end of the season. Recruitment of workers of the right calibre was not always achieved, and the scope for training any less proficient workers was often not recognised. In certain cases, a management structure which had worked well before was no longer adequate.

Certain technical problems followed in the wake of glasshouse construction. Residual soil damage after levelling or draining restricted the performance on several nurseries in the first year, and in one case for at least four years. Where large areas of glass were erected, some growers found themselves unable to maintain the required temperatures throughout, without modifications to their heating systems. Before the widespread adoption of layering techniques, faulty light transmission may well have been a feature of many large blocks of glass. (Several growers also reported very severe attacks of TMV in new structures, with virgin tomato soil, even after taking their normal precautions to restrict the spread of virus).

Marketing presented new problems for some growers who had increased their production. Long-reliable outlets could not always handle all their extra supplies. Sometimes the activities of

competitors, who had also increased their production, were not foreseen. Generally, however, it was more usual for production rather than marketing problems to follow an increase in the glasshouse area devoted to tomatoes.

THE DECISION TO INVEST

It has been noted earlier that the growers concerned in the British Isles surveys generally were not displeased with the results they obtained from expansion. This impression bore out Dr. Folley's conclusion that growers commonly were satisfied if their investments resulted in a higher cash income. At the risk of parting company with growers over this point, it must be asked whether they were not too easily satisfied.

Clearly, no investor can be absolutely certain that he is making the 'right' decisions when he decides to purchase a glasshouse, which may have a working life of twenty years and be written off in half that time. It is only practicable, therefore, to aim at the 'best possible' decision in the prevailing circumstances. The tomato growers with whom the writer has discussed investment decisions generally appeared to have made shrewd choices with regard to what type of glasshouse would give the best 'value for money'.

The evidence which has been quoted above, both concerning the loss of production efficiency for reasons within the growers' control, and also concerning financial difficulties after building extra glass, suggests that other aspects of growers' investment decisions were less well thought out. In other words, they may have misjudged the side-effects which were likely to result from the operation of additional glass; exactly how much to invest; or the best timing for the new venture. Decisions which were suspect for these reasons might not ultimately be wrong. Their significance is that they represented lost opportunities for the growers concerned.

In principle, when new glasshouses can be made to generate the fullest cash flows in each of the initial years of their life, the enterprise stands to gain in the following ways:

a) less interest need be paid out where short-term funds have been used to finance the development,

b) creditworthiness should be enhanced, if further expansion and hence borrowing is contemplated,

c) the project is most likely to be worthwhile, whatever yield is required from the capital invested,

d) there is most likely to be an increase in the capital of the firm by the end of the life of the project.

Particularly at a time when the real value of money is falling, small firms are ill-advised to let opportunities slip.

These thoughts have been expressed in cogent, forceful and practical terms by A. F. Paton, a noted farming entrepreneur(23):

'If one is to build a business using largely borrowed capital it is essential that one earns first and foremost a reputation for unreproachable technical ability. It is essential to allow one's reputation for doing the job supremely well to become known. The tender plant of a young, unstable and precariously financed business cannot wait too long to grow and expand, but it must not be allowed to grow too soon and make a serious mistake early on in the venture. I consider the success or failure of any developing farming entrepreneur hinges completely on his judgement of when to start pressing for expansion. If he starts too soon his technology will let him down, there will be a massive catastrophe and confidence will be lost for ever and that will be the end. If he starts too late, his courage will have left him. No economist can judge this vital moment in the development of a business from figures alone.'

These sentiments clearly endorse many of the strands in the discussion this far. Even the last sentence is one to which the writer would subscribe, although with the important proviso that it should be possible for economists or management advisers to help many growers to improve their own powers of judgement. The remainder of this discussion is thus devoted to what can be done in this respect.

THE NEED FOR LONG-TERM PLANNING

The fact that growers have not made the best possible use of the opportunities afforded by the investments they have made in recent years is symptomatic of a more fundamental condition. For want of a better expression, many growers (and indeed other businessmen) seemingly manage their business affairs in a planning vacuum. When they make decisions about investing

capital in long-term projects such as new glasshouses, this is almost invariably done in the absence of any systematically prepared and detailed plans for the strategic development of their firms over the next five or seven years.

Before discussing this further, it should be said that it is not surprising, in an industry where the growers' way of life and normal business considerations are often so closely interwoven. Independence and survival in business on one hand, and pride of possession and technical achievement on the other, can all count for so much among growers. Inevitably, the structure of many enterprises is such that many growers are continually pre-occupied with burdensome day-to-day matters. In many cases, risks and uncertainties are accepted as a sporting challenge. Alternatively, they are often seen as a factor which must render worthless any effort at systematic planning. (The latter is an attitude very much shared with managers in other industries).

It would also be fair to say that many growers have been concerned about the long-term development of their businesses, yet have been unable to find much guidance about how to approach this aspect of management. Recently, however, an approach to systematic long-term (or strategic) planning has been gaining ground in the management of many forms of commercial and other organisations.

Strategic Planning of this kind is often associated with the broader concept of Management by Objectives. (24) It is known that this has been introduced in a number of leading large-scale companies in the glasshouse industry, and the principles are likely to prove helpful even to growers who operate on a relatively small scale, (25,26,27). To summarise what strategic planning involves, there will be a continuous cycle of the following managerial activities in a firm in which it is undertaken:

a) analysing the trading environment of the firm,
b) appraising the strengths and weaknesses of the enterprise,
c) identifying significant opportunities which the firm can exploit,
d) locating factors which will threaten the survival of the firm,
e) reviewing the purpose of the enterprise,

f) setting objectives for the long-term and the short-term,

g) deciding the physical and financial targets which must be realised if these objectives are to be achieved,

h) reaching agreement through consultation with each person responsible that these targets can and must be achieved, and how this will be done.

While it is not difficult for the sceptical to dismiss this approach as a counsel of perfection, it should be pointed out that it is essentially a common-sense procedure which requires no special knowledge of sophisticated management techniques.

Of course planning per se cannot produce results; management must put plans into effect to get the required results. The significance of the planning process really lies very much in the attitude of mind which it fosters. While it may appear naive to argue that a grower who has a clear objective in mind will be more likely to achieve the full potential of his investment than one who has not, this simplicity is deceptive.

If a grower reaches an investment decision but has no formal plan for the long-term development of his business, the full potential of his new resources may come to be realised only by chance. With no precise long-term objectives, he can have no clear idea about the level of performance which must be achieved with his additional resources. Hence he cannot communicate this to his sub-ordinates, or consult with them about how their own targets are to be realised. Without systematic planning, there may be no search for alternatives to investment which could benefit the firm more, and the financial implications of the decision may almost be disregarded. The investment will thus be 'open-ended'.

It must be emphasised at this point, without embarking on a full account of strategic planning, that the term objective is used with a particular sense in this context. It is a categorical statement both of what is to be done and when it is to be achieved. A good example would be 'to generate a profit of £10,000 in 1976'. It is without real meaning, and no help, for managers to state (as some do) that their 'objectives' are 'to generate maximum profit' or 'to develop a profitable enterprise'.

Similarly, financial or physical targets must be absolutely

specific to promote the required attitude of mind. Targets may otherwise be described as 'goals', 'key results' or 'sub-objectives'. Given a firm with financial objectives of a profit of £8,000 in 1972 and £12, 000 in 1976, the targets on which success depends might be expressed as follows:

	Short-term	Long-term
	1972	1976
Yield	75 tons per acre	100 tons per acre
Grade out	70% Class I	80% Class I
Direct Sales Outlets	2	10

It is not the intention to suggest that growers who are unfamiliar with strategic planning have no plausible reasons for investment. Their reasons often include:

a) the encouragement given by high profits from their existing resources,

b) the availability of capital within the firm,

c) the wish to take advantage of the H.I.S. before the scheme expires,

d) the belief that a larger-scale of operation would ensure viability in the future,

e) the availability of additional land,

f) the presence of a management structure which is under-occupied,

g) the decisions taken earlier, to instal surplus boiler capacity or to purchase other equipment which could operate over a wider area.

Certainly these are relevant considerations. They would be taken into account in strategic planning also, as they relate to the opportunities and threats which confront the firm. But if they are regarded as sufficient reason for further investment by themselves, they can only give rise to the 'open-ended' pattern of unplanned investment, which has been shown often to not benefit the firm to its full potential.

MAKING THE DECISION

Finally, and briefly, it may be helpful to re-express the foregoing discussion in a practical aid for management. The checklist which is laid out on the following pages is thus offered for consideration at times of investment. In no sense

is it intended to stifle sensible initiative on the investor's part. At the worst it may be helpful reading matter for those who are not persuaded of the need for systematic planning. The more rigorous discipline of writing down answers to each question is to be commended, provided that the task is approached in a self-critical manner, without self-deception!

The checklist is intended to be used in conjunction with the appropriate cash flow budgets. The cash flow is the final expression of all other physical and financial production coefficients, and it can be argued that it is the most useful aid to management which is yet available to growers. Guidance in its use can be obtained from the Agricultural Development and Advisory Service, together with a suitable proforma.

The checklist does not cover all the practicalities. Notable omissions relate to planning permission and the negotiation with contractors needed to limit delays from their quarter. The checklist has been designed primarily with the expanding tomato enterprise in mind, but it may readily be adapted to other investment situations.

CHECKLIST FOR INVESTMENT PROPOSALS

WHY IS ANY INVESTMENT NECESSARY?

Is it to take advantage of some specific opportunity?

Is it to resolve a particular threat?

Is it consistent with the agreed purpose of the firm?

Is it consistent with the stated long-term and short-term objectives of the firm?

Would an alternative strategy be better than investment?

HOW CAN CAPITAL BE INVESTED?

Can it be invested to improve the firm's marketing capability?

Can the firm's productive resources be modernised?

Is it possible to expand production?

Should further capital be invested on the present site?

For Each Possible Investment Project

WHAT ARE THE MARKET OPPORTUNITIES?

Who requires extra supplies now?

What are their exact requirements now, and can these be provided?

Where can other extra output be sold?

Is the demand likely to alter?

What are competitors planning to supply at home and abroad?

What level of future prices is likely?

Is there scope for innovation?

IS THE PROJECT FEASIBLE WITH EXISTING MANAGEMENT?

Can management operate the new type of resource?

Does management understand the new techniques needed?

Can management carry the extra responsibility?

What training would management require?

Will extra managerial staff be needed?

IS THE PROJECT FEASIBLE WITH AVAILABLE LABOUR?

Is suitable labour available now?

What training would workers require?

Will extra labour be needed and can it be recruited?

IS THE PROJECT FEASIBLE WITH AVAILABLE CAPITAL?

What would be the maximum requirement of fixed and working capital?

What is the cost of borrowing?

What grants and allowances apply?

Has provision been made for substantial contingendes?

Has taxation been considered?

HOW RISKY IS THE PROJECT?

Would new fixed resources be adaptable to other uses?

What is their economic life?

What is the rate of technological obsolescence?

Is technological failure known?

What side-effects may disrupt the operation of the present resources of the firm?

WHAT ARE THE FINANCIAL IMPLICATIONS?

Will the project pay back in an acceptable time?

Will there be an acceptable return after annual cash flows have been discounted?

Could the project lead to the condition of over-trading?

How sensitive is the project to falling prices and rising costs?

If the Project appears to be a Poor Investment

IS THERE A BETTER APPROACH?

Can the weakness be tackled by re-phasing the timing of the proposed stages in the plan?

Would it be better to re-plan the project in fewer (or more) stages?

Is there a more suitable method of finance?

Have all sources of technical and business advice been consulted?

If the Project appears to be a Good Investment

IS A DECISION YET POSSIBLE?

Are any alternative projects more attractive?

What could the same sum of capital yield if invested outside the firm?

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