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Peas - East good.

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UNIVERSITY OF NOTTINGHAM.

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Department of Agriculture and Horticulture

VINING PEAS

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H. W. T. Kerr



June 1972

UNIVERSITY OF NOTTINGHAM
DEPARTMENT OF AGRICULTURE AND HORTICULTURE

VINING PEAS

A study of the production economics of the
1970 Vining Pea Crop in the
East Midlands Region

H.W.T. KERR

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FOREWORD

The vining pea crop has not been previously surveyed by University Departments either in this Region or in the other main growing area of East Anglia. In view of this a joint survey co-ordinated by Cambridge University was begun in co-operation with Leeds and Nottingham Universities with a pilot survey of the 1969 crop and continued with a main investigation on the 1970 crop. The pilot survey was undertaken because it was realised that an investigation of this crop presented problems of complexity not encountered with other arable crops. The pilot survey did in fact provide useful guides and helped to make a success of the main investigation. However, the results of this pilot survey were never finalised because of the difficulties encountered and it became apparent that the sample obtained for it was by no means representative. The experience gained was, therefore, used to avoid similar errors being made in the main survey. A full report on the whole investigation will be published by Cambridge University later this year, but it is the policy of this Department to produce a separate report on the East Midlands sample of any co-ordinated study. The survey represents the continuing interest of this Department in possible break crops. The report is cast in the same form as those on oil seed rape and field beans and its primary purpose is not to demonstrate the "full cost" of growing the crop but to indicate the output that might be obtained, the variable costs that might be incurred, the physical demands likely to be made on existing resources and the additional capital expenditure that might result from including vining peas in the rotation. Nevertheless, suggestions are given as to how the full cost of growing the crop can be assessed from the information contained in the report.

1. INTRODUCTION

1.1. The Vining Pea Crop in the East Midlands

The vining pea crop, which totalled 127,537 acres in England and Wales in 1970 is all processed either by freezing, dehydrating or canning. Of the 46,940 acres grown in the East Midlands Region the major proportion, about 85 per cent went for freezing. The regional acreage has doubled since 1960 with increased demand for the product and the need for break crops in current arable systems (Table 1). The acreage contracted for freezing is now concentrated on large farms within reach of Grimsby where the main processors have their factories. The acreage grown in the Region in 1970 was half that of both sugar beet and potatoes (Table 2), but in Lindsey where Grimsby is situated, it was almost the same as sugar beet and about three quarters of the potato acreage. The crop has assumed considerable importance on those farms on which it is grown, occupying 16 per cent of the arable acreage (tillage and temporary grass) on farms in the survey sample.

Table 1
ACREAGE OF GREEN PEAS GROWN FOR PROCESSING
(FREEZING, DEHYDRATING, CANNING).
acres

	1960	1964	1967	1968	1969	1970	1971
England and Wales	68,625	81,398	97,236	104,472	111,387	127,537	102,189
East Midlands	13,847	27,674	39,525	41,847	41,503	46,940	36,234
Derby	-	2	-	1	30	2	2
Leicester	2	83	-	26	536	384	546
Kesteven	674	2,411	3,763	4,026	4,559	6,269	4,171
Lindsey	12,341	23,626	33,659	35,681	33,749	37,071	29,535
Northampton	188	258	122	-	38	214	43
Nottingham	642	1,294	1,980	2,114	2,592	3,000	1,939
Rutland	-	-	-	-	-	-	-

Source: M.A.F.F., June 4th Returns Finals.

Table 2 ACREAGE OF BREAK CROPS GROWN IN EAST MIDLANDS
AND IN LINCOLNSHIRE (LINDSEY) IN 1970.

	acres	
	East Midlands	Lincolnshire (Lindsey)
Green Peas for Processing	46,940	37,071
Peas Harvested Dry	9,565	4,714
Green Peas for Marketing	1,130	502
Other Vegetables for Home Consumption	28,436	18,658
Potatoes	98,022	46,818
Sugar Beet	90,297	37,818

Source: M.A.F.F., June 4th Returns Finals.

The crop is grown almost entirely on contract to the processors. Under the contract sowing and harvesting dates are ultimately determined by the processor who also supplies the seed so that the growers responsibilities are concentrated primarily upon the husbandry of the crop. Until the early sixties the peas were vined by static viners owned and run by the processors and the farmers were responsible for growing the crop, cutting it and delivering it to the viner. At this time, mobile viners were introduced first by the processors themselves and then by farmers who formed syndicates to harvest the crop. This development was assisted by government grants for co-operative operations administered by the Central Council for Agricultural and Horticultural Co-operation.

1.2. Selection and Distribution of the Sample

An attempt was made to obtain the sample of growers from a random list stratified by acreage grown but it proved impossible in practice since no co-operators could be found in the lower acreage groups. This was not due to unwillingness on the part of the farmer but because those with smaller acreages in previous years had either expanded their acreage or given up the crop. Eventually a sample of forty growers was obtained; fourteen of these were the members making up two groups for which both syndicate harvesting costs and the average direct growing costs and returns were obtained.

A sample of vining groups was also obtained through the growers in the survey so that each group had at least one member in the grower sample. This proved a considerable assistance in understanding the relationship between the growers and the groups.

The distribution of the growers in the sample by county and by processor is shown in Table 3, and the groups by processor in Table 4. The forty farmers in the sample grew a total of 7,977 acres of peas, a much larger acreage than is usual in enterprise cost studies of this type and represents about 17 per cent of the total acreage grown in the East Midlands region in 1970. Of this total 295 acres were grown for dehydrating on one farm only and three farms grew a total of 227 acres for canning. Two hundred and seventy three acres were rented by farmers in the sample solely for the purpose of growing peas at an average rent of £21.47 per acre. The average acreage of peas grown per farm was 198 acres and the average acreage of the farms in the survey was 1,275 acres.

Table 3 DISTRIBUTION OF GROWERS BY COUNTY AND BY PROCESSOR

County	Number of Growers	Acreage Grown	Processor	Number of Growers	Acreage Grown
Lindsey	26	5,627	Birds Eye	16	2,655
Kesteven	11	1,749	Findus	9	3,005
Holland	1	470	Others	15	2,317
Yorkshire	1	75			
Nottinghamshire	1	56			
TOT AL	40	7,977	TOTAL	40	7,977

Table 4 DISTRIBUTION OF GROUPS BETWEEN PROCESSORS

Processor	Number of Groups	Acreage
Birds Eye	4	4,473
Findus	3	5,574
Others	3	3,417
TOTAL	10	13,464

1.3. Special Features of the 1970 Crop

The spring of 1970 was wet and rather late so that sowing conditions were consequently not ideal. This was followed by a dry summer particularly in May and June which seriously affected yields on light land but generally yields were good especially on the heavier loams. The harvesting conditions were easy which undoubtedly led to

low vining costs. Other favourable features of this year were the small acreage by-passed (only about two per cent of the sample) and the fact that the 1970 crop represented the peak acreage grown so far.

2. THE CULTURAL AND HUSBANDRY ASPECTS OF GROWING THE CROP

2.1. Place in the Rotation

There must be a sufficient gap between crops to prevent a build up of fusarium wilt, downy mildew and pea cyst eelworm for all of which there is no satisfactory chemical control. Field beans, horse beans, tick beans, broad beans and vetches are also hosts of the eelworm and should only be grown if they replace the pea break in the rotation. Dwarf beans, french beans, kidney beans, stringless beans, runner beans and clovers are not, however, attacked by any of these three organisms. There should be a minimum break of four years between crops of peas and the other susceptible crops. In fact, 16.4 per cent of the total arable (tillage and temporary grass) acreage of farms in the sample was sown to peas and susceptible legumes in 1970. Nevertheless, seven out of the 40 growers exceeded 20 per cent, the highest being 27 per cent, which may suggest that some growers are going a little closer than is perhaps advisable in the long term.

The crop is cleared early and so provides an excellent entry for winter wheat. It acts as a good cleaning crop and being a legume leaves residual nitrogen for following crops.

2.2. Yield

The average yield obtained by the 38 growers reporting data from

2.3. Soil Type

Peas can be grown on a wide range of soil types but they are particularly susceptible to conditions where bad drainage or poor soil structure has led to a lack of aeration and water-logging after heavy rain. They appear to grow best on a deep free-working loam. Adequate lime is required but peas are less sensitive to soil acidity than sugar beet or barley. A high pH, however, can lead to manganese deficiency which causes Marsh Spot particularly on organic soils and care must be taken, therefore, not to over-lime.

2.4. Cultivations

A fine seed bed is not necessary for this crop and can be dangerous in that excessive working of the land can destroy the tilth so that it becomes water-logged after heavy rain. The labour requirements are not, therefore, demanding and if the field is ploughed before the winter frosts a single pass with cultivating machinery may suffice on most soils before drilling. The labour and tractor requirements for growing the crop are shown in Table 6 divided into (i) ploughing, (ii) working down and drilling, and (iii) post-drilling and spraying. The only post-drilling operation apart from spraying is rolling which is usually carried out as soon after drilling as weather conditions permit but has to be timed to accommodate spraying with pre-emergent weed killer where it is used.

Table 6
LABOUR AND TRACTOR REQUIREMENTS FOR
GROWING UP TO HARVEST.

Operation	Hours per Acre	
	Man	Tractor
Ploughing	1.6	1.6
Working Down and Drilling	1.1	1.0
Post Drilling and Spraying	0.4	0.4
TOTAL	3.1	3.0
Range	1.5 to 6.2	1.5 to 6.1

2.5. Fertiliser

The application of fertilisers by type and rate is shown in Table 7, indicating that 5,886½ acres, 73.8 per cent of the total acreage drilled, received some fertiliser. Of the acreage treated just over 70 per cent received fertiliser containing no nitrogen applied at an average rate of a little over 2 cwts per acre to give approximately 40 units per acre each of phosphate and potash. Of the fertiliser containing nitrogen the one with an analysis of 8N: 20P: 16K was the most commonly used at an average rate of 2 cwts per acre giving 16 units per acre of nitrogen, 40 units of phosphate and 32 units of potash. The average application per acre of nitrogen to those acres receiving it was 15.7 units and of phosphate 40.3 units and potash 40.7 units. In general, the nitrogenous compounds were applied to the first sowings but some differences in the compounds chosen reflected the farmers assessment of his own soil requirements.

Table 7

FERTILISER APPLICATION

Analysis of Fertiliser			Average Rate of Application	Units Applied per Acre			Acreage Treated	Proportion of Treated Acreage
N	P	K	cwts per acre	N	P	K	acres	%
0	20	20	2.00	0	42	42	4,034½	68.5
0	14	28	2.12	0	30	59	200½	3.4
2.3	6	8	3.00	7	18	24	95	1.6
2.5	12.5	20	3.00	8	38	60	57	1.0
5	10	20	2.37	12	24	47	60	1.0
5	15	15	2.75	14	41	41	208	3.5
8	20	16	2.01	17	40	32	1,073	18.2
9	25	25	2.00	18	50	50	55	0.9
13	13	20	3.00	39	39	60	44	0.8
15	15	21	1.25	19	19	26	21	0.4
23	0	0	1.04	24	0	0	38½	0.7
				(1) 15.7	40.3	40.7	5,886½	100.0

Notes:

- (1) Average application per acre to those acres receiving nutrient.

Lime was applied to a total of 36 acres in all at an average rate of two tons per acre. No manganese was applied for the control of Marsh Spot to any of the acreage in the sample.

2.6. Sowing

In order to give six or seven weeks continuous work for the factory at harvest, sowing is spread over a period from late February

to mid May using early and late maturing varieties. The timing of successive sowings is determined by the processors using the "day-degree" or "accumulated heat-unit" system.⁽¹⁾ The accumulated heat units per day are the number of degrees by which the mean of the maximum and minimum screen air temperature for that day exceeds 40°F, the temperature at which peas will commence growth. Sowings are phased so that sufficient heat units are accumulated to give a continuous harvesting schedule. The drilling programme is divided into drilling periods, each period representing a sufficient estimated production at harvest to satisfy the factory's requirement for 24 hours.

The varieties sown and the average seed rates for each variety used by all growers in the sample are shown in Table 8. Most of the crop was sown in seven inch drills but some was drilled at four or four-and-a-half inches. This was determined more by the drill available on the farm than by any expected advantage to the crop itself.

The seed rate is decided by the processor in consultation with the grower. In general, apart from the special case of Marquis, the first earlies are sown at 280lbs (20 stone) per acre and all the others at 224lbs (16 stone), but to some extent the rate is varied according to the variety, seed size, soil type, and time of sowing, as recommended by the Pea Growing Research Organisation.⁽²⁾

(1) This system is fully described in M.A.F.F. Bulletin No. 81 "Peas" published by H.M.S.O., 1969.

(2) King, J.M. "Row widths and plant population in vining peas", Pea Growing Research Growing Organisation, Miscellaneous publications, No. 18, March 1966.

Table 8

VARIETIES AND SEED RATES BY ACREAGE DRILLED

Type	Variety	Average Seed Rate per Acre	Acreage	Proportion of Total	
		lbs	acres		
Very Early	Sparkle	252	8	0.1	
	Sprite	266	743½	9.4	9.5
Early	Kelvedon Wonder	308	9	0.1	
	Coronet	224	50	0.6	
	Galaxie	252	5	0.1	
	Swift	251	100	1.3	
	Jet	240	331	4.2	
	Scout	226	1,378½	17.5	
	Beryl	239	25	0.3	
	Jade	231	551	7.0	31.1
Late	Dark Skin Perfection	248	2,824½	35.7	
	Johnson's Freezer	229	1,321½	16.7	
	Puget	206	231	2.9	55.3
Petit Pois	Marquis	123	322	4.1	4.1
			7,900 ⁽¹⁾	100	100

Notes:

(1) Acreage actually drilled. Difference between this and total acreage in sample due to headlands, etc.

2.7. Crop Protection

Peas, particularly the early sowings, are susceptible to attack by soil borne fungi of Spp. Fusarium and the processors who supply the seed dress it with thiram or captan at an additional charge of 20p per cwt.

Owing to its prostrate growth the crop can be seriously affected by weeds and every effort has to be made to control this competition. As indicated in Table 9 nearly the whole acreage was sprayed either with a pre- or post-emergent weedkiller. Of the two, the pre-emergent prometryne was used on more than twice the acreage to which the post-emergent D.N.B.P. salts were applied.

Table 9 CROP PROTECTION

Type of Spray	Chemical	Acreage Sprayed	Proportion of Acreage Grown	Purpose
		acres	%	
Herbicides:				
Pre-drilling	Di-allate	216	2.7	Wild oats and Blackgrass
Pre-emergence	Prometryne	5,523½	69.3	Broadleaved weeds
Post-emergence	D.N.B.P. Amine	2,290½	28.7	Broadleaved weeds
	D.N.B.P. Acetate	171	2.2	Broadleaved weeds
	TOTAL	8,201	102.9	
Insecticides:				
Systematic	Dimethoate	1,838½	23.1	Aphis
Organo	Formothion	1,365	17.1	Aphis
Phosphorous	Azinphos Methyl with Demeton-s-Methyl Sulphone	825	10.3	Aphis
	Malathion	600	7.5	Aphis
	Dichlorvos	132	1.7	Aphis
	Demeton-s-Methyl Sulphone	100	1.3	Aphis
	TOTAL	4,860½	61.0	

The main pests of peas which can be controlled chemically are weevil, midge, moth and aphid. In 1970, only aphid was troublesome and nearly 5,000 acres of the later drillings were sprayed for the control of this pest. Various organo-phosphorous chemicals were used, Dimethoate and Formothion being the most popular.

2.8. Harvesting

The crop is first cut and swathed by tractor mounted or self-propelled cutters and then picked up and vined by tractor-drawn mobile viners. The cutting and vining is carried out mainly by growers operating in syndicate and is dealt with in detail later under "The Operation of the Vining Groups." All the haulm was ploughed in after harvesting by mobile viners and only in one case where static viners were still used was any attempt made to save it.

3. METHOD OF PAYMENT

The two main freezers, Birds Eye and Findus, pay for the crop at the point of harvesting and pay a vining allowance to the groups to cover the cost of harvesting. The origin of payment at the point of vining lies in past history when the processors themselves operated static viners. The growers contract required him to cut the crop and deliver it to the viners at which point the processor took over the responsibility for it. When mobile viners first appeared they were operated by the processor in place of the static viner, but subsequently the farmers formed syndicates to whom the processors then paid a vining allowance. The vining allowance is paid per ton of clean peas harvested: the Birds Eye allowance is only intended to

cover vining and is paid on the basis of a flat rate per ton vined whereas that paid by Findus covers both cutting and vining at a rate varied according to the biological yield/tenderometer reading curve. Deductions are made for damage by both companies and Findus pay in addition an overtime allowance for peas delivered between 11 p.m. and 7 a.m. and after midday on Saturdays and on Sundays and Bank Holidays. The difference in the vining allowances is compensated in the price paid by each processor for the peas. The price per ton is varied according to the tenderometer reading - the shearing force required to cut the pea. The price is highest at the lower end of the tenderometer scale when the yield is low and is progressively reduced up the scale as yield increases. The scales are designed to give the highest total return at an optimum tenderometer reading between 95 and 105. A late drilling bonus is paid for sowings made at the processors' request after a given date in late April or early May amounting to £2.50 per ton for the first drilling period and rising by 50p per ton for each successive planting period to a maximum of £7 per ton. The petit pois variety Marquis, grown only for Birds Eye, was paid for at a flat rate of £67 per ton irrespective of tenderometer reading in 1970, because the precise relationship between tenderometer reading and yield had not been established. It also generally qualified for a late drilling bonus.

Other freezers cover the cost of harvesting in the price paid for the peas and do not pay a vining allowance. The canners also follow this procedure taking the peas at an optimum tenderometer reading of about 120.

Examples of two price scales operating in 1970, one offered by

a processor paying a vining allowance and the other intended to cover the cost of harvesting directly are shown in Table 10.

Table 10

CONTRACT PRICE SCALES 1970

Contract Paying a Vining Allowance							Contract not Paying a Vining Allowance	
Tenderometer Reading						£	Tenderometer Reading £	
Not exceeding 85						58.50	Up to 108	71.50
Exceeding 85 but not exceeding 90						55.00	109 - 115	62.00
"	90	"	"	"	95	51.75	116 - 125	56.00
"	95	"	"	"	100	51.50	Over 125	42.00
"	100	"	"	"	105	49.50		
"	105	"	"	"	110	46.00		
"	110	"	"	"	120	41.00		
"	120					35.00		

If the factory is unable to take the crop when it is ready it will be by-passed at the discretion of the processor. Compensation is paid by the processor who may require that the crop be harvested dry for seed. The terms of compensation again differ between processors. Findus pay a by-pass compensation based on the value of the crop for freezing at the time it should have been harvested. If it is harvested for seed they pay the cost of harvesting and drying if it is needed. In 1970 Birds Eye undertook to pay £60 per acre in the first instance and if the crop was taken for seed a rate of £50 per ton of clean seed. If it is not taken for seed the grower can only dispose of it by

ploughing in or by maturing for sale for grinding to a merchant approved by the processor. Only 141½ acres, a little under 2 per cent of the sample acreage, was by-passed in 1970.

4. THE OPERATION OF THE VINING GROUPS

4.1. Organisation

Most of the crop is now harvested by farmer syndicates and the majority of growers are members of a group. They are nearly all using mobile viners but a few statics still remain: one of the groups in the original sample was operating both statics and mobiles, but all the others had mobiles only. The groups usually both cut and vine the peas, but there are some operating cutting machinery only. One group in the sample only vined the crop putting the cutting out to contract. There are two ways in which the groups operate, firstly, there are groups which are purely concerned with the harvesting operations; Birds Eye groups operate in this way, the growing contract being made directly with the grower. Birds Eye themselves control the operation of the groups at harvest and also operate their own viners. A group member's peas may not necessarily be harvested by the group of which he is a member. Birds Eye pay for a maximum of three lorries per group for transport to the factory; if more lorries are required the group has to pay for them themselves. A maximum of 90 minutes is allowed between vining and tipping into the elevator at the freezer and contracts are limited to farms within this range of the factory.

Secondly, there are groups which are responsible for both the growing and harvesting of the crop. The responsibility for growing is passed on to the member but sowing dates, the spray programme and

harvesting are determined by the group in consultation with the processor's fieldsman. Aerial spraying on contract is the responsibility of the group and spray material and sometimes fertilisers may be purchased centrally. These groups usually harvest their own peas upon instruction from the processor, but they may be required to harvest on contract others outside the group if the need arises. Findus groups operate in this way.

One of the groups in the sample averaged the returns to the growers; another averaged the returns from earlies only but intended to average all returns for the 1971 crop and it is possible that this practice may grow. It has the advantage that the earlies can be grown on the land most suitable for them and a more efficient sequence of harvesting can be devised for all the group members' crops.

Labour and tractors are supplied by members although some additional labour, usually mechanics, may be hired outside the group. Members are paid by the group for their contribution at varying rates, but typically a rate of 50p per hour for tractors and 60p per hour for labour was paid in 1970. Higher rates were paid to foremen and in some cases different rates were paid for different sized tractors. Some groups employed managers or one of the members' farm managers was seconded to the group for the season but in others one of the members themselves acted as the manager. All specialised machinery such as cutters, viners, mobile work shops, etc. are the property of the group.

The method of handling the vining allowances paid by the processors to the groups and charges made to the members for harvesting varies considerably. Sometimes the vining allowances are held by the group and no charge is made to the member for vining. In others the vining

allowance is distributed and a charge based on the actual average cost per acre of harvesting is made to the member. Birds Eye pay the vining allowance directly to the group; generally the allowance is held by the group but members are charged £5 per acre for cutting and no charge is made for vining. Birds Eye growers who do not belong to a group pay a contract price of £5 per acre for cutting but no charge is made for vining whether the crop is vined by a group's viners or by Birds Eye's own machines. In 1970 Birds Eye supplied high-lift trailers for transporting the peas from the viner to the lorry and also paid for the labour and tractor to draw them. A levy was charged to all farmers for fitting special tanks to flat lorries due to the shortage of tipping lorries.

When the price paid by the processor for peas covers the cost of harvesting, the group usually charges the members the actual average cost per acre of harvesting.

Transport of peas to the factory is paid for by the processor within the prescribed distance of the factory. Birds Eye stipulate a maximum time of 90 minutes from vining to tipping into the freezer elevator at the factory. Findus work to a maximum distance of 45 miles of the factory and provide ice when conditions necessitate. The processor may employ outside contractors or may contract with the group members for the use of their own lorries.

The main processors are not taking chilled peas, but some groups growing peas for canning who send the peas a considerable distance and those operating more independently with several contracts have installed chilling and cleaning facilities and have to pay the cost of haulage to the processor's factory. This involves additional capital investment

in the machinery and the site itself, more labour to operate the plant as well as higher haulage charges.

4.2. Labour and Machinery Requirements for Vining

The crop is first cut and swathed usually by tractor mounted pea cutters, but some self-propelled machines are operating. It is then picked up and vined by the mobile viner. Teams operate two twelve hour shifts per day throughout the season. In the sample of nine groups the number of viners in the team ranged from three viners handling nearly 900 acres to seven viners covering nearly 2,000 acres. The typical teams were either four viners for around 1,000 acres or six viners for between 1,500 and 2,000 acres. If tractor mounted cutters are used the normal complement is one less cutter than viners. One of these is on hand as a spare in case of breakdown. Fewer self-propelled cutters are needed, one of these machines probably replacing two mounted cutters. The teams required per shift to operate four and six viners are shown in Table 11. A mobile workshop is manned by a trained mechanic and a water bowser is generally on hand to provide water for cleaning the sieves of the viner. The six groups operating these typical cutting and vining systems averaged 286 acres per viner for the season including that handled on contract outside the group members and the average rate of operation was approximately one third of an acre per hour per viner. This is not necessarily the potential rate of operation as it was suggested by the groups that the rate of work was restricted by the intake at the factory. It was claimed that one half to two-thirds of an acre per hour per viner could be achieved and evidence from one group in the sample operating independently indicated that this might be possible. The acreage handled per man including shift foreman but excluding the overall manager, averaged 58.8 acres. The sample was too small to make a satisfactory

Table 11 TYPICAL TEAMS FOR HARVESTING BY MOBILE VINERS

(a) Typical Team Operating Six Viners

Machinery	Tractors	Labour per 12 hour Shift
6 Viners	6	6 Drivers
5 Cutters	5 ⁽¹⁾	5 Drivers ⁽¹⁾
2 High-Lift trailers	2	2 Drivers
1 Work shop	1	1 Mechanic
1 Van	-	1 Foreman
1 Water Bowser	1	Driver supplied from above as required
TOTAL	15	15

(1) Only four cutters working at any one time owing to need for repairs.

(b) Typical Team Operating Four Viners

Machinery	Tractors	Labour per 12 hour Shift
4 Viners	4	4 Drivers
3 Cutters	3	3 Drivers
1 High-Lift trailer	1	1 Driver
1 Work shop	1	1 Mechanic
1 Van	-	1 Foreman
1 Water Bowser	1	Driver supplied from above as required.
TOTAL	10	10

comparison between the 4 viner and the 6 viner team, but what information was available did not suggest that the larger covered a noticeably larger acreage per viner than the smaller nor did it handle a significantly larger acreage per man per season. The overhead costs including management could be spread over a larger acreage but again there was little evidence to show that the larger team was operating at a significantly lower cost per acre.

The harvesting season usually starts in late June and continues until early August. The typical group consisted of eight members so each member would on average contribute between two and four men to the harvesting operation. Whether it would be necessary to carry extra men for this purpose, or whether use could be made of the existing staff would depend on the farming system on the individual member's farm. About two-thirds of the farmers in the sample were also growing sugar beet and potatoes and where rotations include these crops labour is likely to be available at this time. However, some consideration must be given to holidays in a tighter schedule of work.

4.3. Operating Costs

The average operating cost of the nine groups supplying information from their audited accounts are shown in Table 12. The average cost is given for the seven groups with Birds Eye and Findus contracts which have the same method of operating and figures are also shown for the remaining two groups having chilling and cleaning facilities. A third had this equipment, but was operating both static and mobile viners and was not therefore comparable.

Table 12

GROUP OPERATING COSTS

	Average All Groups	Average of Groups with Findus and Birds Eye Contracts	Average of Groups with Chillers and Cleaners
Acres vined	12,181	10,047	2,134
Number of groups	9 ⁽¹⁾	7	2
Average acreage vined per group	1,342	1,435	1,067
	£ per acre	£ per acre	£ per acre
Labour	4.40	4.31	4.85
Machinery (supplied by members)	2.39	2.60	1.42
Fuel	0.36	0.32 (4)	0.52
Repairs	3.53	3.10	5.56
Machinery Depreciation ⁽²⁾	4.88	4.66	5.89
Building Depreciation ⁽³⁾	0.03	-	0.17
Contract and hire of machinery outside group	0.62	0.70	0.22
Haulage	1.25	0.61	4.26
Management, office and sundries	1.41	1.15	2.67
TOTAL COSTS	18.87	17.45	25.56
Range	14.78 to 28.54	14.78 to 21.66	..

- Notes: (1) One group operating both mobile and static viners has been excluded as not being comparable.
- (2) Machinery depreciation charged at 20 per cent straight line.
- (3) Buildings depreciation charged at 10 per cent straight line.
- (4) One group did not own cutters. The average labour and machinery costs for the other six groups were as follows,

	£ per acre
Labour	4.61
Machinery	2.88
Fuel	0.33
Repairs	3.41
Depreciation	4.75

The group not owning cutters incurred a charge of £5 for cutting included under "Contract and Hire of Machinery outside Group".

The cost of labour shown is largely made up of payments by the group to members for the hire of their workers but some labour hired outside the group is included as it could not be separately identified. The cost of machinery, however, is entirely the payment made by the group to the members, the cost of outside contract work and hire of machinery being individually designated.

Machinery depreciation is charged at 20 per cent straight line and building and site depreciation at 10 per cent. Straight line depreciation is used instead of diminishing balance in order to arrive at an annual average depreciation in a situation where no replacements had yet been made.⁽³⁾ A five year period is used for machinery because the contracts between the processor and the group are usually for five years, and, therefore, the group might expect to recover the investment within that period. Depreciation over a period of seven years would probably give a truer representation of the actual loss of value of the equipment. Depreciation at this rate would be £3.5 per acre for all groups, £3.3 for those with Findus and Birds Eye contracts and £4.2 for those with chillers and cleaners. The haulage cost refers only to that part incurred by the group and not to that paid by the processor either to outside contractors or to members of the group. The item "management, office and sundries" includes management salaries actually paid and interest on money borrowed from the bank. The interest charged was only

(3) All the groups in the sample started in 1966 or 1967 so that the depreciation charge relates to all the machinery owned by the group.

significant in the case of groups with the heavier investment in chilling and cleaning equipment and it would appear that the other groups had largely repaid the loans from the bank required to set them up.

The acreage vined is the total vined by the group including contract work for farmers outside the group. The cost involved in vining the contract acreage is included in the total cost but no allowance has been made for the income received for contract work outside the group. The additional cost of operating chilling and cleaning equipment is clearly shown in the figures for the two groups with these facilities.

4.4. Harvesting By-passed Peas for Seed

In some cases it is the responsibility of the individual member to harvest his own acreage of by-passed peas for seed, in others, it is a group operation. In 1970 the proportion of the crop harvested dry was so small as to have little effect on the costs shown here. Dry peas are normally harvested by direct combining, but the acreage was too small to obtain satisfactory details of the resources and costs involved.

4.5. Capital Investment

The groups' capital investment at original cost less grants is shown in Table 13. The average investment in cutters by the six groups with Birds Eye and Findus contracts, if the group not owning these machines is excluded, was £2.87 per acre. The higher investment by the groups with chillers and cleaners is entirely due to these machines and the buildings and site works associated with them.

Table 13

CAPITAL INVESTMENT BY GROUPS
At Original Cost Less Grant

	Average All Groups	Average of Groups with Findus and Birds Eye Contracts	Average of Groups with Chillers and Cleaners
Acres vined	12,181	10,047	2,134
Number of groups	9 ⁽¹⁾	7	2
Average acreage vined per group	1,342	1,435	1,067
	£ per acre vined	£ per acre vined	£ per acre vined
Viners	19.44	19.78	17.82
Cutters	2.50	2.48 ⁽²⁾	2.61
Chillers and Cleaners	1.17	-	6.69
Other Machinery	1.24	1.09	1.92
Buildings and Site Works	0.30	-	1.71
TOTAL	24.65	23.35	30.75
Range	20.58 to 36.88	20.58 to 27.22	..

Notes:

- (1) One group operating both static and mobile viners was excluded as being non-comparable.
- (2) One group did not own cutters. The average investment for the other six groups owning cutters was £2.87 per acre.

The machinery inventories were revalued at current (1972) prices to give an indication of the capital required to set up a group now, and the figures are shown in Table 14. Grants are no longer available for the purchase of this machinery.

Table 14

CAPITAL INVESTMENT BY GROUPS
Revalued at 1972 prices (No grant available)

	Average of Groups with Findus and Birds Eye Contracts	Average of Groups with Chillers and Cleaners
	— £ per acre vined —	
Viners	30.82	25.16
Cutters	3.06	3.75
Chillers and Cleaners	-	9.08
Other Machinery	1.69	5.77
Buildings and Site Works	-	2.72
TOTAL	35.57	46.48

4.6. Financing the Groups

Most groups set up since the introduction of mobile viners have received grants administered by the Central Council for Agricultural and Horticultural Co-operation and all the groups in this sample did so. These grants were made at a maximum rate of 33 $\frac{1}{3}$ per cent, but the actual rate was decided by the C.C.A.H. C. according to the merits of each individual case. The full rate was paid in the early years but it is clear that the rate paid subsequently was generally lower. The grants were discontinued at the end of the 1970-71 financial year. Table 15 shows the average proportion of the total investment financed by the members as share and loan capital, government grant and bank loans respectively for the eight groups in the sample reporting this

information. This indicates that the grant provided a little over a quarter of the gross investment, the banks nearly 30 per cent and the members themselves just over 40 per cent, almost entirely as loan capital. The loan capital provided by each member was usually related to the acreage of peas grown at the time of the formation of the group. Share capital is purely nominal ranging from as little as fl per member up to fl per acre grown. The groups are mostly constituted as companies registered under the Industrial and Provident Societies Act which gives special advantages in building up reserves since the company is only taxed on income received from sources outside the group members themselves. Distributed surpluses are, however, taxed when received by the members. A company formed under this Act must have a minimum of seven members.

Table 15

PROPORTION OF INVESTMENT FINANCED BY SHARE
AND LOAN CAPITAL, GOVERNMENT GRANT AND BANK LOAN

Eight groups reporting

Percentage	
Net Investment	73.4
Grant	26.6
	100.0
Share Capital	0.8
Loan Capital	42.7
Grant	26.6
Bank Loan	29.9
	100.0

5. FINANCIAL RESULTS OF 1970 CROP

5.1. Margin over Direct Growing Costs

Considerable difficulty was experienced in obtaining comparable figures for the whole sample because of the different ways in which the crop is paid for by the processors. In Table 16 the results of the 25 growers having Birds Eye and Findus freezer contracts are given omitting vining allowances and harvesting costs, since essentially the processors pay the growers for the peas at the point of harvesting.

Table 16

MARGIN OVER DIRECT GROWING COSTS Growing with Birds Eye and Findus Contracts

	Average All Growers with Birds Eye and Findus Contracts
Total acres	5,659½
Yield per acre vined, tons	1.85
Average price per ton vined, f	47.31
Number of growers	25
Average acreage per grower	226½
OUTPUT ⁽¹⁾	f per acre 89.22
DIRECT GROWING COSTS	
Seed	12.07
Fertilisers	1.33
Sprays - Herbicides	2.14
- Pesticides	0.09
Miscellaneous	0.22
Contract: Spraying - Herbicides	0.44
- Pesticides	0.99
Miscellaneous	0.29
Total	17.57
MARGIN over Direct Growing Costs	71.65

Notes: (1) Payment by processor to grower for peas for freezing (excluding vining allowances) plus sales of dry peas for seed and by-pass compensation.

Output is made up of the payment made by the processor to the grower for peas for freezing (excluding vining allowances) plus sales of dry peas and by-pass compensation. If the harvesting costs are exactly covered by the vining allowance then the margin over direct growing costs shown in Table 16 would be equal to the margin over direct growing costs and harvesting costs. Payments between members and the groups are treated as internal payments and ignored, but where growers outside groups, say, with a Birds Eye contract, pay a charge for cutting of £5 per acre, this figure should be deducted from that shown in Table 16 to arrive at the margin obtained from this arrangement.

5.2. Margin Over Direct Growing and Group Harvesting Costs

In Table 17 the vining allowance is included in output so that the output of those with contracts paying vining allowances is comparable with those whose contract price is expected to cover the cost of harvesting. Harvesting costs are shown below the direct growing costs and internal payments between the groups and the members are ignored as before.

Full details of the vining allowances were available for three groups with four members in the grower sample out of the four groups with Birds Eye contracts surveyed. The vining allowance per ton paid to the group was applied to the respective member's total sales to obtain his contribution to the vining allowance received by the group. The average rate per ton paid to the Birds Eye groups was £9.86. To obtain comparability this rate was applied to the other Birds Eye growers in the sample who belonged to a group for which the information was not available. The same rate was also applied to those growers who are not members of groups and the contract cutting charge was excluded. The group harvesting cost which was obtained from all four Birds Eye groups in the group sample was applied respectively to the seven members in

Table 17

DIRECT GROWING AND HARVESTING COSTS
All Growers and Growers with Freezer Contracts

	All Growers ⁽¹⁾	Growers with Freezer Contracts only
Total acres	7,484 ⁽²⁾	6,928
Yield per acre vined, tons	1.71	1.73
Average price per ton vined, £	49.28	48.65
Number of growers	37	34
Average acreage per grower	202	204
OUTPUT	£ per acre	£ per acre
Sales	87.40	87.79
Vining allowance	15.34 ⁽³⁾	16.57 ⁽³⁾
Total	102.74	104.36
DIRECT GROWING and HARVESTING COSTS		
Direct Growing Costs		
Seed	12.44	12.36
Fertilisers	1.45	1.42
Sprays - Herbicides	2.05	2.19
- Pesticides	0.15	0.16
Miscellaneous	0.38	0.18
Contract: Spraying - Herbicides	0.52	0.36
- Pesticides	1.10 ⁽⁴⁾	1.09
Miscellaneous	0.43	0.24
Total Direct Growing Costs	18.52	18.00
Harvesting Costs	18.34	18.80
Total	36.86	36.80
MARGIN over Direct Growing and Harvesting Costs	65.88	67.56

- Notes: (1) 3 growers were omitted: one with contracts with more than one processor and insufficient data on vining allowances and costs; two with special contracts rendering them non-comparable.
- (2) 171 acres grown for canning, 295 acres grown for dehydrating.
- (3) Average allowance per acre of those with contracts paying vining allowances was £20.29.
- (4) Spray materials and the cost of spraying were not clearly delineated in contractors bills. But assuming the cost of land spraying to be 45p per acre spraying with fixed wing aircraft £1 and with helicopter £1.50 the average cost of contract spraying would be £0.44 per acre and would add £0.30 per acre to herbicides and £0.54 per acre to pesticides shown above.

the grower sample on an acreage basis. The average cost of harvesting by these groups was £18.65 per acre and this rate was then applied to all the remaining Birds Eye growers in the sample for whom the actual cost was not available.

The vining allowances were known for seven of the nine Findus growers in the sample and averaged £12.27 per ton (including overtime allowances). This rate was applied to the yield of the other two. The group harvesting costs were known for all except one of the growers: the average cost of £17.32 per acre was used for this grower's figures.

The remaining growers included in the figures in Table 17 had contracts which paid a price for the peas intended to cover the cost of harvesting and the average harvesting costs were known for the groups of which these growers were members.

Of the three growers who did not have freezer contracts, one sent part of the crop for dehydration and part for freezing and the other two had contracts with canners. Unfortunately this does not provide a suitable sample to show separate figures for these contracts but it would appear that the price paid for canning peas compared with that paid for freezing does not compensate for the additional cost of chilling and transporting incurred by growers at a distance from the factory.

The cost of spray materials and the spraying operation itself was not clearly delineated in the charges made by contractors. However, if a charge of 45p per acre is raised for ground spraying, £1 per acre for spraying by fixed-wing aircraft and £1.50 by helicopter, the average cost of spray material would be increased by £0.30 per acre for

herbicides and £0.54 per acre for pesticides. The average cost of the contract spraying operation would be £0.44 per acre.

The most important direct growing cost is seed which accounts for about 75 per cent of the total. The seed is supplied by the processor usually at a standard price for all varieties. In 1970 Birds Eye charged £5.65 per cwt plus 20p for dressing and Findus £6.29 per cwt with the same addition for dressing.

The range of yield, costs and margin about the averages shown in Table 17 for those growers with freezer contracts are given in Table 18. As with other arable crops, the range in the margin is mainly related to the level of output which is in turn dependent upon yield. A high output is associated with high yield provided it has not been achieved by allowing the crop to over-mature.

Table 18
AVERAGE AND RANGE OF YIELD, COSTS AND MARGIN
Growers with Freezer Contracts only

	Average	Range
	tons per acre	tons per acre
Yield per acre vined	1.73	1.04 to 2.31
	£ per acre	£ per acre
Output	104.36	61.26 to 131.26
Direct Growing Costs	18.00	13.44 to 20.59
Harvesting Costs	18.80	14.78 to 23.41
Total Direct Growing and Harvesting Costs	36.80	32.00 to 44.00
MARGIN over Direct Growing and Harvesting Costs	67.56	20.08 to 94.63

The labour and tractor requirements for growing the crop up to harvest (shown in Table 6) are no greater than for cereals and because the spread of sowing dates from late February to mid-May the work may be spread over a longer period. No special machinery is required, corn drills being used for sowing.

5.3. Comparison with Other Crops

Because of the group operations it is difficult to arrive at figures which are truly comparable with other crops. However, if it is assumed that only the contract and haulage charges paid by the groups are "variable costs" and that all the other group costs are "fixed costs" then the average gross margin for vining peas in 1970 would have been £82.35 per acre. This figure is compared in Table 19 with the gross margin obtained in 1970 for sugar beet and potatoes by farmers in the East Midlands co-operating in the Department's Farm Management Survey.⁽⁴⁾ The average gross margin of the vining peas crop on this basis is £10 per acre higher than sugar beet and almost the same as potatoes but within a rather narrower range of performance.

Table 19 GROSS MARGIN OF VINING PEAS COMPARED WITH SUGAR BEET AND POTATOES - EAST MIDLANDS REGION 1970 CROP
£ per acre

	Average	Range
Vining Peas	82.35 ⁽¹⁾	38.90 to 112.84
Sugar Beet ⁽²⁾	72.03	52.59 to 115.49
Maincrop Potatoes ⁽²⁾	82.24	22.20 to 167.00

Notes: (1) Treating contract and haulage charges as variable costs (average £1.87 per acre) and all group labour and machinery charges and overheads as fixed costs.

(2) Gross margin results "Farming in the East Midlands - Financial Results 1970-71". University of Nottingham, Department of Agriculture and Horticulture, January 1972.

(4) Kerr, H. W. T. and Johnson, H. W. "Farming in the East Midlands, Financial Results 1970-71". University of Nottingham, Department of Agriculture and Horticulture, January 1972.

6. INTRODUCING VINING PEAS INTO THE ROTATION

Entry into E.E.C. may provide some opportunity for the processors in this country to expand production so there may be a chance for new growers to introduce the crop into their rotations. On the evidence of these results a gross margin of about £80 per acre is attainable. It is unlikely that additional labour would be required for growing the crop. Whether it would be required for harvesting would depend on the system operated on the farm in question. If sugar beet and potatoes or other crops with autumn labour peaks are grown on the farm the existing force could probably cope, but consideration would have to be given to holiday schedules. If it could not, adjustments could no doubt be made to the system so as to ensure that any extra men needed could be fully occupied throughout the year. No additional machinery would be required for growing the crop. If the grower set up a new group in company with others he would be faced with supporting a contribution of the order of £35 per acre at 1972 prices (see Table 15). If he was able to obtain a contract for growing and remain outside the groups, which is a possibility at present, he would receive no vining allowance, but would not be charged for vining. He would be charged for cutting the crop and assuming this charge plus the vining allowance paid to group members was equal to cost of harvesting he would have the same margin over direct growing and harvesting costs as a group member. He would, however, have no investment in group harvesting machinery but would forego the opportunity of sharing any profit that the group might make on its harvesting operations.

Peas provide an excellent entry for winter wheat and being a leguminous plant supply nitrogen for the following crop which should improve the gross margin of the rest of the rotation into which they are introduced.

7. ASSESSING THE FULL COST OF GROWING THE CROP

Although it was not the purpose of this publication to attempt to arrive at the full cost of growing the crop, the results presented in this report can be used to make an assessment. In view of the interest in obtaining such an estimate for price negotiations, suggestions are given how this may be done.

The main problem is arriving at a realistic assessment of the overhead labour and machinery costs on farms growing the crop. This can only be done by estimation since it was impossible to collect the relevant information in this investigation. It is suggested, therefore, that 30 per cent of the direct labour cost is allowed for overhead labour. The cost of employing a man in 1970⁽⁵⁾ was 42p per hour which with 30 per cent added for labour overheads gives a round figure of 55p per hour. It can, however, be justly claimed that well above the average rate is paid to workers on large arable farms in Lincolnshire and an adjustment can be made accordingly. Similarly, tractors can be charged at an average figure of 50p per hour and an allowance of 50p per tractor hour made for tractor overheads and a share of the cost of general equipment such as ploughs, cultivators, drills, etc. These figures can then be applied to the average labour and tractor requirements shown in Table 6, to arrive at an estimate of the cost of labour and machinery for growing the crop up to harvest. It is suggested that the overheads, including those related to labour and machinery involved in harvesting the crop, are generally accounted for in the group costs shown in Table 11.

(5) M.A.F.F., Wages and Employment Enquiry.

General overheads, excluding interest charges for borrowed money, on cash cropping farms over 500 acres in the East Midlands Farm Management Survey⁽⁶⁾ amounted to £3 per acre in 1970-71. The only remaining charge is rent: the average rent or rental value on those farms in the sample reporting was £11.70 per acre including drainage charges. Some estimate might also be made for interest on working capital and management up to harvest. Interest, however, would be very small since payment is made for the peas soon after they are harvested, and seed, the biggest direct expense, is contra-charged against it. Similarly an allowance for management could not be very great since the major decisions such as sowing and harvesting dates are determined finally by the processor.

(6) Kerr, H. W. T. and Johnson, H. W. "Farming in the East Midlands, Financial Results 1970-71". University of Nottingham, Dept. of Agriculture and Horticulture, January 1972.

8. CONCLUSIONS

There is little doubt that 1970 was a good year for the vining pea crop particularly with regard to easy harvesting conditions. In less propitious circumstances the cost of vining might well be in excess of that shown here. According to the N.F.U. Vegetable Marketing Division Survey the average yield per acre was the second highest in the last five years (Table 5) and a very low proportion of the crop was by-passed. In 1971, the freezing contract quantities were reduced by 25 - 30 per cent which resulted in a fall in acreage grown both in the Region as a whole and in Lindsey of over 20 per cent (see Table 1). Various adjustments were made by the grower to meet this: some growers gave up growing the crop altogether, those outside groups finding it more difficult to obtain contracts; some groups were able to make up the acreage of peas lost with broad beans for freezing, but the general effect of the reduction in the contract acreage must have been to increase the cost per acre of capital charges on machinery owned by the groups. In addition there has been a general rise in prices of at least five per cent per annum so that the cost of harvesting the 1972 crop could be expected to be at least ten per cent above that shown for 1970 on this count alone. Furthermore, some of the machinery originally purchased by the groups when they were set up will need replacing before long. Machinery prices have risen substantially and the co-operation grants are no longer available so that the groups' machinery depreciation charges will inevitably rise.

Nevertheless, the pea crop is one of the best arable breaks and a gross margin equivalent at least to that of sugar beet can be achieved. As a break crop it fits well into the arable system: it is a relatively easy crop to grow and will do well on a wide variety of

soil types. The harvesting operation also fits in well with the main arable crops and is well organised on a syndicate basis. It is a good cleaning crop in that weeds must be controlled in the crop itself if good results are to be achieved and as it is cleared early there is ample opportunity for thorough preparation before sowing to winter wheat. Being a legume it provides nitrogen for the benefit of following crops in the rotation.

The extension of the crop has been limited by a slackening in demand for the frozen product. If demand picks up it seems likely that the acreage will continue to expand again and there may be prospects upon entry into E.E.C. The system of contracts operated by the processors should guard against dangerous over-expansion and would appear to be beneficial to farmers on the whole, especially as they are negotiated co-operatively by the Processed Vegetable Growers Association. However, it would be considerably more costly to move into growing this crop now than it was a few years ago when most of the vining groups were first formed.

APPENDIX

Comment on the Methodology of the Investigation

The sample was selected primarily as a sample of growers and the group information was obtained through growers in the sample who were able to get agreement to provide it from the other members in the group. Because of the close integration of the growers and the groups it would be better to select a sample of groups for any future investigation and to obtain the growing information through the groups rather than the other way around. It will be more important to do this if the practice of averaging returns to members of the group spreads. This procedure would simplify the problem of handling the vining allowances and harvesting costs experienced in presenting the results in this report.

In view of the need to arrive at the full cost of growing crops for which the price is negotiated directly by the growers, it is important that some work should be done to determine the proportion of the total labour and machinery costs which cannot be directly allocated to the individual enterprises on large arable farms likely to grow these crops. It has always been beyond the resources available to obtain this information from individual enterprise studies and it would have to be carried out as a separate exercise embracing the whole farm system.

