UNIVERSITY OF NOTTINGHAM

Department of Agriculture and Horticulture

THRESHED PEAS

H. W. T. Kerr

Agricultural Enterprise Studies
in England and Wales
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DEPARTMENT OF AGRICULTURE AND HORTICULTURE

THRESHED PEAS

A study of the production economics of the
1971 Threshed Pea Crop in the
East Midland Region including the
Holland Division of Lincolnshire.

H.W.T. KERR

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AGRICULTURAL ENTERPRISE STUDIES IN ENGLAND AND WALES

University departments of Agricultural Economics in England and Wales have for many years undertaken economic studies of crop and livestock enterprises. In this work the departments receive financial and technical support from the Ministry of Agriculture, Fisheries and Food.

A recent development is that departments in different regions of the country are now conducting joint studies into those enterprises in which they have a particular interest. This community of interest is being recognised by issuing enterprise reports in a common series entitled "Agricultural Enterprise Studies in England and Wales", although the publications will continue to be prepared and published by individual departments.

Titles of recent publications in this series and the addresses of the University departments are given at the end of this report.

ACKNOWLEDGEMENTS

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FOREWORD

This report is a further contribution to the series concerning arable break crops published by this Department and complements that on vining peas produced earlier this year. Threshed peas have not been investigated by University Departments in the past decade, a period during which the emphasis has been placed on producing peas for human consumption. It was therefore, decided to conduct a study of the 1971 crop but owing to a lack of resources the investigation was confined to a small sample in the East Midlands Region. In order to provide a wider choice for selection it was agreed with the University of Cambridge that the Holland Division of Lincolnshire which is in their province and which has the highest acreage of threshed peas of any county be included. The study provides useful data in its own right, but it is also hoped that it may act as a pilot for a wider investigation of the threshed pea acreage grown in the whole country in a few years' time.

The report is cast in the same form as the previous ones on arable break crops its primary purpose being 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 be needed to include threshed peas in the rotation rather than to determine the "full cost" of growing the crop.

1. INTRODUCTION

1.1 Use of the Product

Threshed peas[1] are used primarily for human consumption in this country. In the dry state they are packeted for the retail trade mainly in the Midlands and the North of England where they are popular. An increasing quantity is sold loose to fish and chip shops, factory canteens, and other institutions. Dried peas are also soaked and canned for selling as "processed peas" in contrast to the canned vining peas which are labelled "garden peas" There is a further demand for peas for canned soups and for pea flour. There are, therefore, several uses for the product each with their different requirements. Peas required for the retail packeting trade have to be of a relatively deep and uniform grey green colour. The requirements for loose peas are less stringent, the fish and chip trade being more particular than the institutions. Peas for canning, on the other hand, should not be too well coloured since this results in too deep a colour in the canned product and in any case colouring is added in the canning process. The peas must not be too soft or variable in texture since this causes difficulties in the cooking process. The variability in texture of the homegrown crop compared with peas grown in hotter, more reliable climates, is a traditional problem. Texture is particularly important to the

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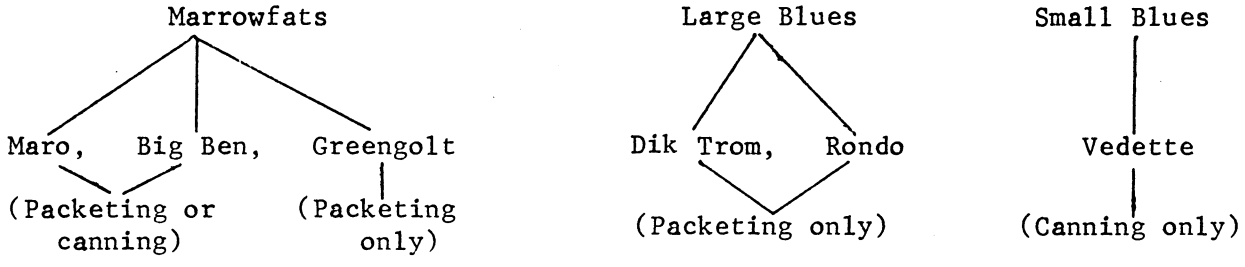
(1) The terms "dry", "drying" "dried", and "harvesting" are all applied to peas grown for harvesting in a ripe state for human consumption.

canned soup manufacturer and the peas used for this purpose are nearly all imported. Peas rejected as unsuitable for human consumption are sold for stockfeed, most being exported to the Continent and at present little, if any, of the acreage is grown specifically for feeding to livestock.

1.2 Types of Pea Grown for Threshing

Three types of pea are grown in this country for harvesting dry, marrowfats, large blues and small blues Marrowfats and large blues are used for packeting, but the harvesting technique incorporating desiccation produces samples from the more commonly grown marrowfat varieties which are often too pale in colour. The new dark skinned marrowfat, Greengolt, was introduced to overcome this, but because of its deep colour it is unsuitable for canning. Apart from this variety the marrowfats can also be canned but large blues are too soft and are, therefore, only used for packeting The small blues, which are considered distinct from marrowfats from the marketing point of view, are all canned, and until recently, only imported Alaskas were used. This variety cannot be grown successfully in this country and Vedette was introduced in an attempt to provide a homegrown substitute. Most of the small blues, however, are still currently imported whilst marrowfats are largely home produced, roughly two thirds being canned and one third being sold packeted or loose A very small acreage of white peas is grown for the canned soup market. The main types, varieties and methods of processing the home-grown crop are summarised in Figure 1.

Figure 1 MAIN TYPES, VARIETIES AND METHODS OF PROCESSING THE HOME-GROWN CROP



The crop is usually ready for harvest during late July and early August depending on weather conditions and the variety grown. Large blues have a similar yield but mature about a week earlier than Maro, the most commonly grown marrowfat variety. The small blue Vedette is lower yielding but matures about a week earlier than large blues. Early maturity is, of course, an advantage agriculturally in that the crop is more likely to be cleared before cereals are ready for harvesting.

1.3 Marketing

About half the national crop is grown on contract to a processor or merchant and the other half is disposed of through the open market. There are several large businesses specialising in peas which have the necessary grading equipment to remove damaged and stained peas before passing them on to the processor. Whether sold direct to the processor

or through a merchant the price received by the farmer for peas for human consumption is dependent upon the waste and stain content in the sample. Waste and stain is defined as any peas unsuitable for human consumption due to their being immature, broken, dirty, damaged, discoloured, mouldy or stained. Damaged peas can be separated mechanically but stained peas can only be removed from the sample by the use of an electronic eye. A premium is therefore sometimes paid for peas of good colour suitable for packeting. An example of a typical 1971 price scale is given in Table 1. There is little difference now in the price paid for marrowfats and blues, but in earlier years marrowfats commanded an appreciably higher price. If the waste and stain content is more than 25 per cent the crop may be totally rejected. The waste from grading and consignments unacceptable for human consumption are disposed of for stockfeed. Only a small proportion is now retained on farm for feeding to stock and little is used by the home compounder. Most of it is exported to the Continent and trade estimates suggest that approximately 28,000 tons left the country during the 1971-72 season, mainly to Dutch feed compounders.

1.4 Acreage Grown

The acreage of threshed peas grown in England and Wales rose from 26,000 acres in 1961 to peak of 73,000 acres in 1970 (Table 2). According to trade estimates about 52,000 acres at current yields is sufficient to satisfy the processor's demand for the home product. There was a considerable surplus in 1970 which weakened the market for both this crop and the 1971 crop when the acreage fell to just under 60,000 acres. The increased output has been absorbed largely by replacing imports, mainly marrowfats from Holland, by the homegrown product and recently through the export trade for livestock feeding. While

Table 1 TYPICAL PRICE SCALE FOR DRY PEAS FOR HUMAN CONSUMPTION

1971 CROP

Waste and Stain	£ p.	Waste and Stain	£ p.
Under 3%	2.60 per cwt.	14% and under 15%	2.07½ per cwt.
3% and under 4%	2.55 " "	15% " " 16%	2.00 " "
4% " " 5%	2.50 " "	16% " " 17%	1.92½ " "
5% " " 6%	2.45 " "	17% " " 18%	1.85 " "
6% " " 7%	2.40 " "	18% " " 19%	1.80 " "
7% " " 8%	2.35 " "	19% " " 20%	1.75 " "
8% " " 9%	2.30 " "	20% " " 21%	1.70 " "
9% " " 10%	2.27½ " "	21% " " 22%	1.65 " "
10% " " 11%	2.25 " "	22% " " 23%	1.60 " "
11% " " 12%	2.22½ " "	23% " " 24%	1.55 " "
12% " " 13%	2.20 " "	24% " " 25%	1.50 " "
13% " " 14%	2.15 " "		

(a) The above prices are reduced by £0.05 per cwt. for each 1% moisture in excess of 18.0% for peas in bags and 16.0% for peas in bulk. If the moisture content is above these levels the contractor reserves the right to artificially dry the peas at the growers expense at a charge of £4.00 per ton or to reject the consignment.

(b) The contractor reserves the right to accept or reject consignments with a total waste and stain content of 25% or over. If accepted the price paid is £1.50 per cwt.

(c) Any soil content in excess of ½% is deducted by weight from each consignment. Peas with a soil content in excess of 5% may be rejected.

there has been some increase in the total quantity used for human consumption, the proportion supplied by the homegrown product has risen from under a third in 1961 to over a half in 1971.(2) Most of the acreage is located in the drier eastern counties, 87 per cent of the 1971 acreage being grown in the Eastern and East Midland Regions. The counties in which the main acreage is located are Lincolnshire (Holland) (10,374 acres), Norfolk (9,314 acres), Essex (8,646 acres), Cambridgeshire and the Isle of Ely (6,546 acres), Suffolk (5,765 acres), Lincolnshire (Lindsey) (3,405 acres) and Huntingdonshire and Peterborough (2,884 acres).

Table 2 ACREAGE OF PEAS GROWN FOR HARVESTING DRY
1961 to 1971

	1961	1964	1967	1968	1969	1970	1971
England and Wales	26,223	32,002	39,947	49,544	55,838	73,298	59,956
Eastern Region (less Lincs. (Holland))	11,623	16,258	21,630	27,897	31,337	40,898	34,779
East Midland Region (plus Lincs. (Holland))	11,218	13,262	15,378	17,700	18,911	22,581	17,589
Lincs. (Holland)	7,493	9,525	11,887	13,074	12,007	13,016	10,374
Lincs. (Kesteven)	874	850	986	1,327	1,868	2,291	1,801
Lincs. (Lindsey)	3,238	2,024	1,721	2,122	3,204	4,714	3,450
Derby	-	-	-	-	-	1	8
Leicester	114	80	198	381	398	650	326
Northants	267	242	487	656	1,050	1,213	1,110
Notts.	195	56	99	122	274	489	322
Rutland	28	69	-	16	109	208	200

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

(2) Derived from M.A.F.F. estimates of Area, Gross Production and Output of Vegetables for Human Consumption, and M.A.F.F. Import Statistics.

1.5. The Scope of the Study

A sample of 18 cooperators was drawn from a random list of growers in the East Midland Region plus Lincolnshire (Holland). The sample covered 468½ acres which represents 2.7 per cent of the acreage grown in this Region in 1971. The distribution of the sample by county is given in Table 3.

Table 3 DISTRIBUTION OF THE SAMPLE BY COUNTY

	Number of Growers	Acreage
Lincs. (Holland)	10	198½
Lincs. (Kesteven)	4	152
Lincs. (Lindsey)	2	22
Leicester	2	96
Total	18	468½

Conditions for sowing in the spring of 1971 were good and apart from June the weather was generally warm and dry. The cold, wet weather in June delayed the maturity of the crop and the critical period in early August was wet in most areas making the harvest very difficult although not all cooperators were equally affected. The results therefore do not necessarily represent the level of performance which may be achieved in more favourable conditions.

2. HUSBANDRY[3]

2.1 Place in the Rotation

It is generally considered that a minimum of four years must be allowed between pea crops and other crops, such as broad beans, field beans and vetches, which act as host to pea root eelworm (Heterodera göttingiana). No grower in the sample was prepared to go to a closer rotation than once in five years and the more experienced growers in Lincolnshire (Holland) preferred a gap of six or seven years. In fact, only one cooperator grew the maximum acreage on the basis of one year in seven, and the average acreage in peas and susceptible legumes was ten per cent of the total. Downy mildew (Peronospora viciae) and pea wilt (Fusarium oxysporum, f. pisi) which cannot be controlled chemically are also encouraged by close cropping, although marrowfats and several blue varieties are resistant to wilt. The crop provides a good entry for winter wheat, but there is a greater risk of slug and wheat bulb fly attacks following peas than after most arable crops.

2.2 Soil Type and Cultivations

Except for large blue varieties which must be grown on a very fertile soil because of their short haulm, peas can be grown on a wide range of soils in the drier eastern side of the country. 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 and therefore do best on a deep free working loam. Adequate lime is needed but peas are less sensitive to soil acidity than sugar beet or barley. A

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(3) Recommendations referred to in this section are taken from

(i) Game, A.J., King, J.M., and Gent, G.P. "Pea and Bean Growing Handbook, Vol. 1 - Peas", Pea Growing Research Organisation Ltd., 1971.

(ii) "Peas for Drying", M.A.F.F. Short Term Leaflet No. 91, 1969.

high pH, however, can lead to manganese deficiency which causes Marsh Spot particularly on organic soils and care must be taken therefore not to overlime. A fine seedbed is not necessary: excessive working of the land may destroy the tilth, especially on unstable soils with low organic matter content, causing the land to become water-logged after heavy rain. The field should if possible be ploughed in autumn after which a single pass with cultivating machinery should usually suffice on most soils before drilling.

2.3 Seed and Sowing

When the crop is grown on contract the seed is supplied by the contracting firm. The seed is dressed with thiram, captan or drazoxolon as a protection against losses from damping off (Pythium spp.) which can be severe especially in early sowings. Seed dressing does not however control the internal seed-borne disease Leaf and Pod Spot and Foot Rot (Ascochyta pisi, Ascochyta pinodella and Mycosphaerella pinodes) and the use of healthy seed is of prime importance. Home grown seed can be used for several years before purchasing fresh stock but it should be tested to ensure that it is of high germination and that it is free from disease. It should also be protected with one of the above seed dressings. Home grown seed was sown on a 180 acres (six growers) amounting to 38 per cent of the sample acreage: 13½ tons of the 1971 crop were retained for seed by five growers, sufficient to sow 135 acres at 2 cwts per acre.

The varieties sown and the average seed rates for each variety are shown in Table 4. Over 80 per cent of the acreage was sown to marrowfats and the variety Maro was grown on three quarters of this acreage, most of the remainder being sown to Greengolt. Of the acreage sown to blues about half was in Dik Trom and only 13 acres was sown to the small blue

variety Vedette.

It has been demonstrated that increased yields are obtained by reducing row widths to 8" but that there is no additional advantage in sowing in rows narrower than this.(4) In fact, only four growers covering 75½ acres sowed at this width, but eight with 194 acres sowed in 7" rows and another two (11 acres) at 9", so that 62 per cent of the sample was sown within the range of 7" - 9". Of the remainder two (125 acres) sowed in 4" - 5" rows because of the setting of the drill generally used on the farm and two (63 acres) chose a 14" row width claiming better weed control and yield. A sowing depth of 2" - 3" was generally chosen, seeds being sown deeper (down to four inches) on light soils where pre-emergence weedkillers were used or where attack by pigeons was anticipated.

Table 4 VARIETIES AND SEED RATES BY ACREAGE GROWN

Type	Variety	Average Seed Rate per acre	Acreage	Proportion of Total	
		lbs.		%	
Blues	Dik Trom (Large)	224	40	8.5	
	Rondo (Large)	206	14	3.0	
	Vedette (Small)	196	13	2.8	
	Variety not recorded	224	6	1.3	15.6
Marrowfats	Maro	224	291	62.1	
	Greengolt	198	92	19.6	
	Big Ben	224	12½	2.7	84.4
		218	468½	100.0	100.0

(4) Reynolds, J.D., Spacing trials with Dried Peas. J. Min. Agric., 54, 527-537, 1950.

Experimental work has shown the importance of plant population and optimum populations for marrowfats, large blues and small blues have been determined at five, six and nine plants per square foot respectively.(5) Tables have been compiled indicating the seed rates required to achieve these optimum populations at different rates of seedbed loss, germination and size of seed. Nearly 80 per cent of the sample acreage was sown at 224lbs (16 stone) per acre and the rest was sown at 196lbs (14 stone). It would not appear that much attention is being paid to this refinement, at least on the farms surveyed here.

The date of sowing is important, each week's delay after the first week in March having been shown to result in a yield reduction of about one cwt per acre.(6) Only one grower (65 acres) had drilled by the end of the first week in March, but another three (171 acres) had sown by the middle of the month. Nine growers (190½ acres) sowed in the second half of March and the remaining five (42 acres) in April. It was generally agreed by the cooperators that the crop should be sown as early as conditions permit, but most were wary of sowing in February and it was considered better to delay rather than sow early in poor conditions. The majority thought it worthwhile to sow up until mid April, but those prepared to start early put the limit at the end of March.

2.4 Fertilisers

Fertiliser was applied to 29.9 per cent of the sample acreage and of that treated nearly two thirds received a 0:20:20 compound at an average rate of little over 2 cwts per acre. Full details of fertiliser application are given in Table 5.

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(5) Pea Growing Research Organisation Ltd., Annual Reports, 22-23, 1967; 24-25, 1968; 30-32, 1969; 31-33, 1970.

(6) Proctor, J.M., An experiment to determine the effects of date of sowing on the yield and quality of harvesting peas, J. Agric. Sci., Camb., 61, 281-289, 1963.

Table 5 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	2.22	0	44	44	91½	78.2
5½	5½	12	2.00	11	11	24	3	2.6
8	20	16	2.50	20	50	40	10	8.5
12	12	18	3.00	36	36	54	12½	10.7
				27	43	44(a)	117	100.0

(a) Average application per acre to those acres receiving nutrient, i.e. N 25½ acres, P & K 117 acres.

Of the growers applying fertiliser, two (68 acres) combine-drilled and four broadcast. The three growers who applied nitrogen were on the lighter soils but they did not sow particularly early. One grower applied potassic slag to 21 acres and another lime to two acres. Manganese sulphate was used by two growers on 13½ acres as a protection against manganese deficiency and Marsh Spot disease.

2.5 Crop Protection

Details of the crop protection programme carried out on the sample farms are given in Table 6. The whole acreage was sprayed with either pre- or post-emergence weedkillers and 120 acres was treated with both. All three types of weedkiller, contact, residual and translocated, were used. Several materials specified in Table 6 were used against Pea Moth and Aphis.

Table 6 CROP PROTECTION

Type of Spray	Chemical	Acreage Sprayed	Proportion of Acreage Grown	Purpose
		acres	%	
Herbicides:				
Pre-drilling	Triallate	30	6.4	Wild Oats
Pre-emergence	Gramoxone	12	2.6	Grasses and broad-leaved annuals
	Prometryne	243	51.8	Broadleaved annuals and some grasses
	Cyanazine	4½	1.0	Broadleaved annuals and meadow grass
	Triatazine with Simazine (Experimental)	2	0.4	Broadleaved annuals and some grasses
Post-emergence	Dinoseb Amine	173	36.9	Broadleaved annuals
	Dinoseb Amine + M.C.P.A.	58	12.4	Broadleaved weeds
	TOTAL	522½	111.5	
Insecticides:				
Systemic Organo-Phosphorous	Azinphos-Methyl	28	6.0	Pea Moth
	D.D.T.	65	13.9	Pea Moth
	Dimethoate	30	6.4	Aphis
	Formothion	75	16.0	Aphis
	Demeton-s-Methyl	83½	17.8	Aphis
	TOTAL	281½	60.1	

2.6 Harvesting

Harvesting usually takes place in late July and early August. There are three main methods of harvesting employed. The crop can be combined directly usually preceded by the application of a desiccant; it can be cut, windrowed, turned mechanically or by hand, and combined; or it can be cut, tripoded and threshed.

To desiccate, the crop should be sprayed when the top pods have become parchment-like and the bottom brown in colour. Seven to nine days of good weather are required before the peas are likely to be dry enough to combine. Using the other two methods the crop should be cut when it begins to lose its green colour and the lower pods are becoming wrinkled and parchment-like. The seeds should be firm and come away from the seed stalks at a touch. A windrowed crop should be turned daily, combined as soon as it is fit to go through the combine and dried artificially. For tripoding, the crop should also be turned daily and placed on the tripods when the haulm is becoming brittle. The peas can be threshed as soon as they are dry enough to store with little or no artificial drying. Between 16 and 20 tripods are required per acre depending upon the crop density.

Peas must be artificially dried more slowly than cereals and because they present less resistance to the flow of air twice as many lateral ducts are required for on the floor drying. The top of the ducts can be covered to direct the flow of the air laterally through the peas. Care should be taken to limit the height of the heap according to the moisture content, the proportion of dross and the heat to be used.

The maximum moisture content for storage in bulk is 16 per cent. The peas must not be allowed to become dirty when wet for it is then impossible to clean them and the sample will be unacceptable for human consumption. Augers can easily damage the crop and they should have a greater clearance than cereals and operate at slower speeds. These three main methods of harvesting were represented in the sample, five growers covering 237 acres direct combining, ten with 179 acres windrowing, and the remaining three (52½ acres) tripoding.

Only two crops of blues (43 acres) were ready for cutting before the end of July and these were the only crops harvested before mid August, both at the end of the second week. Another 245½ acres including the other 30 acres of blues were harvested by the end of August. Of the remaining 180 acres, 167½ acres were finished before mid-September including two of the three which were tripoded. The third (12½ acres) was not threshed until the end of the month.

Of the five growers who direct combined, one combined without a desiccant, three used diquat and one sulphuric acid applied by contractor. The timing of the spray is important since the advantage can be nullified if the weather is wet in the period before combining. At least one batch was spoilt in this way.

Eleven growers (399 acres) had to dry the crop; seven (212½ acres) dried in bin, four (162 acres) dried on the floor, one (17 acres) dried in sack and another (7½ acres) had his dried on contract. Of the growers who direct combined, four dried on the floor, the other drying in bin: two of those who tripoded did not dry the crop and the other dried in bin. Three (14 acres) of those windrowing did not dry at all and

another did not have to dry 13 acres of his total of 50 acres. Both warm and cold air was used.

The straw was mostly burned or ploughed in but two growers baled it for feeding to older cattle on the farm.

2.7 Labour and Machinery Requirements

The average labour, tractor and combine hours used are shown in Table 7. These figures include casual labour, contract labour, tractor and combine hours for those jobs usually done by regular labour but excluding operations such as aerial spraying, normally put out to contract. The wide range is a reflection of different harvesting methods as well as varying weather conditions experienced by each grower. Figures for each method employed are shown in Section 4 and are discussed in relation to the financial results achieved.

Table 7 AVERAGE LABOUR AND MACHINERY REQUIREMENTS FOR DIFFERENT OPERATIONS

Operation	Labour	Tractors	Combine
Ploughing	1.53	1.53	-
Working down and drilling	1.79	1.43	-
Post drilling[(a)]	0.80	0.69	-
Harvesting	7.50	2.32	0.65
Post harvesting[(b)]	0.51	0.25	-
TOTAL	12.13[(c)]	6.22[(c)]	0.65[(c)]
Range	4.19 to 35.80	3.04 to 14.50	0.27 to 1.60

(a) Post drilling includes cultivations (e.g. rolling) and spraying. Application of desiccant is included in harvesting.

(b) Post harvesting includes drying, handling and loading for sale, and any post harvesting field operations.

(c) of which 10.91 hours was regular labour,
5.80 hours was farmers' own tractors and
0.63 hours was farmers' own combines.

The team normally employed for harvesting by direct combining or picking up from windrows was similar to that used for harvesting cereals, namely one combine driver, one tractor driver with one or two trailers and sometimes one man at the store operating at about the same rate of work as in cereals. A team of 4 to 6 men was used for threshing from tripods clearing between 5 and 7 acres per 8 hour day. Unlike beans, there was no evidence that peas cause any more wear and tear on the combine than cereals.

3. FINANCIAL RESULTS OF THE 1971 CROP

The average output, variable costs and gross margin are shown in Table 8.

Table 8 AVERAGE OUTPUT, VARIABLE COSTS AND GROSS MARGIN

	Average	Range
Number of Farms	18	-
Total acreage grown	468½	-
Acres per farm	26	3 - 75
Yield per acre tons	1.24	0.70 to 1.67
Average price per ton sold £	35.31	27.00 to 50.00
Percentage of total yield sold for human consumption	42.9	-
	£ per acre	£ per acre
OUTPUT	44.31	19.78 to 70.15
VARIABLE COSTS:		
Seeds	9.31(a)	
Fertilisers	0.63	
Sprays : Herbicides	2.23	
Pesticides	0.32(b)	
Manganese	0.02(c)	
Desiccant	0.65(d)	
Contract	2.99(e)	
Casual Labour	0.76	
Miscellaneous	0.86	
TOTAL VARIABLE COSTS	17.77	11.26 to 25.04
GROSS MARGIN	26.54	1.51 to 47.10

(a) Homegrown seed charged at £2.75 per cwt plus cost of dressing.

(b) Average cost per acre treated (144½ acres) £1.04

(c) Average cost per acre treated (13½ acres) £0.72

(d) Average cost per acre sprayed with diquat (207 acres) £2.32

(e) Contract spraying : average cost per acre sprayed by air (including material) (170½ acres) £2.14

(The cost of materials and the cost of spraying could not be separated.)

Contract cutting : cost per acre cut (128 acres) £3.43

Contract combing : cost per acre combined (11 acres) £4.32

3.1 Output

The average yield per acre of 1.24 tons with a range of 0.70 tons to 1.67 tons, is similar to the average yield of 1.2 tons forecast for the whole 1971 crop.(7) According to the same source, the average annual yield for the last five years was also 1.2 tons per acre, only the good year of 1967 exceeding it at 1.4 tons per acre.

The effect of the difficult harvest of 1971 and the over-supply of the market due to the carry-over of the 1970 crop is reflected in the low proportion sold for human consumption (42.9 per cent). The average price received for peas sold for human consumption was £40.38 per ton and that sold for stockfeed was £30.00 per ton. An average price of about £40 per ton suggests that those samples accepted for human consumption had a rather high proportion of waste at around 15 per cent compared with a more normal level of ten per cent. Output is therefore influenced by variations in yield and particularly in the price per ton received which varied from £27.00 per ton to £50.00 per ton. This in turn is determined by whether the crop is sold for stockfeed or human consumption and if, for the latter, the proportion of waste in the sample. Both yield and quality of sample are particularly susceptible to weather conditions at harvest in relation to the method of harvesting adopted.

Only four growers covering 63½ acres grew the crop on contract for human consumption, two to processors and two to merchants, but two of the samples proved unacceptable and were eventually sold for stockfeed. It was apparent that the more experienced growers of Lincolnshire (Holland) felt that they obtained a better deal selling on the open market.

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(7) M.A.F.F. Annual Estimates of Area, Gross Production and Output of Vegetables for Human Consumption (Excluding Potatoes) in the United Kingdom.

Peas retained for seed were valued at £55 per ton and a small quantity of straw fed to livestock at £4 per ton. A very small quantity amounting to about 1.5 per cent of the total yield was retained for feeding, mainly to pigs, and was valued at its estimated market price.

The P.G.R.O. levy of 5p per ton was deducted from the payments made to the farmer for his peas.

3.2 Variable Costs

The most significant variable cost is that for seed which accounts for a little over half the variable costs. The cost of seed dressing at 25p per cwt is included.

Considerable use was made of the services of contractors, only three growers not employing one at all. Details are given of the cost of the three main jobs, aerial spraying, cutting and combining for which contractors were used in the footnote to Table 8. Other operations carried out by contractors included drying, ploughing and straw baling.

Miscellaneous costs cover the variable cost of drying and loading, sack hire and pigeon scaring.

3.3 Gross Margin

The average gross margin of £26.54 per acre was better than that achieved by a group in the East Midlands Farm Management Survey

in 1970 and 1971 but considerably less than that obtained in 1969 as shown in Table 9. It is also comparable to the gross margin per acre of spring barley in 1969 and 1970 but lower than in 1971.(8)

Table 9 GROSS MARGIN OF BARLEY AND THRESHED PEAS
EAST MIDLANDS FARM MANAGEMENT SURVEY
1969, 1970 and 1971 CROP YEARS

£ per acre

	1969	1970	1971
Threshed Peas	39.45	24.12	17.82
Spring Barley	26.94	26.60	30.40

(8) Kerr, H. W. T. and Johnson, H. W. "Farming in the East Midlands Financial Results" 1969-70, 1970-71, 1971-72. Univ. Nott., Dept. Agric. and Hortic., 1971, 1972 and 1973.

4. THE INFLUENCE OF HARVESTING METHOD

It is generally accepted that tripoding produces the best sample, but requires considerably more labour than the other methods of harvesting. Direct combining, on the other hand, uses little labour but is less likely to produce a good sample particularly in difficult harvesting years. Despite the small size of the sample an examination of the results confirmed that this was the case in 1971. The labour and machinery requirements for the main methods of harvesting identified earlier are shown in Table 10. These figures clearly indicate the high labour

Table 10 LABOUR AND MACHINERY REQUIREMENTS FOR HARVESTING

Hours per acre

Method of Harvesting	Labour		Tractors		Combine	
	Average	Range	Average	Range	Average	Range
Direct Combining	1.49	1.07 to 3.05	0.84	0.60 to 1.26	0.53	0.27 to 0.95
Windrowing:						
Turned Mechanically	5.31	4.02 to 10.93	3.32	2.77 to 5.20	0.58	0.42 to 0.93
Turned by Hand	14.30	9.00 to 21.00	2.95	1.17 to 6.83	0.73	0.65 to 1.17
Tripoding	28.60	23.76 to 30.60	6.09	2.17 to 7.83	1.26	1.14 to 1.60

These figures include contract and casual work.

requirement for tripoding and the much lower use by the direct combining method. The requirement for windrowing was intermediate, closer to direct combining when turned mechanically and to tripoding when turned by hand. One grower succeeded in combining after turning by machine once only, whereas, at the other extreme another had to turn by hand

as many as six times before the crop was fit to combine. Even when a mechanical turner was used some hand turning at the corners was often needed and, in general, more turning was required this year than usual. Because of the small size the sample and the poor harvesting conditions of 1971, these figures should not be interpreted as standards. They do, however, give some indication of the relative levels required in poor conditions by these different methods of harvesting.

The physical and financial details of the average output for each harvesting method are shown in Table 11. Only 7.3 per cent of the direct combined crop was sold for human consumption whereas almost all the tripoded crop went for this purpose, and consequently the average price received for the direct combined crop was over £16 per ton less. As the yield was also lower there was a difference of £31 in the average output per acre of the two methods, which would be sufficient to cover the cost of additional labour and machinery of the tripoding method. Nearly three-quarters of the crop harvested by both windrowing methods was sold for human consumption and with the yield a little higher than the tripoding method gave an average output per acre only £11 lower. Differences in labour requirements and the proportion of the crop sold for human consumption were undoubtedly accentuated by bad weather in the critical period. These results do not mean that adequate yields and good samples cannot be obtained by direct combining but they do emphasize the risk attached to using this method in poor harvesting conditions.

Table 11 COMPARISON OF OUTPUT FROM FOUR DIFFERENT METHODS OF HARVESTING

(a)

	Direct Combining	Windrowed		Tripoded
		Turned Mechanically	Turned by Hand	
Number of Farms	5	5	5	3
Total acreage grown	237	100½	78½	52½
Acres per farm	47.4	20.1	15.7	17.5
Yield per acre tons	1.05	1.51	1.41	1.34
Average price per ton sold £	31.05	42.38	37.21	47.81
Percentage sold for human consumption	7.3	70.6	72.4	96.4
	£ per acre	£ per acre	£ per acre	£ per acre
OUTPUT	33.16	53.35	53.24	64.69

(b)

	Direct Combining	Windrowed		Tripoded
		Turned Mechanically	Turned by Hand	
Range	tons per acre	tons per acre	tons per acre	tons per acre
Yield	0.70 to 1.33	1.35 to 1.56	1.12 to 1.67	0.97 to 1.47
Output	19.78 to 41.13	39.60 to 61.00	30.24 to 64.40	48.80 to 70.15

5. INTRODUCING THRESHED PEAS INTO THE ROTATION

All growers in the survey considered peas to be one of the best break crops from the technical point of view. They are not hosts of cereal diseases and pests; being a leguminous plant, they improve fertility by raising the nitrogen level of the soil and they are held to have a beneficial effect on soil structure. As chemicals are available to control a wide range of grasses and broadleaved weeds in peas, they can act as an effective cleaning crop. Apart from large blues, peas can be grown successfully on a wide range of soils in the drier parts of the country. The crop is not difficult to grow and it is usually harvested early enough to provide a good entry for winter wheat.

No additional equipment would be required by the arable farmer intending to introduce peas into the rotation if the method of direct combining were to be used for harvesting. A pea cutter, costing about £700 new at present prices, is generally used in the other methods. A turner and pick-up reel may be required for the windrowing method, but this equipment is likely to be already available or obtainable cheaply. For tripoding, the tripods currently costing about £1 per set, £16 to £20 per acre, are an additional capital cost. Care is needed in drying and handling the crop, but apart from some small expenditure on more lateral ducts and larger augers it is unlikely that additional facilities for drying and storage would have to be provided. In fact nearly all the special machinery used on the sample farms was purchased second-hand and amounted to an average investment of only £4.30 per acre at original cost.

No additional labour would be required for direct combining, but the labour requirement of the other methods, particularly tripoding, can be considerably higher. For this reason it is likely that those intending to grow larger acreages would choose the direct combining method despite the attraction of higher prices for good samples. Tripoding is more likely to be employed by those with smaller acreages able to call upon the labour required for it and aiming at the production of a high quality sample. This was in fact, the situation on the farms in the survey. The windrowing method was also generally used by farmers growing smaller acreages, but two growing approximately 50 acres each obtained satisfactory results (gross margins of £36 and £43 per acre) even in this difficult year.

The advantage of including peas in the rotation can be assessed by taking the difference between the gross margin of winter wheat and barley, the crop which the wheat would most likely replace. In addition when winter wheat follows peas a saving can be made in fertiliser application. On fertile fen soils it is common practice to apply no fertiliser and on less well-endowed soils some reduction can be made in the use of nitrogen. It is also suggested that both the grain and the straw is of better quality than that grown after many break crops, a factor which may be of particular importance in E.E.C. These benefits can be set against the pea crop and can make a significant contribution to the return.

6. CONCLUSIONS

1971 was not an encouraging year for threshed peas. Nevertheless, the results of this investigation do indicate that even in a poor year such as this, it is possible to achieve a gross margin per acre equivalent to winter wheat if an adequate yield and a sample acceptable for human consumption can be obtained. Unfortunately, both the yield and the samples obtained by the direct combine method, the most likely to be used by the arable farmer looking for a break crop, were not good enough to give a satisfactory return. However, there is no reason to suppose that in years when weather conditions at harvest are more favourable acceptable yields and satisfactory samples cannot be produced using this method. There remains the problem that the use of desiccants is still unacceptable to some processors. It is worth noting, however, that two farmers growing about 50 acres each obtained satisfactory gross margins using the windrowing method, one turning mechanically and the other by hand.

It was generally agreed that peas are an excellent break agriculturally and as arable farmers are still looking for a good break crop it is perhaps worth considering the prospects for possible expansion in demand for the product despite the rather disappointing results of 1971. Clearly, the most attractive proposition is to produce for human consumption and the interest during the last decade has been focused on this market. However, it seems unlikely that there would be more than a very slow expansion in the total demand for dry peas for this purpose. The opportunity for expansion of home production for this market lies in the possibility of a further substitution of imports. Now that the marrowfat demand is largely supplied by the home producer the main opportunity would appear to lie in the replacement of Alaskas imported from the U.S.A. The variety Vedette, an intended substitute, has not been wholly accepted by

the processors so far. Their attitude may change and other varieties may be found which prove more acceptable to the trade, but the price differential must be such as to overcome the home product's disadvantage of comparative variability of texture. Entry into E.E.C. will not be an encouragement since the tariff against whole peas imported from countries outside the Commonwealth which now stands at 10 per cent is to drop to 4.5 per cent by 1978. There may be some potential for the production of peas for soups, especially as the white peas used for this purpose are high yielding. Work on white varieties is in progress at the P.G.R.O. but acceptance by the canners is dependent upon the products consistency of texture. There does not appear to be much scope, therefore for any immediate expansion in the acreage to supply the market for human consumption.

There remains the possibility of producing for the stockfeed market or for home mixing. Peas are safe to feed to all classes of livestock; they have a feeding value similar to beans and should be easier to handle and grind. They have a similarly high lysine content and for non-ruminant livestock the additional advantage of containing carotene. Very few peas are now fed on the farm: only the smaller compounders use them for mixing and then only in small quantity. The surplus arising from the over-supply of human consumption market in 1970 and those rejected in 1971 appears to have found a market for export as stockfeed mainly to Dutch compounders. Within E.E.C. high cereal prices have made medium protein commodities such as peas and beans attractive as a substitute for cereals giving an incidental protein bonus. The Dutch are showing a preference for peas over beans and could have a potential annual demand for as much as 200,000 tons if they were available. It may be that entry into E.E.C. will

encourage a similar interest by the UK compounders. The problem is that even if there was an extensive expansion in the production of stockfeed peas, the quantity would only represent a very small proportion of the total feedingstuffs used. The compounders would want a consistent supply but their demand would be sensitive to the price and availability of other competitive feedingstuffs. They might not, therefore, be able to offer the producer a stable outlet. It is unlikely that the price offered would result in a gross margin much better than barley, the crop peas would most likely replace, so that the advantage of introducing peas for this market would lie in the rotational benefits the crop provides. For home mixing, peas could be a useful alternative to beans having the advantages of easier handling, easier drying and earlier harvesting. As attention has been focused exclusively on the human consumption market in recent years a search for and development of new varieties suitable for stockfeed with the agricultural advantages of high yield and early maturity would perhaps be warranted.

There may therefore be some opportunity for an expansion of the acreage of peas grown for stockfeed. Whatever the potential may appear to be, however, experience with this crop and others tried as break crops in recent years demonstrates the danger in expanding production without first securing the market.

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