Cauliflower

Agricultural Enterprise Studies
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Economic Report No. 5

UNIVERSITY OF EXETER

YEAR ROUND CAULIFLOWER PRODUCTION IN LINCOLNSHIRE, KENT AND CORNWALL 1969/70

Including Trends in Production, Imports, Prices, Complementary and Competing Brassica Supplies

Helen M. Cole

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FOREWORD

University departments of agricultural economics in England and Wales, which formed the Provincial Agricultural Economics Service, have for many years conducted studies of farm and horticultural enterprises. Such studies are now being undertaken as a co-ordinated programme of investigations commissioned by the Ministry of Agriculture, Fisheries and Food. The reports of these studies will be published in a new national series entitled "Agricultural Enterprise Studies in England and Wales" of which the present report is the fifth.

The studies are designed to assist farmers, growers, advisers and administrators by investigating problems and obtaining economic data to help in decision-making and planning. It is hoped that they will also be useful in teaching and research. The responsibility for formulating the programme of studies rests with the Enterprise Studies Sub-Committee, on which the Universities and the Ministry (including the Agricultural Development and Advisory Service) are represented.

Copies of the reports may be obtained from the University departments concerned. Details of preceding reports and the addresses of the departments are given at the end of this report.

ACKNOWLEDGMENTS

The field work connected with the survey was carried out in Lincolnshire by Tony Dye and Peter Bowbrick, in Kent by Peter Rogers and in Cornwall by the author of this report.

Very sincere thanks are due to co-operating growers who supplied details of their holdings and cauliflower crops in all three counties and especially where cutting and packing records were faithfully kept.

The author would also like to thank individuals in the Ministry of Agriculture, Fisheries and Food, in A.D.A.S., and in the N.F.U. who helped with advice and supplied facts and figures incorporated in the report.

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Tables and Figures

INTRODUCTION

In terms of value, the main brassica crops, cauliflower, cabbage and Brussels sprouts together, accounted for 35% to 40% of the total outdoor vegetable output in England and Wales from 1963-70. Cauliflower, at 15%, was the highest of the three until 1968-69, when it was overtaken by cabbage.

In area occupied brassicas as a whole remained relatively constant and became a slightly smaller proportion of total outdoor vegetables in 1968-69 and in 1969-70. This was due to increases in the national acreage of carrots, of French and runner beans, also of peas for processing and thus of the total area of outdoor vegetables.

While average annual yields of cauliflower fluctuated over the same seven years those of cabbage showed what appeared to be an established increase of about half to one ton per acre. However, analysis of the previous seven years reveals an increase of around half a ton per acre in Brussels sprouts and one to one and a half tons in cauliflower. The fruits of recent breeding work and new varieties can be detected in each of the major brassica crops although they occurred at different times.

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Prior to analysing in some detail the survey data collected in the three counties, this report sets out to show the distribution of the major cauliflower crops over the year, of complementary and competing brassica crops and of Channel Island and imported supplies. It looks at recent trends in the level of supplies and relates them to the population increase. It also attempts some explanation of market price variations for cauliflower from season to season.

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I YEAR ROUND CAULIFLOWER AND OTHER BRASSICA SUPPLIES

Based on a seven year analysis of statistical data 1963-70

The three cauliflower crops in England and Wales

Although marketed in every month of the year home grown cauliflower is produced from three quite separate crops*, early summer, summer and autumn and winter heading.

Early summer cauliflowers, autumn sown in frames, or January sown under heated glass, overwintered and planted out in spring, have upright but very brittle foliage. Because they are more costly to grow than later varieties and liable to button they can be a risky crop. They are marketed from the latter part of May to July, or even August in a late season.

Summer crops for selling in July and August may be frame sown in March and transplanted in May or direct drilled at the end of April or early May. Late summer and autumn crops are sown mid May and transplanted in late June. They mature from the end of July to November in Lincolnshire, to December and sometimes early January in sheltered parts of Kent.

Winter heading cauliflower, also known as broccoli, is a hardier plant with a number of leaves folding over the curd to protect it from frost and weather damage. It comes on the market during the rest of the year from late November or December to the following June, when it overlaps with the early summer crop. In the exceptionally severe winter of 1962-63 a large part of the crop was destroyed. Frost damage of varying proportions is a hazard in every winter.

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* There are really five different kinds of seed for varieties heading in early summer, summer, autumn, winter and late spring. Because of the considerable overlap of these different crops and for statistical convenience they are generally grouped under three headings.

Table 1. Seasonal distribution of the three main cauliflower types

Month	'000 tons				%			
	Early summer	Summer and autumn	Winter heading	Total	Early summer	Summer and autumn	Winter heading	Total
May	.2	-	-	.2	..	-	-	-
June	32.9	.1	-	33.0	57	..	-	11
July	23.5	8.1	-	31.6	41	6	-	10
August	.9	35.9	-	36.8	2	27	-	12
September	-	36.1	-	36.1	-	28	-	12
October	-	30.8	.1	30.9	-	23	..	11
November	-	15.5	1.3	16.8	-	12	1	6
December	-	5.7	4.3	10.0	-	4	4	3
January	-	.2	5.5	5.7	-	..	5	2
February	-	-	8.5	8.5	-	-	8	3
March	-	-	14.8	14.8	-	-	14	5
April	-	-	23.0	23.0	-	-	21	8
May	-	-	42.4	42.4	-	-	39	14
June	-	-	8.4	8.4	-	-	8	3
Total	57.5	132.4	108.3	298.2	100	100	100	100
%	19	45	36	100	-	-	-	-

Source: Agricultural statistics M.A.F.F.

Major production areas in England and Wales

On the basis of tonnage produced and taking the 1963-70 average, Lincolnshire accounts for nearly half the national output of early summer and exactly half the late summer and autumn crops. No one county dominates the output of winter heading cauliflower. Cornwall, Lincolnshire and Kent together contribute three-quarters, Cornwall provides nearly one-third and Lincolnshire nearly one-quarter.

Table 2. Major county supplies of each cauliflower type

County	Early summer		Summer and autumn		Winter heading		All types	
	'000 tons	%	'000 tons	%	'000 tons	%	'000 tons	%
Lincolnshire	28.1	49	65.5	50	26.3	24	119.9	40
Kent	-	-	17.6	13	21.5	20	39.1	13
Cornwall	-	-	-	-	34.8	32	34.8	12
Rest	29.4	51	49.3	37	25.7	24	104.4	35
Total England and Wales	57.5	100	132.4	100	108.3	100	298.2	100

Source: Agricultural statistics M.A.F.F.

Seasonal distribution of supplies from main producing counties

There are variations in the timing of each crop from the chief producing areas. Early summer cauliflower is most forward in Worcester and its season lasts longest in Lincolnshire.

Summer and autumn crops tend to be predominantly summer and early autumn in all counties except Kent, where the emphasis is on autumn varieties.

Because of its climate Cornwall has the longest marketing period of winter heading cauliflower and, in the relatively normal winters of that seven years, produced between 75% and 80% of England and Wales supplies from January to March. In Lincolnshire, Kent and other counties (except Devon and Pembroke) it is usually late April or May before the winter heading crop is firmly in the market, at a time when the Cornish crop is tailing off.

Table 3. Seasonal distribution of cauliflower supplies by type and by producing source

'000 tons

Month	Early summer		Summer and autumn			Winter heading				Total
	Lincs	Rest	Lincs	Kent	Rest	Corn-wall	Lincs	Kent	Rest	England and Wales
May	-	.2	-	-	-	-	-	-	-	.2
June	15.1	17.8	-	-	.1	-	-	-	-	33.0
July	12.3	11.2	5.6	-	2.5	-	-	-	-	31.6
Aug.	.7	.2	22.8	.6	12.5	-	-	-	-	36.8
Sept.	-	-	18.5	2.4	15.2	-	-	-	-	36.1
Oct.	-	-	11.6	6.1	13.1	.1	-	-	-	30.9
Nov.	-	-	5.3	5.3	4.9	1.2	-	-	.1	16.8
Dec.	-	-	1.7	3.1	.9	3.9	-	-	.4	10.0
Jan.	-	-	-	.2	-	4.6	-	.2	.7	5.7
Feb.	-	-	-	-	-	6.4	-	.6	1.5	8.5
March	-	-	-	-	-	11.0	.2	1.0	2.6	14.8
April	-	-	-	-	-	7.0	4.5	6.7	4.8	23.0
May	-	-	-	-	-	.6	18.2	11.7	11.9	42.4
June	-	-	-	-	-	-	3.4	1.3	3.7	8.4
Total	28.1	29.4	65.5	17.7	49.2	34.8	26.3	21.5	25.7	298.2

Source: Agricultural statistics M.A.F.F.

Seasonal distribution of Channel Island and imported cauliflower supplies from all sources

Total cauliflower supplies from England and Wales are at a relatively low level from November to April (table 3). It is during that period that consignments from the Continent and the Channel Island supplements the home grown crops.

While Channel Island cauliflower enter the country freely other imported supplies have been subject, since 1954, to a duty of 30p (6/-) per cwt. from 1st July to 30th April and 40p (8/-) per cwt. from 1st May to 30th June.

Table 4. Seasonal distribution of imported and Channel Island cauliflower supplies and as a percentage of total cauliflower supplies

Month	France	Italy	Irish Republic and Holland	Total imports	Channel Isles	Imported + Channel Isles as a percentage of total supplies
	'000 tons					%
June	-	-	.2	.2	-	..
July	-	-	-	-	-	-
August	-	-	-	-	-	-
Sept.	-	-	-	-	-	-
October	-	-	-	-	-	-
November	-	.1	.1	.2	1.1	7
December	.3	.4	.2	.9	3.1	29
January	2.1	1.0	.2	3.3	3.2	53
February	5.2	1.1	.3	6.6	1.6	49
March	8.2	.7	.1	9.0	1.3	41
April	8.0	.1	.2	8.3	2.3	32
May	1.1	-	.1	1.2	.1	3
Total	24.9	3.4	1.4	29.7	12.7	12

Source: Agricultural statistics M.A.F.F.

Complementary and competing brassica supplies

From the table 5 page 6 it is evident that even with the addition of Continental and Channel Island cauliflower supplies, its level in winter and spring is still considerably below that in the summer and autumn. The "gap" is more than filled from September to December by the Brussels sprout crop, table 5. Despite a fair weight of sprouts coming forward in January and February the combined supplies remain at a slightly lower level in these two months and also in March, after the Brussels sprout crop has finished.

Table 5. Seasonal distribution of total cauliflower and Brussels sprout supplies

Month	Cauliflower Home and imported + Channel Isles		Brussels sprouts		Cauliflower and Brussels sprouts	
	'000 tons	%	'000 tons	%	'000 tons	%
June	*(8.4 ø(33.2	12	-	-	41.6	8
July	31.6	9	-	-	31.6	6
August	36.8	11	2.0	1	38.8	8
September	36.1	11	13.0	8	49.1	10
October	30.9	9	29.8	18	60.7	12
November	18.1	5	38.8	23	56.9	11
December	14.0	4	45.0	27	59.0	11
January	12.2	4	19.2	11	31.4	6
February	16.7	5	13.1	9	29.8	6
March	25.1	7	4.4	3	29.5	6
April	33.6	10	.6	-	34.2	7
May	*(43.7 ø(.2	13	-	-	43.9	9
Total	340.6	100	165.9	100	506.5	100
May-October	220.9	65	44.8	27	265.7	53
Nov-April	119.7	35	121.1	73	240.8	47

* Winter hardy spring heading.
ø Early summer.

Source: Agricultural statistics M.A.F.F.

The average monthly weight of cabbage coming on the market over the same seven years shows a relatively steady flow, table 6. It is at its highest from October to January, thus augmenting the already high level of cauliflower and sprout supplies available from October to December.

Table 6. Seasonal distribution of cabbage, total cauliflower, Brussels sprout and total brassica supplies

'000 tons

Month	Cabbage			Total cauli-flower	Brussels sprouts	Total brassicas
	Home-grown	Imported	Total			
June	42.8	.7	43.5	41.6	-	85.1
July	44.2	.2	44.4	31.6	-	76.0
August	39.5	.2	39.7	36.8	2.0	78.5
September	45.2	.3	45.5	36.1	13.0	94.6
October	49.6	.3	49.9	30.9	29.8	110.6
November	51.3	.3	51.6	18.1	38.8	108.5
December	50.2	.2	50.4	14.0	45.0	109.4
January	49.7	.4	50.1	12.2	19.2	81.5
February	47.9	.5	48.4	16.7	13.1	78.2
March	42.5	1.3	43.8	25.1	4.4	73.3
April	38.5	1.7	40.2	33.6	.6	74.4
May	37.0	1.3	38.3	43.9	-	82.2
Total	538.4	7.4	545.8	340.6	165.9	1052.3
%	51	1	52	32	16	100

Source: Agricultural statistics M.A.F.F.

Cauliflower prices

When average monthly England and Wales cauliflower prices are set alongside total monthly cauliflower and total monthly brassica supplies the price pattern becomes largely self explanatory, table 7. With the arrival of fresh early summer cauliflower in June the late winter heading crop from Kent, Lincolnshire and other more northerly counties loses its attraction. Not surprisingly prices are at their lowest in late summer, when salad and leguminous vegetables are most plentiful and into early autumn when Brussels sprouts are reaching their peak. Although total brassica supplies are very large in November and December the cauliflower crop has dwindled and begins to command a premium in the market. Rather higher prices continue, not only from January

to March but into April when cauliflower supplies have reached a high level but cabbage is relatively short and other vegetables are scarce.

Table 7. Seasonal supplies of total cauliflower and total brassicas with corresponding cauliflower prices

Month	Supplies		Cauliflower prices per doz. heads
	Total cauliflower	Total all brassicas	
			p.
June	*(8.4 ø(33.2	85.1	(55 (73
July	31.6	76.0	51
August	36.8	78.5	43½
September	36.1	94.6	46
October	30.9	110.6	39½
November	18.1	108.5	54
December	14.0	109.4	62
January	12.2	81.5	66
February	16.7	78.2	65½
March	25.1	73.3	74½
April	33.6	74.4	70
May	*(43.7 ø(.2	82.2	49

* Winter hardy spring heading. Two year average June price 1968-69 and 1969-70.
ø Early summer.

Source: Agricultural statistics M.A.F.F.
Agricultural market reports M.A.F.F.

II TRENDS IN CAULIFLOWER AND OTHER BRASSICA SUPPLIES

Trends in total home supplies

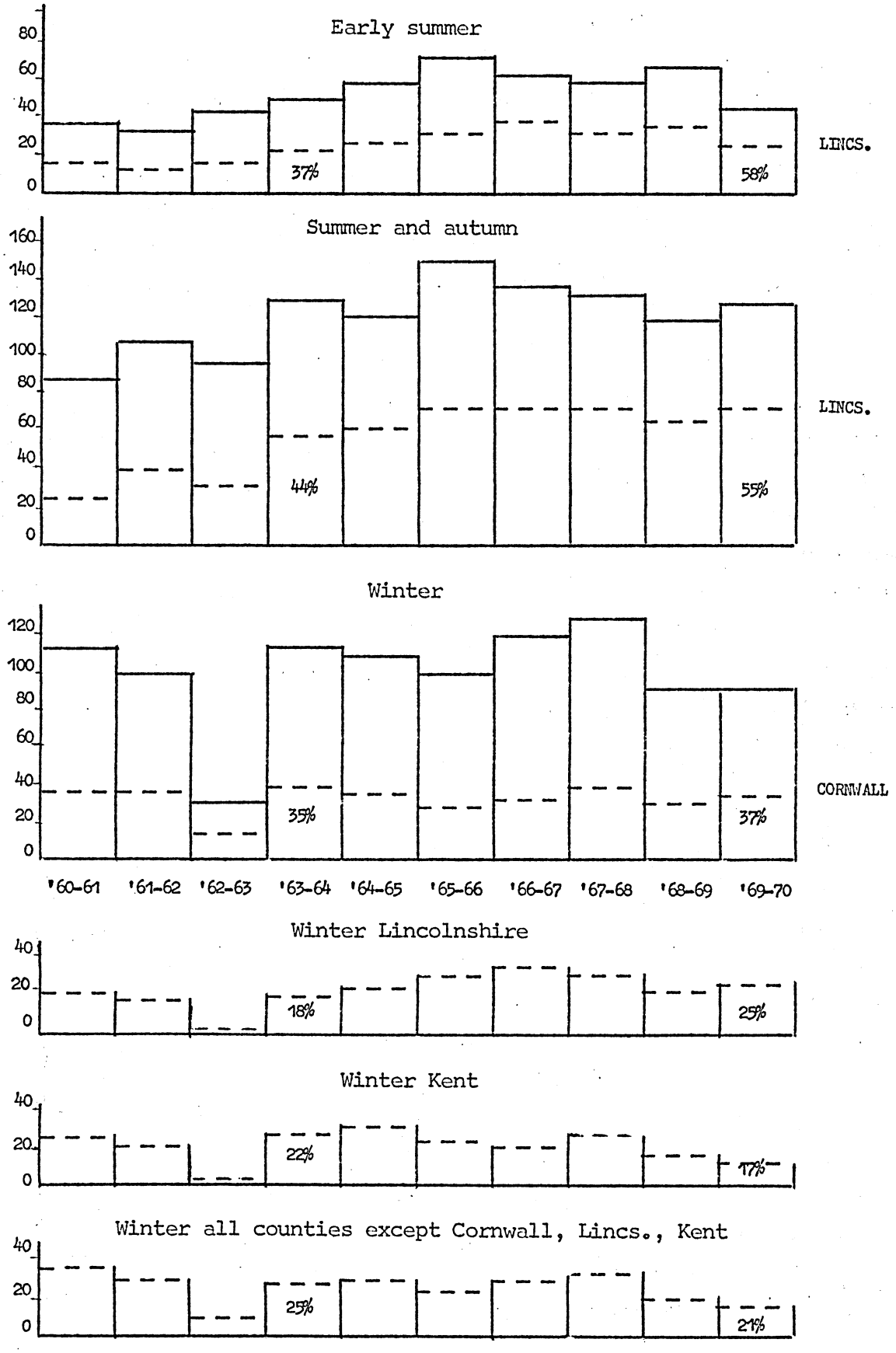
In the previous chapter a seven year average presentation for cauliflower and other brassicas was chosen because, yield-wise, that period was fairly stable and therefore gave a reasonably good picture of the total size of production and seasonality of the various brassica crops. Obviously production varied as between one year and another quite considerably and changes took place over time. Thus the exceptionally severe winter of 1962-63 greatly reduced supplies in that season of winter cauliflower from each producing area in England and Wales.

Over the seven year period all three cauliflower crops expanded, then contracted again to a similar or a lower level. Actually an increase in summer and autumn cauliflower had started about 1960, with the introduction of the new Australian varieties. In Lincolnshire, the county almost entirely responsible for the initial increased national supply, expansion was further stimulated by the formation there in 1964-65 of the growers' co-operatives, E.L.G.R.O. and Old Leake Growers Ltd. Through this development cauliflower from some 1,000 to 1,500 acres was channelled into new markets. Additional supplies of each crop were, therefore, required to maintain quantities going to traditional markets.

The fall back in national supplies in the last two seasons, 1968-69 and 1969-70, suggests that this upward adjustment in Lincolnshire was overdone. That county's early summer and winter heading crops dropped below the 1966 and 1967 peak but summer and autumn cauliflower continued at the higher level. In Kent and all other counties except Cornwall, supplies of each crop declined, no doubt in response to the oversupply situation. Expansion in the Lincolnshire winter crop meant increased supplies in late April and May, at the end of the Cornish November/December to April season, table 3.

As a result of these changes Lincolnshire, in 1969-70, was supplying a larger share of the national output of each crop than in 1963-64 and a much larger one than in the late 1950's. Thus, of the total national cauliflower supply Lincolnshire produced 33% in 1963-64: by 1969-70 the proportion had risen to 45%. This compares with little more than 20% in the late 1950's.

Figure 1. Annual cauliflower supplies 1960-61 to 1969-70 by type and by county



Trends in imported and Channel Island supplies

Over the same period there were minor seasonal fluctuations in supplies from outside England and Wales. Imports of French cauliflower averaged just over 20,000 tons until 1968-69 when they jumped to 37,300 tons. In 1969-70 they fell to 27,800 tons but this was still above the seven year average.

A major increase in cauliflower production in Brittany occurred in the 1950's. It rose from 19,000 to nearly 35,000 acres. The area fluctuated in the 1960's and reached 37,000 acres in 1970.

The destination of French cauliflower exports is normally determined by comparative price levels in Germany, Scandinavia and the United Kingdom. That French imports to this country were above average in every month of 1968-69 suggests that cauliflower prices in other European countries were consistently below average. Exceptionally heavy quantities were no doubt attracted to the United Kingdom in March and April by a shortage of cabbage and relatively high brassica prices (35,200 and 27,500 tons of cabbage compared with a seven year average of about 44,000 and 40,000 tons respectively, table 6).

There was another heavy French importation of 11,800 tons in April 1970 when cabbage supplies at nearly 48,000 tons, were well above average. A cold winter and early spring held back the winter heading cauliflower and below average supplies per head attracted high prices. A mid April rise in temperature brought on the April as well as the delayed earlier varieties in Cornwall, in Jersey and in France and with it a drop in market returns for all three crops. Since the main profit on cauliflower exports from Brittany is made in German markets, the French merchants are content to dispose of the small heads (moudets) in the United Kingdom, so long as they cover transport costs and tariff.

Seasonal imports of Italian cauliflower did not exceed 5,500 tons during the seven years 1963-70 so were on a much smaller scale than those from France. This is not surprising in view of the much higher transport costs the crop must bear.

Holland and the Republic of Ireland are the only other countries from which cauliflower are imported with any consistency. The combined seasonal

quantity, even less than that from Italy, was relatively unimportant and showed no major variations over the seven year period.

Channel Island cauliflower is generally regarded as part of the home crop. It was introduced in the early 1950's after a County Horticultural Adviser was moved from Cornwall to Jersey. As in West Cornwall it soon became part of an annual early potato/cauliflower rotation. The monthly distribution follows roughly the Cornish pattern but with greater emphasis on the early December/ January heading varieties.

Channel Island seasonal exports first exceeded 1,000 tons in 1956-57. By 1961-62 they were just over 10,000 tons. As elsewhere supplies were severely reduced by the hard winter of 1962-63. In 1963-64 exports were back to 8,000 tons and in 1969-70 had reached 16,000 tons.

Trends in the consumption of brassicas

In view of the steady rise in population during the 1960's, nearly 3¼ million in England and Wales, some increased cauliflower and other brassica production could obviously be absorbed. Table 8 shows small, five year increases in Brussels sprout consumption, a jump of 2lb. per head of cabbage during the last five years and a jump of 2lb. per head of cauliflower during each of the two recent five year periods.

Table 8. Annual consumption of the three types of brassica crops: five yearly periods 1955-70

lb. per head

	Cauliflower	Cabbage	Brussels sprouts	Total
1955-60	11.8	23.9	7.0	42.7
1960-65	13.7	23.3	7.3	44.3
1965-70	15.8	25.5	7.7	49.0

Source: Supplies: Agricultural Statistics M.A.F.F.
Home population: Registrars General and year estimates.

The increases in cauliflower were not, however, spread evenly over the 12 months. During the winter/early spring six months cauliflower consumption remained constant. The increase occurred solely during the late spring/summer to early autumn period. Cabbage consumption was more variable while the start

of the Brussels sprout season was advanced by a few weeks.

Table 9. Seasonal consumption of the three types of brassica crops: five yearly periods 1955-70

lb. per head

	Cauliflower	Cabbage	Brussels sprouts	Total
	November to April			
1955-60	5.5	12.5	5.7	23.7
1960-65	5.6	11.9	5.5	23.0
1965-70	5.4	13.4	5.5	24.3
	May to October			
1955-60	6.3	11.6	1.3	19.2
1960-65	8.1	11.8	1.8	21.7
1965-70	10.4	12.4	2.2	25.0

Source: Supplies: Agricultural statistics M.A.F.F.
Home population: Registrars General mid-year estimates.

Table 9 shows that the consumption of all brassicas together is rather greater in winter, when Brussels sprouts are available, than in summer. The progressive rise in cauliflower consumption during the May to October seasons suggests that prices recently will have become much more sensitive to periods of oversupply, particularly in the last five years, when total brassicas consumption has risen, on average, by nearly 4lb. per head.

During the 15 years 1955-70 a fall of about 1½lb. per head has occurred in the consumption of fresh green peas for market so there may have been some degree of substitution for summer cauliflower.

Factors influencing cauliflower prices

Cauliflower prices are determined by supply and demand for the cauliflower crop itself and for those crops which compete with it. The level of market prices is further complicated by the quality of the cauliflower heads marketed which, in turn, are largely dependent on variations in rainfall and temperature at critical periods of the season.

Mention has already been made in chapter 1, of the relatively high cauliflower prices ruling during the winter season when supplies are reduced and the relatively lower ones prevailing in late summer and autumn, when large supplies of fresh salads, peas, beans and later Brussels sprouts augment a larger supply of cauliflower.

Following the increase, over the last 15 years, in May to October cauliflower supplies per head of population, it would be interesting to know whether there was also a downward trend in cauliflower prices. Unfortunately any such analysis is invalidated by various changes that have occurred. For example, in 1961 the method of establishing average market prices was altered, there has been continuing inflation, at an accelerating rate in the last year or so and, particularly important, a considerable improvement in the inherent quality of the cauliflower crops.

Returning to the seven year period (1963-70) when statistical comparisons are more reasonable, it is possible, from the considerable ranges in average monthly prices, to attribute some of the low ones to oversupply rather than to quality/weather factors and vice versa, crude though the measurements are.

Early summer cauliflower

The bulk of the early summer cauliflower is marketed in June. The high prices in 1963 and 1969 were obviously due to a shortage of cauliflower heads.

Table 10. Early summer cauliflower: June prices and supplies per head

	1963	1964	1965	1966	1967	1968	1969
Cauliflower price per doz. £	0.88½	0.65½	0.69	0.70	0.69	0.64	0.84½
lb. per head cauliflower early summer	.6	1.6	1.8	2.0	2.0	1.7	1.0
lb. per head cauliflower winter	.2	.4	.4	.4	.3	.5	.6
lb. per head cabbage	2.4	1.5	1.7	2.0	2.1	2.2	2.2
lb. per head total	3.2	3.5	3.9	4.4	4.4	4.4	3.8

Source of prices: Agricultural market reports M.A.F.F.

Prices were apparently a little depressed in 1964, after unusually high temperatures in May, which affected crop quality and again in 1968 from the opposite kind of weather in May, when crops suffered from cold winds and lack of sun.

Summer and autumn cauliflower

In the July to October period of the summer and autumn cauliflower season

Table 11. Summer and autumn cauliflower: July to October prices and supplies per head

	1963	1964	1965	1966	1967	1968	1969
JULY							
Cauliflower price per doz.£	0.63	0.44	0.44	0.59½	0.41	0.55½	0.46
lb. per head cauliflower	1.8	1.9	1.4	1.5	.8	1.6	1.3
lb. per head cabbage	1.6	1.8	1.5	2.1	2.0	1.7	3.7
lb. per head total	3.4	3.7	2.9	3.6	2.8	3.3	5.0
AUGUST							
Cauliflower price per doz.£	0.34	0.44½	0.45½	0.54½	0.49½	0.41½	0.37
lb. per head cauliflower	1.5	1.3	1.6	1.7	2.1	1.8	1.9
lb. per head cabbage and Brussels sprouts	1.7	1.8	2.1	1.8	1.7	2.2	2.4
lb. per head total	3.2	3.1	3.7	3.5	3.8	4.0	4.3
SEPTEMBER							
Cauliflower price per doz.£	0.40½	0.52½	0.30	0.38½	0.57	0.49	0.57½
lb. per head cauliflower	2.5	1.3	2.2	1.7	1.7	1.3	1.2
lb. per head cabbage and Brussels sprouts	3.8	2.4	3.0	2.7	2.2	3.1	2.3
lb. per head total	6.3	3.7	5.2	4.4	3.9	4.4	3.5
OCTOBER							
Cauliflower price per doz.£	0.24	0.50½	0.32	0.47	0.37	0.49	0.37½
lb. per head cauliflower	1.3	1.3	1.9	1.5	1.5	.8	1.6
lb. per head cabbage and Brussels sprouts	3.6	3.1	4.4	3.7	3.9	3.8	3.5
lb. per head total	4.9	4.4	6.3	5.2	5.4	4.6	5.1

Source of prices: Agricultural market reports M.A.F.F.

it is clear that 5lb. or more per head of all brassica crops in one month, constitutes an oversupply and cauliflower prices suffer in consequence. It is equally clear from table 11 that there were periods when cauliflower prices were as low or even lower than in the corresponding periods of oversupply and all of the low prices can be attributed to weather/quality factors. In 1963 and 1965 July, August and September were unusually cold and the latter summer also had above average rainfall with an excessive amount in September. Summer drought was the main problem in 1964 while the summers of 1966 and 1968 went to the other extreme, with very high rainfall. Although there was excessive rainfall in May 1967, June and July were very dry and July also had above average temperatures while rainfall in October was the highest in any month for 20 years at least. The reason for the low price for cauliflower in August 1969 was less obvious; heavy supplies in the first two or three weeks were accompanied by high temperatures.

The monthly prices in table 11 are a four or five week average. Supplies as well as weather can change dramatically from one week to another so the monthly figures reflect a somewhat inexact and generalised picture of the cause/effect relationship. However, the main purpose of the analysis is to show that weather factors affecting both the timing of supply and crop quality have perhaps a greater influence on market prices than is generally realised.

Winter cauliflower

In a mild season the start of Cornwall winter cauliflower marketings in November/December, coincides with the end of autumn cauliflower crops and with heavy cabbage and peak Brussels sprout supplies. Prices are therefore relatively low, apart from a week or so around Christmas.

An interesting feature of table 12 is the way in which cauliflower and Brussels sprout prices moved up and down together in November and December. This was less pronounced in December 1968, when Cornwall had double the national average rainfall and December 1969, when improved sprout varieties were making an impact on the market.

Exceptionally heavy rainfall affected both crops in November and December 1963. Wet autumns and oversupply of brassicas depressed prices in November and December 1965 and 1969. Cauliflower quality was affected in 1968 by alternate

frosty and mild spells.

Table 12. Winter cauliflower and Brussels sprouts: November and December prices and supplies per head

	1963	1964	1965	1966	1967	1968	1969
NOVEMBER							
Cauliflower price per doz.£	0.32½	0.61½	0.40	0.65	0.70	0.56½	0.52½
Brussels sprouts price per cwt. £	1.67	2.79½	1.95	3.02½	2.39	2.32	2.42
lb. per head cauliflower	.9	.7	1.1	.6	.8	.9	.9
lb. per head Brussels sprouts	2.1	1.8	1.7	1.8	1.6	1.6	1.9
lb. per head cabbage	1.9	2.1	2.6	2.7	2.5	2.2	2.8
lb. per head total	4.9	4.6	5.4	5.1	4.9	4.7	5.6
DECEMBER							
Cauliflower price per doz.£	0.44	0.63½	0.51	0.84	0.70	0.59	0.65
Brussels sprout price per cwt. £	1.95	2.35½	1.71	3.27½	2.99½	2.74	3.40½
lb. per head cauliflower	.6	.7	1.0	.5	.8	.6	.4
lb. per head Brussels sprouts	2.4	2.0	2.1	2.0	2.3	1.6	2.4
lb. per head cabbage	2.3	2.2	2.7	2.3	2.4	2.1	2.6
lb. per head total	5.3	4.9	5.8	4.8	5.5	4.3	5.4

Source of prices: Agricultural market reports M.A.F.F.

With the exception of March 1967, when cauliflower glutted the markets for a week or so, oversupply was never a problem in the January to March period. Low prices were, to a large extent, therefore, a reflection of poor quality. For instance frost damage accounted for low prices in February 1965, (which followed a very wet January) and February 1967. Low January prices in 1966 and 1969 can also be attributed to damage resulting from several severe frosts in those two months.

In April and May, declining Cornish supplies would normally be supplemented by increasing quantities, first from Kent then from Lincolnshire. Climatic variations, however, influenced the timing of these three crops in the market which resulted in low prices in April 1965. In Cornwall it was a late season and the peak, which came in April instead of March clashed with a

relatively early season in Kent and Lincolnshire. Cornwall had another April peak in 1970 but the Lincolnshire crop was late and Kent produced a smaller tonnage; thus prices were less affected.

Table 13. Winter cauliflower: January to March prices and supplies per head

	1964	1965	1966	1967	1968	1969	1970
JANUARY							
Cauliflower price per doz.£	0.62½	0.65	0.60½	0.77	0.66	0.60½	0.70½
lb. per head cauliflower	.7	.5	.4	.4	.6	.7	.5
lb. per head cabbage and Brussels sprouts	3.3	2.8	3.1	3.3	3.5	3.5	3.1
lb. per head total	4.0	3.3	3.5	3.7	4.1	4.2	3.6
FEBRUARY							
Cauliflower price per doz.£	0.61	0.57	0.61	0.54	0.85	0.69	0.69½
lb. per head cauliflower	.9	.8	.7	1.0	.7	.6	.6
lb. per head cabbage and Brussels sprouts	3.5	2.5	2.5	2.7	3.1	2.8	2.8
lb. per head total	4.4	3.3	3.2	3.7	3.8	3.4	3.4
MARCH							
Cauliflower price per doz.£	0.62	0.63	0.68½	0.56	0.94½	0.96½	0.81
lb. per head cauliflower	1.1	1.2	1.0	1.8	1.1	1.1	1.0
lb. per head cabbage and Brussels sprouts	2.3	1.9	2.5	2.8	2.1	1.8	2.3
lb. per head total	3.4	3.1	3.5	4.6	3.2	2.9	3.3

Source of prices: Agricultural market reports M.A.F.F.

Since Lincolnshire recently increased its output of winter cauliflower, figure 1, page 10, May has become the month with the largest supply; 2lb. per head of population per month is clearly on the glut borderline. That May prices are a little higher than those in late summer and early autumn is due to the smaller supply of cabbage and to the absence of sprouts and other vegetables available in late summer. Minor fluctuations in May prices appear to reflect varying short period gluts and shortages within the month, as well as quality.

Table 14. Winter cauliflower: April and May prices and supplies per head

	1964	1965	1966	1967	1968	1969	1970
APRIL							
Cauliflower price per doz.£	0.71	0.46	0.83	0.69	0.65½	0.84	0.71
lb. per head cauliflower	1.3	2.3	1.0	1.5	1.9	1.4	1.5
lb. per head cabbage	2.6	2.2	1.6	2.0	1.5	1.3	2.2
lb. per head total	3.9	4.5	2.6	3.5	3.4	2.7	3.7
MAY							
Cauliflower price per doz.£	0.46	0.48	0.61	0.48½	0.46	0.54	0.46
lb. per head cauliflower	1.9	1.7	2.0	2.0	2.4	2.0	2.3
lb. per head cabbage	1.6	2.0	1.6	1.5	2.0	2.0	1.6
lb. per head total	3.5	3.7	3.6	3.5	4.4	4.0	3.9

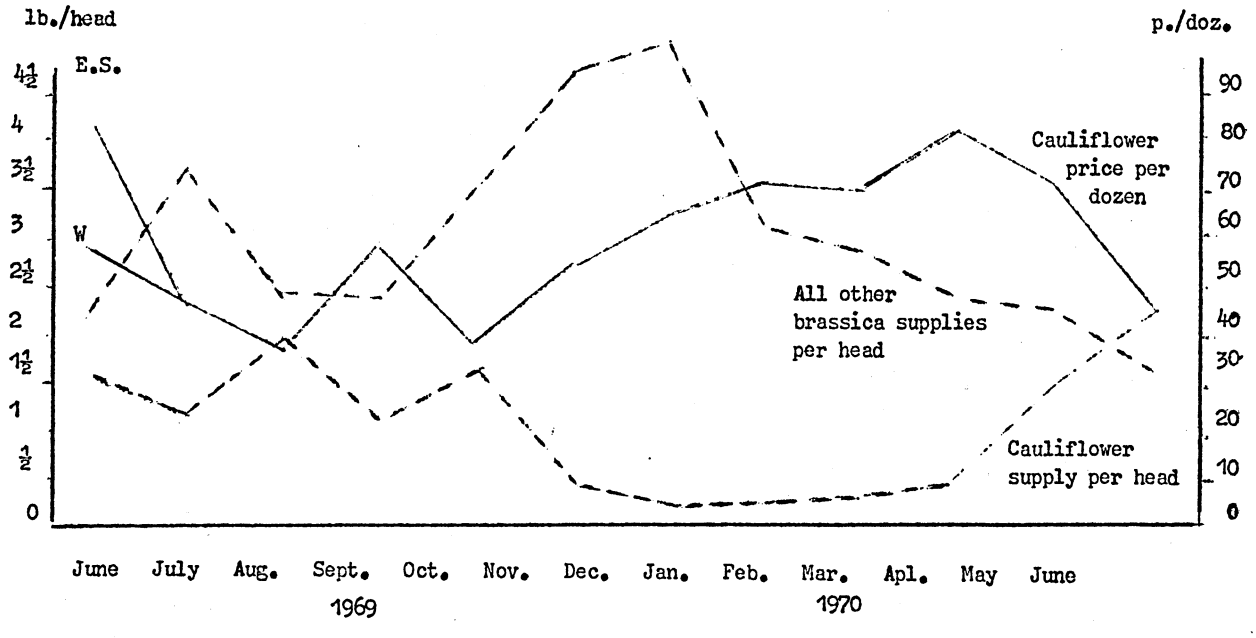
Source of prices: Agricultural market reports M.A.F.F.

III THE 1969-70 CAULIFLOWER SURVEY

The 1969-70 season

The year (June to May) was drier than average with the rainfall rather unevenly distributed but summer growth received a boost from heavy rainfall in May 1969. The early summer cauliflower acreage was the lowest since 1961 and a shortage in June brought high returns. Hot periods in July affected some cauliflower heads in transit and although supplies per head were slightly below average, so were prices. To some extent, also, the lower prices could be said to be due to a glut of summer cabbage from a greatly increased acreage of that crop.

Figure 2. Monthly supplies per head of cauliflower and other brassicas and cauliflower prices 1969-70



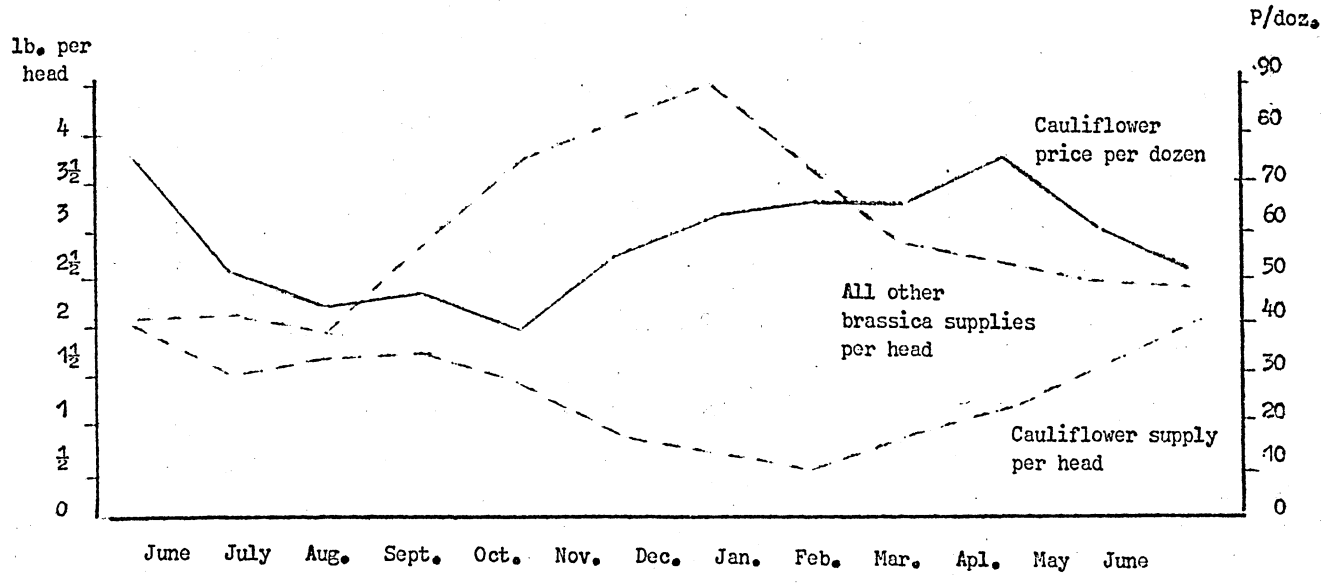
August saw an oversupply of both cauliflower and cabbage with low market prices as a result. September was very dry and a shortage of all brassicas resulted in above average returns. Despite a drought in October supplies of cauliflower and cabbage were plentiful, but only Brussels sprouts made high prices. November was very warm and exceptionally wet with $5\frac{1}{2}$ inches of rain being recorded by the Meteorological office. The quality of cauliflower was good but the market remained depressed for the first two weeks.

Apart from a favourable September the summer and autumn crop was a poor one for most cauliflower growers, largely because of the oversupply of cabbage.

The winter heading crop on the other hand was a remarkably good one for Cornish growers. The four months from December to March were abnormally cold but free from exceptionally severe frosts. Total cauliflower supplies were a little short and those of cabbage nearer the seven year average than during the summer and autumn seasons. Because of these four cold months varieties in West Cornwall were behind schedule all through the season and the usual March peak was delayed until the latter part of April. That month supplies from Kent were much below average and negligible from Lincolnshire. This seasonal pattern was rather similar in Jersey and probably also in Brittany. Good cauliflower prices were sustained until the last two weeks in April when they fell quickly for French as well as English and Jersey heads.

The winter heading crops from Kent, Lincolnshire and other counties followed in the wake of the late April glut. They also oversupplied the market in May and, therefore, received below average prices, even though cabbage supplies were relatively short that month.

Figure 3. Monthly supplies per head of cauliflower and other brassicas and cauliflower prices seven year average 1963-70



The county samples

In each county the co-operators were obtained from random samples based on cauliflower acreage per holding size-groups in the 1968 June Census. The acreages grown do of course change from year to year and potential co-operators sometimes fall by the wayside in the course of an investigation. In consequence the final samples were somewhat different from those originally intended.

In Lincolnshire the surveyed holdings were centred on Boston and Spalding. The Kent holdings were spread across the Northern part of the county from Rochester in the West to Sandwich in the East and as far South as Canterbury. Cornish holdings were confined to the Western extremity, stretching from St. Buryan to Penzance and Marazion in the South West peninsula to Gwithian and Crantock in the North and to Cury in the Lizard peninsula in the South.

The average size of holding in Cornwall was much smaller than in the other two counties. In addition the proportion allotted to cash crops was relatively small compared with Lincolnshire and Kent but among the cash crops grown, cauliflower was far more important in Cornwall than in Lincolnshire and least important in Kent.

Table 15. General holding data by county

County	Average size full-time holding	Percentage of cash crops	Cauliflower as percentage of cash crops
	Acres	%	%
Lincolnshire	223½	90	23
Kent	367¾	89	12
Cornwall	94½	43	43

Of the crops preceding cauliflower, in each county about half were brassicas; in Lincolnshire and Kent around a quarter were potatoes and the remainder corn and other crops. Only in Cornwall did ley precede the cauliflower crop, as much as 25% of the surveyed area; apart from brassicas, potatoes and other crops made up the rest.

The total surveyed acreage of each county, table 16, was that for which data was obtained. In addition a few growers recorded further acreages of cauliflower, either grown and marketed but not included in the survey, ploughed or disced because prices were low or the crop was poor, or never planted as intended e.g. three acres in Kent owing to extreme wet. If the excluded acreages are added to those surveyed the average cauliflower acreage per holding rises to 46 in Lincolnshire, 39 in Kent and 17½ in Cornwall. The only alteration this makes to the distribution by size-group is in Lincolnshire, where the 20-29¾ acre group is reduced to three and the 50 acre plus group is increased to two.

Table 16. Holdings surveyed by cauliflower acreage size-groups and by county

Acreage size-groups	Lincolnshire	Kent	Cornwall
	No.	No.	No.
0 - 9¾	3	4	5
10 - 19¾	8	1	5
20 - 29¾	4	3	3
30 - 39¾	2	1	1
40 - 49¾	-	-	1
50+	1	2	-
Total No.	18	11	15
Total acres	329	342	258
Average Acreage/Holding	18.27	31.09	17.20
Range Acreage/Holding	4 - 500*	4 - 210	5 - 40

* Only 10 acres out of the 500 were costed. The largest costed crop was 62½ acres.

In Lincolnshire there is greater continuity of cauliflower cropping than elsewhere. A summer crop, marketed in July and August, can be distinguished from the early summer crop (mainly June with a little in July) in addition to an autumn (September to November) and a winter one (April to June). Kent markets little cauliflower before late August/September, an autumn crop lasting

into December, as well as the winter one (March to June). Cornwall, apart from a very small autumn acreage, concentrates on the winter broccoli (December to April).

Table 17. Cauliflower crop records by type and by county

Cauliflower type \ County	Lincolnshire		Kent		Cornwall	
	No.	Av. Ac.	No.	Av. Ac.	No.	Av. Ac.
Early summer	5	4.02	1	1.00	-	-
Summer	7	6.30	-	-	-	-
Autumn	13	15.50	9+	17.83	3	1.50
Winter	3	6.50*	11	16.23	15	16.90

* Excluding nine acres ploughed in on one holding.
+ One grower ploughed in two acres of autumn cauliflower.

Ten of the Lincolnshire co-operators grew or recorded just one cauliflower crop (one early summer, two summer, six autumn and one winter). Four had acreages of early summer, summer and autumn cauliflower, one of summer and autumn only and two of autumn and winter only.

In Kent, 10 of the 11 co-operators grew both autumn and winter crops and one of them a small area of early summer as well, only one grower produced the winter crop alone.

Three Cornish co-operators, whose average cauliflower acreage was well above that of the whole sample, had small areas of autumn in addition to the winter cauliflower. This provided a slightly longer season and ensured available ground for a subsequent early potato crop.

With one or two exceptions growers planted a number of different cauliflower varieties, whether of early summer, autumn or winter crops, in order to spread the harvesting period. For the relatively small acreage of early summer cauliflower the chief varieties were early Mechels and Classic. For mid and late summer crops, again a relatively small planted area in Lincolnshire, of almost equal importance were Delta, Dominant and Sesam, each with 25% to 30% of the total.

The very much larger acreages of autumn cauliflower showed interesting differences in variety type, as between Lincolnshire and Kent. In the former county the main type, Flora Blanca, accounted for nearly 60% of the entire crop. The Australian varieties occupied little more than 20% and Danish, Le Cerf and Long Leaved Italian types the remainder. In Kent, however, the Australian type predominated; it accounted for two-thirds of the costed acreage. Nearly 20% was planted with Long Leaved Italian and only 10% with Flora Blanca.

In Cornwall, of the winter heading crop, nearly 37% consisted of the early varieties from Extra Early up to Trevean 2 and A6*, 55% could be called mid season, from Hilary-Seale to DK7, leaving only a small proportion of late varieties. In Lincolnshire the small area of winter hardy, spring heading cauliflower comprised mainly Armado and May Glory. In Kent the large acreage of this crop was composed of 22 varieties, Summer Snow, Manston and Thanet each occupying 15% to 20% of the planted area. The remaining 50% was, therefore, cropped with 19 different varieties.

Financial results

Gross margins and margins over labour and machinery costs, specifically related to cauliflower production, table 18, were calculated for the sum of cauliflower crops, where two or three were grown per holding.

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* Including 2% of autumn cauliflower.

Table 18. Summary of cauliflower crop margins per acre by county

	Lincolnshire	Kent	Cornwall
No. of records	12*	11	15
	£	£	£
Gross output$^{\emptyset}$	66	95	184
Less variable costs	23	38	20
Gross margin	43	57	164
Less specific labour and machinery costs	18	29	41
Gross margin less specific labour and machinery costs	25	28	123
	%	%	%
Type of cauliflower crop			
Early summer	-	..	-
Summer	18	-	-
Autumn	73	48	2
Winter	9	52	98
All types	100	100	100

* Contains only three crop combinations. In all but two instances the cost of specific labour and machinery inputs was obtained for only one field per holding. Therefore the number of margins over specific labour and machinery costs per holding is limited in Lincolnshire, where two or three crop types were grown on one holding.

$\emptyset$ Gross output = market price less all marketing costs including container.

The summary of individual crop results presented in table 19, illustrates the type of market conditions encountered by each county as mentioned at the beginning of the chapter, i.e. good early summer crop prices and good winter season prices for Cornwall, but poor prices for summer and autumn crops (apart from September) and for winter crops in Lincolnshire and Kent.

Selling methods and output analysis by county

Where a grower handled the whole of his crop from planting to harvesting and consigning to market his financial output was determined by the yield and

the unit prices obtained for it.

Table 19. Summary of cauliflower crop margins per acre by type and by county

Cauliflower type	County	No. records	Gross output	Variable costs	Gross margin	Sp.Lab. & mach. costs	G.M. less sp. L. & M. costs
			£	£	£	£	£
E. summer	Lincs.	2	307	116	191	51	140
	Kent	1	380	174	206	51	155
Summer	Lincs.	3	71*	32	39	19*	20
Autumn	Lincs.	10	65*	20	45	16*	29
	Kent	9	91	37	54	31	23
Winter	Lincs.	2	56*	13	43	14*	19
	Kent	11	95	37	58	27	31
	Cwll.	15	184	20	164	41	123

* Crops cut and packed by contractor 2 summer
8 autumn
2 winter

When other methods of disposal were used the output figure was, to some extent, modified. For example, if the crop was sold through a co-operative or growers' group the organisation deducted a small sum to meet its operating costs. In Lincolnshire an early summer, a summer and two autumn crops were sold in this way. In Kent one autumn and three winter crops were marketed by a co-operative. In all cases crop yields were available and the results could be included along with ordinary commission sales.

A quite different modification occurred through the common practice in Lincolnshire where growers sold their crop by contract to a merchant, who cut, packed and marketed the crop. In one case the merchants also did the seed drilling and top dressing and in another provided the plants and carried out the planting and spraying operations. Usually a per acre figure was contracted either before the crop was planted or before cutting commenced. Ten crops were sold on this basis. For six further contracted crops, yields with their net return were also available.

One suspects that per acre contracts were determined by the merchant's assessment of the field being planted and the grower's past performance, for, leaving aside the two instances where field operations were also contracted there was a considerable range in prices offered. Of seven such contracts for the autumn crop amounts ranged from £65 to £100 per acre.

Table 20. Methods of cauliflower crop disposal in Lincolnshire

Crop	Contracted			Commission sale		Total	
	Records	Acres	Price/Ac.	Records	Acres	Records	Acres
	No.		£	No.		No.	
E. summer	2	13	170	4	12	6	25
Summer	2	17	94	4	22	6	39
Autumn	9	163	78	4	38½	13	201½
Winter	3	28½	62	-	-	3	28½
Total	16	221½	-	12	72½	28*	294*

* Excluding one holding where early summer, summer and autumn crops could not be separated.

It would have been interesting to make a comparison of the margin over specific labour and machinery costs between contracted acreages and crops sold on commission, the only comparable margin between the two methods of sale since labour costs are excluded at the gross margin level. Unfortunately few crops were sold on commission and only one had full labour and machinery costs.

Growers' comments did not in every case indicate their view of selling methods but three said they had no alternative, one added that he had no facilities for cutting and grading. The two growers for whom the contract covered field operations had small holdings so they too probably had little alternative. One grower said he was happy with the contract arrangement. Another grower, selling contract, indicated that he would prefer to be in a group. Both group members seem to be satisfied with their lot.

In Kent, judging from the survey sample, contracting is a comparatively rare method of crop disposal. Only one grower sold part of his acreage on contract and this was not included in the survey.

As already mentioned three growers marketed through a co-operative, the whole of one autumn crop and three winter crops. One grower sold the whole of his autumn and winter crops, transported in bulk and sold by weight, to a freezer. Three growers sold practically the whole of their autumn and winter crops to commission salesmen in London wholesale markets. Two of the remaining four had retail rounds; between them they produced five crops of which virtually the whole of an early summer, one autumn and one winter with half the other autumn and winter crops were sold in local towns, the rest was sent to London on commission. The two other growers divided the sale on commission of their autumn and winter crops between local and London markets.

In Cornwall, 13 growers each consigned the whole of their crop to distant wholesale markets and only two sold 1% and 4% respectively of their total crop to local shops at the start of the season.

Yields and recorded losses

The carefully raised early summer cauliflower sustained no specific damage but yields of some late summer, autumn and winter crops were considerably reduced by abnormal weather factors such as drought, flooding and high temperatures which caused heads to blow before they could be harvested and by frost. *Bracting was a problem in Cornwall and the common brassica disease, club root, took its toll in each county (table 21).

In Lincolnshire one or two merchants provided yield data but the majority did not. Thus for 10 of the 28 crops recorded no yield data was available. One grower of an autumn cauliflower crop mentioned a 12% acreage loss from frost damage but this was the only information of the kind provided.

No reason was given for the recorded losses of one or two acreages in Lincolnshire shown in the "poor quality" column. In Kent the main causes in this category were drought after transplanting, wet spring with poor seedbed and flooding in the field, which delayed transplanting. Poor quality in Cornwall occurred only in the early varieties, probably due to the unusually high rainfall of over eight inches in West Cornwall in November, giving rise, among other things, to a large number of very small curds.

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* Small leaves between flower clusters.

With the exception of one Kent crop sold by weight for freezing, crop yields were expressed in numbers of crates. However crate types and sizes varied from county to county. For example, the "capacity" of the rigid 21" x 14" x 12" Lincolnshire crate was only about two-thirds of that of the collapsable Cornish crate and rarely held more or less than 12 heads, which feature can perhaps be explained by the need to send the curds to market in a fairly tight condition in the higher summer and early autumn temperatures, otherwise they tend to blow in transit.

Table 21. Crop losses, reasons and estimated acreages by county and by cauliflower type

County	Crop	Records	Planted	Causes of loss					
				Blown	Poor quality	Frost	Club root	Total	Percentage of acres planted
		No.	Ac.	Ac.	Ac.	Ac.	Ac.	Ac.	%
Lincs.	E.S.	5	20	-	-	-	-	-	-
Kent	E.S.	1	1	-	-	-	-	-	-
Lincs.	S	5	37.5	-	2.75	-	.25	3.00	8
Lincs.	A	7	83	-	4.50*	3.50	4.00	12.00	14
Kent	A	8	146.5	3.75	3.50	6.50	1.25	15.00	10
Lincs.	W	1	13ø	-	9.00	-	-	9.00	69
Kent	W	10	158.5	6.50	4.00	3.75	3.00	17.25	11
Cwll.	W	15	258	5.75	6.25ø	.75	.25	13.00	5

* Including buttoned and bracted heads.
ø Only four acres harvested.

Kent growers, who consigned to wholesale markets, also used the smaller, rigid non-returnable crate, holding on average about 12 heads, though in some cases a percentage of size 16 and eight were included. These crops were marketed later in the autumn and, therefore, in rather lower temperatures than the Lincolnshire crates. Growers who sold their cauliflower in local towns and to retailers used bushel boxes or other suitable containers of similar size, also holding mainly size 12 but with some 16's.

A range of head sizes was marketed from Cornwall. Late autumn cauliflower may produce some fairly large curds but the earliest winter varieties, maturing "out of season" in January and February throw smaller ones, mainly the popular 24 count with a proportion of 30's, which fit the 24" x 14" x 14" Cornish crate. The March and particularly the April maturing varieties produce larger heads as well, of which only 16 and sometimes 12 can be packed into the crate.

Because of these differences in crate sizes and contents an inter-county comparison of yields expressed in crates per acre alone is misleading.

Any comparison of yields is also influenced by a second factor, viz. a difference in plant populations. Lincolnshire growers generally used a narrower between-plant-spacing than their counterparts in Kent and Cornwall. In the autumn crops, for instance, the difference amounted to over 3,000 plants per acre.

Table 22. Cauliflower crop yields, plant populations and proportions marketed by county and by cauliflower type

County	Crop	Records	Planted	Yield /acre	Heads /crate	Plant population	Heads marketed
		No.	Acres	Crates	Av. No.	No.	%
Lincs	E.S.	5	20	875	12	12,200	86
Kent	E.S.	1	1	593	12.27	10,600	69
Lincs.	S	5	35	524	12	11,500	54
Lincs.	A	7	83	497	12	12,200	50
Kent	A	8	144.5	288	12.62	9,075	40
Lincs.	W	1	4*	233	12	9,600	29
Kent	W	10	158.5	276	12.50	8,950	39
Cwll.	W	15	258	243	21.42	8,700	59

* 13 acres planted but only four acres harvested.

The true yield and, by implication the true loss, is reflected by the proportion of heads recorded as being cut and marketed. The data is presented in Table 22.

The level of losses as shown in table 21 could be said to be due to troubles easily identified by the grower. In the author's experience, with the Cornish broccoli crop over 18 seasons, there is always considerable crop wastage even when there appear to be no specific reasons for it. The maximum average proportion marketed by growers in the longer period Cornish study was 71%. In good seasons it averaged a little over 60%. In two very severe winters it fell as low as 33%. There seems no reason to suppose that the performance of late summer, autumn and winter crops in other counties is very different.

Unit returns - gross in the market

The most striking feature about a sample of growers' (wholesale) market prices is the wide variation that occurs between individuals for the same commodity for a similar period of time.

In this survey the only homogeneously marketed sample occurred in Cornwall. With the exception of the season's earliest heads maturing in September and October which were sold locally, all growers consigned their crops to distant wholesalers. Most of the 15 growers graded into class 1 and class 2 but a few marketed some as "extra" and some as class 3 as well. One grower labelled everything as class 2 and another sold the whole crop as class 3.

Table 23. Differences between highest and lowest gross market cauliflower prices per month per crate of 24's in West Cornwall

Month	Average of "extra" class 1, 2 and 3 15 growers	Class 1 13 growers*	Class 2 13 growers*
	p.	p.	p.
December	56	45	77½
January	47½	48½	56½
February	36½	49	93
March	42½	41	55½
April	36	34½	41

* Excluding two growers selling the whole crop as class 2 or class 3. These two growers' crops generally made above sample average prices; in December the class 3 crop made the highest price and in March the class 2 crop did the same.

One would expect the largest divergence in price to occur where all classes are averaged because of varying combinations of quality. However, the range between highest and lowest monthly prices in class 1 proved to be no less and in class 2 even greater.

Crop quality undoubtedly varied from holding to holding but an examination of individual growers' prices from the market revealed a wide range in the assessment of individual growers as to what constituted a crate of "extra" or of class 1, 2 or 3 grade, despite official classifications. Admittedly there were additional factors contributing to the price variations, such as differences in the distribution of sales within each month. In this respect price variations occur from day to day and indeed between different markets on the same day. However these factors were apparently secondary to those of crop quality and quality grading concepts.

Only relatively limited comparisons can be made in Kent because nearly half the autumn and winter crops were distributed between distant wholesalers and local outlets. The few comparable monthly gross prices available did suggest that in a larger, homogeneously marketed sample the differences between growers, either per class or average of all classes, might be no less than in Cornwall.

As already mentioned more than half the surveyed crops in Lincolnshire were sold by contract and most of the remaining sales on commission were recorded net of marketing costs so they cannot be included in this analysis.

Unit returns - net of all marketing costs

As gross market returns were not available from the Lincolnshire sample, inter-county comparisons can only be made at the level of unit return, net of all marketing costs (table 24).

In Lincolnshire, net returns per dozen for 1969-70 were lower than those in Kent in all periods of the year. Part of the difference was due to somewhat higher marketing costs compared with Kent, where the whole June/July crop was sold to local outlets, as were varying proportions of some of the autumn crops.

Among the winter crops West Cornwall appeared to have a slight edge over Kent. The low March return in Kent was from a very small quantity for the

Table 24. Comparative seasonal net returns per dozen cauliflower heads by county

Month	Lincolnshire		Kent		Cornwall	
	No. records	p.	No. records	p.	No. records	p.
May	1	32½	-	-	-	-
June	6	40½	1	76	-	-
July	7	20½	1	46½	-	-
August	6	18	-	-	-	-
September	5	26	3	32	-	-
October	5	10½	8	22	-	-
November	4	28½	8	37	14	42
December	-	-	7	49½	15	52
January	-	-	3	44½	15	38
February	-	-	-	-	15	54
March	-	-	2	36½	15	59
April	-	-	7	36½	15	37½
May	-	-	9	32	14	34
June	1	14½	6	31	-	-

earliest cuts, before marketing had got under way. The one Lincolnshire winter crop was admitted to be of poor quality and part was ploughed in.

Cost and input analysis by county

For an inter-county comparison of variable costs alone, the whole sample of Lincolnshire crops has been used, since these costs were collected for all crops. However, the specific labour and machinery cost comparisons have been limited to the smaller number of Lincolnshire records, shown in table 17, where these costs were available.

Variable costs

The overwintered plants for the early summer crop are inevitably the most expensive to produce. The Kent grower raised his own but all five Lincolnshire growers bought theirs from specialists. They also planted more to the

acre than the Kent grower, table 22. The seven Lincolnshire summer crops were also grown from purchased plants; hence the relatively high cost per acre. Among the autumn crops in Lincolnshire, three were grown with purchased plants but in two instances no cost of seed was shown as it was provided as part of the contractor's deal. Of the eight autumn crops produced from grower-raised plants the average rate of seed was five ounces per acre of cauliflower crop, compared with an average of four and a half ounces in Kent. Winter cauliflower in Kent had a slightly higher average seed rate of five and a half ounces. This was less than the Cornish average of six and a quarter ounces. The three Lincolnshire growers managed with only three ounces per acre. The price per lb. of Cornish Roscoff varieties was rather lower than that of autumn and other winter varieties, grown in Kent and Lincolnshire.

Only where purchased, was F.Y.M. shown as a cost. Thus the very low average figure in Cornwall does not reflect the pattern of usage there in so far as F.Y.M. was applied for part or all of the cauliflower crop on each holding, in two cases purchased but home produced on the rest. In fact a total of 50% of the costed acreage was dressed. This was in sharp contrast to practice in the other two areas, since in Lincolnshire and Kent respectively only 5% and 1% of the total was dressed.

Another sphere of operational difference between the three counties studied lay in the application of chemicals. Kent growers were heavy users of insecticides and the early summer crop had a heavy dose of herbicides, but minimal amounts were applied in Lincolnshire and Cornwall.

Large scale use of casual labour seemed peculiar to growers in Kent. The very heavy bill for the early summer crop was due to an elaborate system of hand planting, in addition to casual labour for pricking out seedlings. Casuals were used to hoe the seedbeds for half the autumn and winter crops, to help pull plants and transplant all of both crops and to assist in cutting and packing six autumn and nine winter crops. By comparison only negligible amounts of plant pulling and transplanting was done by casual and contract labour in Lincolnshire and in Cornwall.

Table 25. Variable costs per acre by cauliflower type and by county

Crop	Early summer		Summer	Autumn		Winter		
County	Lincs.	Kent	Lincs.	Lincs.	Kent	Lincs.	Kent	Cwll.
No. records	5	1	7	13	9	3	11	15
Item:								
Plant bed	£	£	£	£	£	£	£	£
Plants/seed	87.67	77.10	26.55	8.84	4.63	3.41	5.55	3.95
Ferts.	-	-	-	.03	.25	.11	.22	.31
Insectics.	-	* .80	-	-	.47	-	.51	.05
Herbics.	-	-	-	-	.18	.09	.39	.09
Casual lab.	-	3.58	-	-	-	-	-	-
Sub-total	87.67	81.48	26.55	8.87	5.53	3.61	6.67	4.40
Field crop								
F.Y.M. Purch.	-	-	-	-	1.11	-	-	.38
Lime	-	.50	-	-	.06	.67	.14	1.60
Ferts. Base.	11.77	13.60	12.44	9.98	11.72	7.28	11.61	11.52
+Ferts. T.Dr.	1.72	2.80	1.62	1.19	1.20	-	2.84	.19
Insectics.	.45	4.60	1.39	1.50	3.82	.46	3.72	.73
Herbics.	-	5.30	-	.45	1.71	1.93	1.45	-
Casual lab.	-	66.02	-	.63	12.56	-	10.99	.56
Contract	.20	-	.14	.13	-	-	.07	.40
Sub-total	14.14	92.82	15.59	13.88	32.18	10.34	30.82	15.38
TOTAL	101.81	174.30	42.14	22.75	37.71	13.95	37.49	19.78

* Fungicide and Sodium Molybdinate.
\+ Applied in Lincolnshire to two early summer, one summer and five autumn crops, in Kent to four autumn and six winter crops and in Cornwall to two winter crops.

Fixed costs (regular labour and machinery)

In gross margin analysis it is usual to include both casual and contract charges, incurred solely for the crop in question, as variable costs. There is, in addition, the regular and family labour input, specific to the enterprise but treated as a fixed cost, because of its availability whatever crop is grown. The labour costs shown in table 26 are, therefore, complementary to the ones in table 25. In Lincolnshire two of the summer, seven autumn and both winter crops were harvested by contractors, therefore, only four of the

crops included in table 26 show a cutting and packing cost.

Table 26. Regular labour and machinery costs per acre by cauliflower type and by county

Crop	Early summer		Summer	Autumn		Winter		
County	Lincs.	Kent	Lincs.	Lincs.	Kent	Lincs.	Kent	Cwll.
No. records	2	1	2	9	9	2	11	15
	£	£	£	£	£	£	£	£
Labour: Growing	17.23	20.56	13.72	11.28	8.70	10.41	8.55	10.81
Cutting and packing	26.59	21.53	19.18*	12.30**	15.34	-ø	12.10	22.08
Tractor	6.70	7.30	3.79	2.55	5.44	2.79	5.19	7.07
Machinery: Depreciation	.21	.30	.41	.34	1.02	.20	.95	.45
Machinery: Repairs	-	1.00	-	.13	.82	-	.80	.70
TOTAL	50.73	50.69	-	-	31.32	-	27.59	41.11

* One crop only.
** Two crops only
ø Deducted from market returns by contractor.

The relatively high growing cost for the early summer crops in Lincolnshire was due to the system of hand planting, and in Kent to the raising of the overwintered plants on the holding instead of buying them in, as was done by the Lincolnshire growers. There was a slight difference in the input of labour hours, 45 for the winter (and autumn) crop in Kent but 33 in Cornwall. Kent growers employed slightly more hours per acre on the seedbed and on planting and mending gaps after planting than Cornish growers. They also used more insecticides and some herbicide and, of course, the labour that went with their use.

Total growing, with cutting and packing labour costs are shown in table 27, but with a reduced number of records from Lincolnshire.

Cutting, grading and packing methods and speeds

The predominance in the Lincolnshire sample of contract sales, and there-

fore of contract cutting and packing, together with the custom of paying a piece rate of four or five new pence per crate for non-contracted crops, leaves little scope for analysing harvesting methods and speeds from the county's sample of growers. Two growers of non-contracted crops had their cauliflower graded and packed under cover, one in his own packing shed, the other in one belonging to a co-operative group. The remaining non-contracted crops appeared to be handled in the field up to the marketing stage.

Table 27. Total labour costs per acre by cauliflower type and by county

Crop	Early summer		Summer	Autumn		Winter		
County	Lincs.	Kent	Lincs.	Lincs.	Kent	Lincs.	Kent	Cwll.
No. records	2	1	2	9	9	2	11	15
	£	£	£	£	£	£	£	£
Labour growing	17.23	90.16	14.07	12.37	14.47	10.41	14.10	11.77
cutting) packing)	26.59	21.53	19.18*	12.30**	22.13	-ø	17.61	22.08
TOTAL	43.82	111.69	-	-	36.60	-	31.71	33.85

* One crop only.
** Two crops only
ø Deducted from market return by contractor.

Of the 11 growers in Kent one only took the cauliflower into his packing shed, the rest graded and packed in the field, in cleared roadways or headlands. One used a tractor-pulled platform. In Cornwall, however, all 15 growers graded and packed the whole or most of the crop under cover, one or two did a little packing in the field when it was really fine and dry or during the last week or two of the cutting season.

A major factor governing the cutting, grading and packing speed is the number of weeks during which each variety matures. National Institute of Agricultural Botany variety trials, over two three-year periods in the 1960's, showed the length of cutting period for Cornish winter Roscoffs, heading from December to early March, as ranging from 7-12½ weeks. Later varieties, maturing in March, April and early May, came nearer the four to five week duration

of autumn and winter hardy spring heading varieties, grown in Kent and Lincolnshire.

The long maturing period for much of the Cornish season, involving a lot of walking through the crop in relation to number of crates cut, would lead one to expect a slower rate of harvesting of the Cornish crop than would be the case in Kent. In terms of average number of crates per hour handled this proved to be the case, just over four in Cornwall compared with Kent where it was five for the autumn and five and a half for the winter crop. But, as already mentioned, the crates and their contents were not identical. It could take longer to assemble, pack and label a given number of rigid Kent crates, holding an average of 12-13 heads, than the same number of collapsable Cornish ones, holding on average 21 heads, which also have to be covered with lids and wired or tied down. This could explain why there was not an even greater difference in the speeds between the two counties.

Average numbers of crates handled per hour conceal a considerable range, from two to five and a half in Cornwall and from four to eight and a half in Kent. No correlation was found between speed and proportion of early or late varieties planted in Cornwall, or proportion of crates with small heads, (30's) which take a little longer, or in the amount of grading done in either county. Speed would therefore seem to depend on organisation and the growers conception of how the job should be done and perhaps on the farm layout, i.e. distance from the fields to the packing shed.

Not unexpectedly the three growers in the Kent samples of autumn and winter cauliflower, who sold the crop mainly or entirely locally, achieved noticeably faster speeds than those who consigned to distant markets. The grower of the one Kent early summer crop achieved a cutting and packing rate of nearly 10 crates per hour. From this it is probably fair to deduce that harvesting this quick maturing, relatively waste-free crop is considerably faster than harvesting a late summer, autumn or winter one, more especially when this same grower's rates for autumn and winter cauliflower crops were a little over four and five and a half crates per hour respectively.

Machinery used

Among the specific implements used for the cauliflower crop, and included

in depreciation and repair charges, the planter was employed by all growers in each county, except for early summer crops and three Lincolnshire autumn crops planted by contractors. In Kent eight growers also had provision for irrigation at planting, either from tanks mounted on the side of the tractor or drawn by a second tractor following the planter. Six of the 11 Kent growers used precision drills, as did two out of 14 in Cornwall (one grower there purchased plants) but this implement was totally absent in the Lincolnshire sample. A piece of equipment, apparently peculiar to the Lincolnshire group, was a top-dresser, probably raised to travel over the top of the plants. More than half the Cornish growers used harvesting boxes mounted on the tractor and this again did not seem to be in evidence elsewhere except on one holding in Lincolnshire where a fork lift was also used.

Marketing costs

For reasons already stated the comparison is limited to Kent and Cornwall. Again the nearest common denominator is one dozen heads, although the size and weight of one dozen heads may not be precisely the same in both counties.

Transport costs were naturally higher in Cornwall but with more heads carried per crate than in Kent the ratio of container weight to cauliflower weight must be higher in Kent, lessening that county's advantage of shorter distance from the main markets. Since gross market prices per dozen heads in 1969-70 were higher in Cornwall than in Kent, commission charges, based on a percentage of gross price, were naturally a little higher there too. The average cost of crate, per dozen heads, was higher in Cornwall than in Kent but, on a straight comparison of non-returnable crate costs per dozen heads, there was little difference between the two counties.

Table 28. Average marketing costs per dozen cauliflower heads with gross and net returns in Kent and Cornwall

Crop	Autumn		Winter		Winter	
County	Kent				Cornwall	
No. records	4*		5*		15	
	p.	p.	p.	p.	p.	p.
Gross return		52		49½		70
Less marketing costs						
Transport	6½		6½		9½	
Commission and handling	6½		6¾		8½	
Crate etc.	7ø	20	6¾ø	20	9	27
Net return		32		29½		43

* Crops sold on commission only.

ø One grower used salesman's empties for which the charge was rather less than half the cost of a non-returnable crate.

IV SUMMARY AND CONCLUDING OBSERVATIONS

In value terms the England and Wales cauliflower crop - the largest of the brassicas until overtaken by cabbage in 1968-69 - accounts for approximately 15% of all outdoor vegetables. About 90% of the total cauliflower consumed each year in this country comes from home grown sources.

Although year-round cauliflower is an accepted commodity, climatic limitations make the flow of production uneven. Supplies are at their lowest during the late winter and early spring months, when those of other home grown vegetables, apart from cabbage, are tailing off; the Jersey crop together with imports, mainly from France, help to fill the gap. In this period, Brussels sprouts and cabbage could be regarded as complementary crops. In late summer and autumn, when vegetables other than brassicas are plentiful, Brussels sprouts and cabbage compete with cauliflower for the consumers' money. Thus market prices for cauliflower are consistently lower in this period than in winter and early spring.

With population increasing annually in the 1960's it was not surprising to find that total cauliflower consumption rose as well. Considerable expansion in the production of late spring, summer and autumn varieties occurred almost exclusively in Lincolnshire. In the six months May to October, supply per head of resident population, calculated in five year averages from 1955-70 revealed an increase of over 60%, making cauliflower prices much more sensitive to oversupply. As the consumption per head of fresh green peas declined by 35%-40% during the same period, there may have been some substitution.

Steady expansion in the Jersey crop produced the additional quantities required to maintain the supply per head in winter and early spring. The latter hardly varied from year to year. Cornish supplies showed minor changes, those from the rest of England and Wales tended to fall, while French imports fluctuated according to relative prices of cauliflower in European countries and in the United Kingdom. There was no real trend towards increased French supplies until the last two seasons, but the available area of cauliflower production in Brittany, and therefore the increased potential, should be borne in mind.

Cauliflower is particularly sensitive to climatic variations which affect

both the timing of maturity and quality of curd. So far there has been little that growers could do about price fluctuations that reflected "unplanned" gluts and shortages or quality variations.

Main features of the 1969-70 crop seasons were an average total supply of cauliflower; above average supplies of cabbage and Brussels sprouts in summer and late autumn; a reduced acreage and consequently a smaller supply of early summer cauliflower. For the remainder of the year weather factors resulted in erratic supplies during summer and autumn, followed by delayed supplies right through the winter months, causing a glut in the spring, at the end of the Cornish and beginning of Kent and Lincolnshire seasons.

Differences between the three counties in the surveyed holdings and in their cropping practices are quite striking. Relatively large and small holdings occur in all three samples but on average Kent shows the largest holding size at between 300 and 400 acres, Lincolnshire is not far behind with over 200 acres, while Cornwall, with less than 100 acres is well down. In both Kent and Lincolnshire about 90% of the area is in arable and cash crops: in Cornwall, less than half. The relative importance of the cauliflower crop in the farm economy in each county is clearly revealed in the respective proportions of cash crop area planted with cauliflower - 43% in Cornwall, 23% in Lincolnshire and 12% in Kent. Also significant for relative humus levels and water retention are differences in cropping sequence and in application of farmyard manure to the cauliflower crop, both features favouring Cornwall. In the latter county, the analysis indicated that 25% of preceding crops were leys and 50% of the cauliflower acreage received a dressing of F.Y.M. Only cash crops preceded cauliflower in Kent and Lincolnshire while the use of F.Y.M. was negligible in both counties - 1% and 5% respectively of the surveyed acreages.

No less striking are the differences between the three, or more accurately five cauliflower crops. The early summer variety with its high cost of plant raising over the winter stands in a class of its own. In Lincolnshire summer cauliflower is rather more costly to grow than the autumn crop because the plants are raised in cold frames. The autumn crops, and in fact all the cauliflower types, are sold by different methods. This ranges from various contractual arrangements with merchants, as in Lincolnshire, to growers consigning the whole crop to wholesalers or to retailers or some mixture of them

as in Kent. The Cornish winter heading crop is unique in using a different type and size of crate from Lincolnshire or Kent and, because of its distance from centres of population, the Cornish crop is sold almost entirely to distant wholesalers. In Lincolnshire and Kent winter hardy spring heading varieties, which differ from the Cornish Roscoff strains, are marketed in the same way as the autumn varieties, these coming on the market at the time the Cornish crop is finishing.

The crop margins of £140 and £155 per acre for the relatively small early summer crop look very attractive (table 19). However, it only needs a drop of 20% in yield or in price, a not unreasonable assumption, for this attraction to disappear and this crop needs more working capital to finance than the other type of cauliflower crops, and indeed most other outdoor vegetables.

As profit margins for the much larger autumn and winter crops in both Lincolnshire and Kent were low in 1969-70, due mainly to low market prices, they should be capable of showing considerably better results. The feature that stood out from the survey was the higher prices received in Kent compared with Lincolnshire, (table 24). In fact, the data suggests low cost production crops coupled with low returns in Lincolnshire as compared with Kent. That margins for autumn cauliflower are not higher in Kent than in Lincolnshire appears to be due to lower yields (table 22).

The comment concerning the effect on early summer crop margins of a drop of 20% in yield or in price applies also to the 1969-70 margin for the winter heading crop in West Cornwall. Damaging frosts can cause even greater loss and this of course applies to autumn and winter crops elsewhere. With reasonably normal weather conditions the margins per acre in West Cornwall are probably higher, on average, than for either autumn or winter crops in Kent and Lincolnshire. In saying that, however, perspective should be restored by repeating the survey findings of much smaller holdings in West Cornwall and of the much greater proportion of cash crop acreage accounted for by cauliflower. Winter cauliflower is the largest single cash crop of very many West Cornwall growers.

What are the future prospects for the various cauliflower crops? Since the mid 1960's, when an expansion of all the crops grown in Lincolnshire reached their peak and at times when oversupplying the markets, there has been a steady

decline in that county. Pressure on market returns will doubtless continue but seems more likely to come from competing vegetable crops, than from an oversupply of cauliflowers.

For the summer and autumn crops calabrese appears less of a threat than the new mini-cauliflower*, now being grown experimentally on a considerable scale. The mini-cauliflower is geared to the supermarket trade. Success could lead to rapid expansion, for although the supermarket chains may not handle much more than about 30% of fresh produce, with their sophisticated promotions techniques, once a new line is available, they can popularise the product over quite a large area in a comparatively short time. Better quality and higher yielding cabbage and Brussels sprouts crops are still strong competitors in both summer and autumn.

Any competitive threat to the Cornish winter heading, or Kent and Lincolnshire spring heading crops appears at present to be rather less from home sources because of climatic limitations. However, "spring" greens are now available from autumn to spring and it may not be long before a cabbage, of the January King type, is being marketed over the same period. There is also the growing popularity of Dutch White cabbage, which can be stored for sale through the winter months. Cornwall is bedevilled by transport problems, not only of rising costs but of physical distribution in the face of dwindling transport services. The solution of this problem is not one that should fall on the individual grower.

Only the winter heading cauliflower, maturing between December and April or early May, is affected by competition from supplies outside England and Wales, i.e. from Jersey and from Brittany in France, in particular. Although production in Jersey expanded steadily, following the introduction of the crop there in the early 1950's, amounts reaching the United Kingdom in the last year or so have remained at around 14,000 to 16,000 tons; for rotational reasons in the Island they seem unlikely to increase much beyond this level. In Brittany, however, there is apparently scope for further production and as the area expands, so does the output of the smaller heads, which are exported to the United Kingdom. Germany is at present the main export outlet and with

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* Though derived from existing cauliflower varieties mini-cauliflowers are grown by a specialised system and are a different crop from the existing large heading strains.

rising demand there, a profitable one. Should we join the E.E.C. our tariff would disappear during the transition period and competition would, therefore, increase.

In a climate of overproduction of nearly all vegetable crops in the United Kingdom, of rising quality standards, of freer trade, of rising unit costs and narrower margins, cauliflower production seems likely to be confined to the most frost-free locations, where the highest yields can be more consistently attained and where high quality standards can be maintained.

APPENDIX

Table 1. Seasonal distribution of cauliflower supplies by type and by producing source

Percentages

Crop	Early summer		Summer and autumn			Winter heading				Total
County	Lincs.	Rest	Lincs.	Kent	Rest	Lincs.	Kent	Cwll.	Rest	England & Wales
May	-	1	-	-	-	-	-	-	-	-
June	54	60	-	-	-	-	-	-	-	11
July	44	38	8	-	5	-	-	-	-	11
Aug.	2	1	35	3	25	-	-	-	-	12
Sep.	-	-	28	14	31	-	-	-	-	12
Oct.	-	-	18	35	27	-	-	-	-	10
Nov.	-	-	8	30	10	-	-	4	-	6
Dec.	-	-	3	18	2	-	-	11	2	3
Jan.	-	-	-	-	-	-	1	13	3	2
Feb.	-	-	-	-	-	-	3	18	6	3
Mar.	-	-	-	-	-	1	5	32	10	5
Apl.	-	-	-	-	-	17	31	20	19	8
May	-	-	-	-	-	69	54	2	46	14
June	-	-	-	-	-	13	6	-	14	3
Total	100	100	100	100	100	100	100	100	100	100

APPENDIX

Table 2. Monthly supplies per head of cauliflower and other brassicas and cauliflower prices 1969-70 and seven year average 1963-70.

	Cauliflower				All other brassicas	
	Supply per head		Price per dozen		Supply per head	
	1969-70	Average 1963-70	1969-70	Average 1963-70	1969-70	Average 1963-70
	lb	lb	p	p	lb	lb
June Winter	.6	.4	59	-	) 2.2	) 2.0
June E. summer	1.0	1.5	84½	73	)	)
July	1.3	1.5	46	51	3.7	2.1
August	1.9	1.7	37	43½	2.4	1.9
September	1.2	1.7	57½	46	2.3	2.8
October	1.6	1.4	37½	39½	3.5	3.7
November	.9	.8	52½	54	4.7	4.2
December	.4	.7	65	62	5.0	4.5
January	.5	.5	70½	66	3.1	3.2
February	.6	.8	69½	65½	2.8	2.8
March	1.0	1.2	81	74½	2.3	2.2
April	1.5	1.6	71	70	2.2	1.9
May	2.3	2.0	49	49	1.6	1.8

OTHER PUBLICATIONS IN THIS SERIES

No. 1	Lowland Sheep: Production Policies and Practices. Editor: W. J. K. Thomas. University of Exeter. October 1970.	50p (10s)
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