

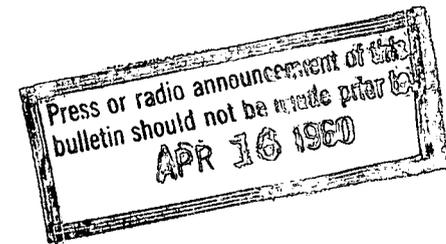
Estimated Costs of . . .

Producing Green Peas

*in Major Pea Freezing Areas
of United States*

H. M. Hutchings

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Agricultural Experiment Station
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By H. M. Hutchings and G. B. Davis

Foreword

This report is the fourth dealing with costs and efficiencies in the pea freezing industry. The other three publications are as follows:

Costs and Efficiencies in Pea Freezing Operations,
Part I - Vining, by Davis, G. B. and H. M. Hutchings.
Oregon Agricultural Experiment Station Miscellaneous Paper No. 66,
January 1959.

How to Improve Operating Efficiency in Food Processing Plants,
by Hutchings, H. M. and G. B. Davis. Oregon Agricultural Experiment
Station Miscellaneous Paper No. 77, August 1959.

Costs and Efficiencies in Pea Freezing Operations,
Part II - Packaging and Freezing, by Davis, G. B. and H. M. Hutchings,
Oregon Agricultural Experiment Station Miscellaneous Paper No. 87,
March 1960.

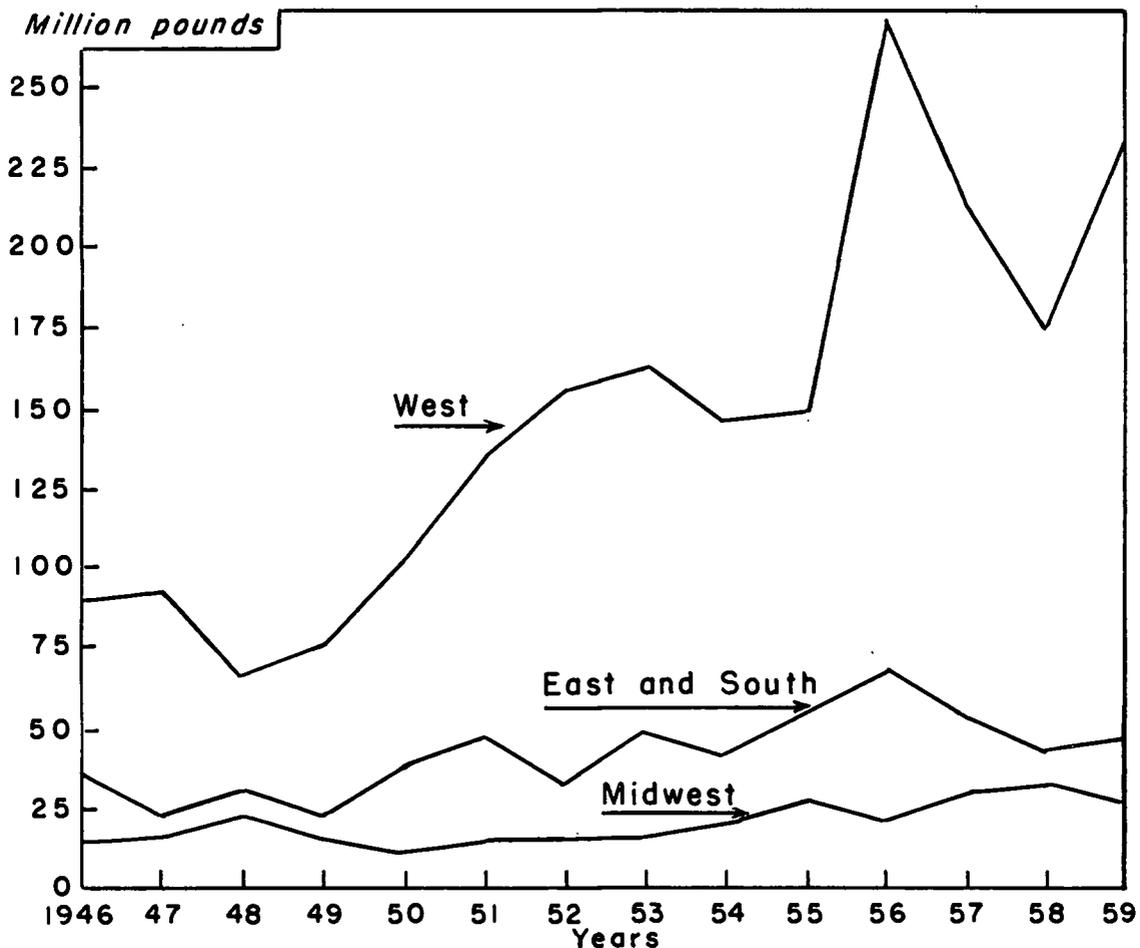
These studies are being made under a regional project concerned with the marketing of frozen fruits and vegetables. Experiment stations in Oregon, Washington, California, and Hawaii and the Agricultural Marketing Service of the United States Department of Agriculture are cooperating in this program.

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Introduction

Production of peas for freezing has increased at a rapid rate during the past 10 years (Figure 1). There are two reasons for this increase. First, frozen peas have found increasing favor with consumers. Consumption is now 1.64 pounds per person and has increased at the rate of about a tenth of a pound per person per year over the past 10 years. Secondly, population is increasing at a rate of about 3 million people per year. If these trends continue, substantial increases--over 20 million pounds per year--in frozen pea production will be required. This raises a question relative to the source of this increased production. Increases in the past 10 years have been shared among major producing areas, with the heaviest increases taking place in the West (Figure 1). This area now produces about 70 percent of the United States supply of peas for freezing. Do economic conditions justify a continuation of this trend in the regional allocation of production?

Figure 1. Frozen Pea Pack by Region 1946-59 /1



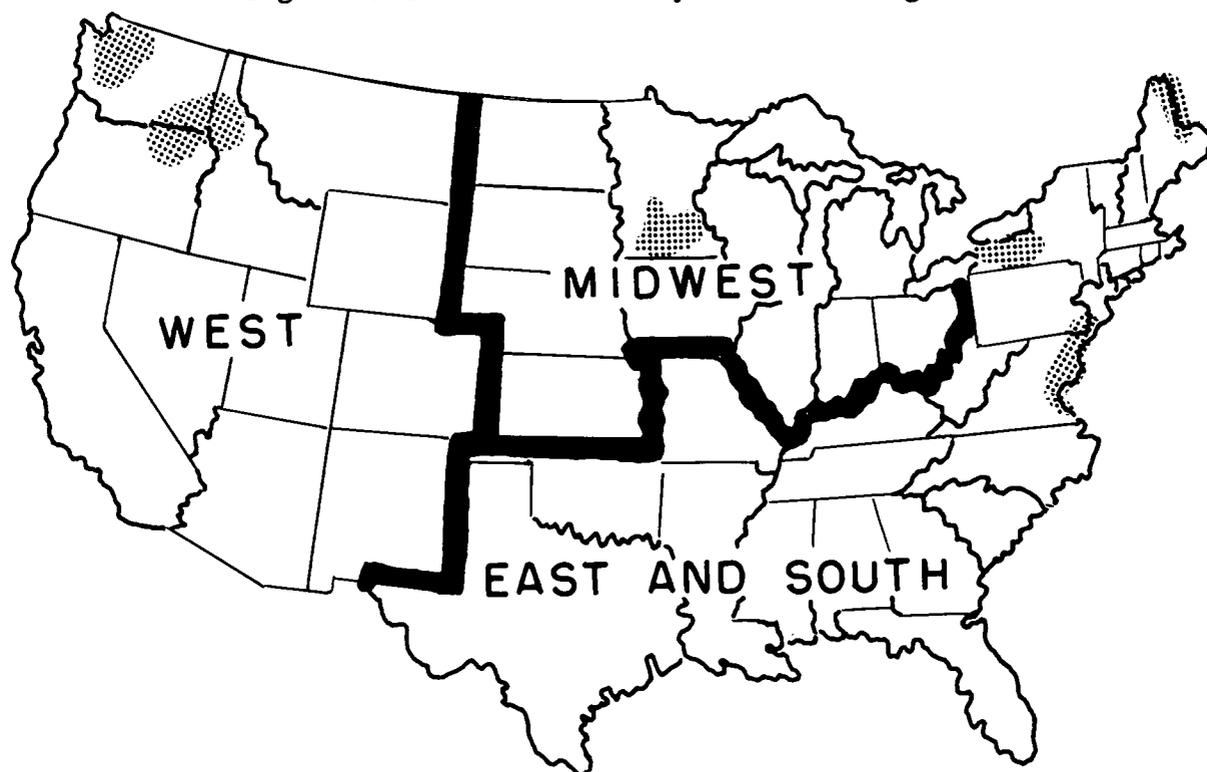
/1 Data obtained from the National Association of Frozen Food Packers--1959 data are preliminary.

Information on production costs in the competing areas is one of the important considerations needed to answer such a question. This report is concerned with costs of producing peas for freezing in the major competing areas of the country. This cost information later will be combined with costs of processing, storing, transporting and distributing the product in an attempt to measure the competitive position of the Northwest frozen pea industry.

The principal pea freezing areas of the United States for which production costs are estimated include (1) the Blue Mountain area of eastern Oregon, southeastern Washington, and northwestern Idaho, (2) western Washington, (3) southern Minnesota, (4) western New York, (5) northern Maine, and (6) southern New Jersey, Delaware, Maryland, and the eastern seashore of Virginia. /1 These major areas of concentrated production are shown in black in Figure 2.

/1 These areas will be referred to in the remainder of this report as (1) eastern Oregon, (2) western Washington, (3) Minnesota, (4) New York, (5) Maine, and (6) eastern seashore.

Figure 2. Location of the Major Pea Freezing Areas



The more important of the minor areas of production for which no attempt has been made to estimate costs are located in Pennsylvania in the East, and California and Utah in the West. Pea freezing operations in the South are relatively small. With the exception of Minnesota, pea freezing in the Midwest is also of minor importance. Wisconsin is the largest producer of peas for processing, although relatively few are commercially frozen.

Data used in estimating costs of producing peas in these six major pea freezing areas were obtained from grower group meetings, local processor fieldmen, county agents, and the state agricultural colleges in each area.¹ Group meetings were held where several typical commercial growers were asked to consider and discuss all physical requirements and costs of all inputs. They would then use their collective judgment to estimate typical requirements, yields, and costs for commercial producers within the area.

Comparative Costs, Yields, and Harvesting Seasons

Eastern Oregon and Maine pea-producing areas had the lowest costs per ton and the eastern seashore the highest (Table 1). Western Washington had the highest per acre costs, but because of heavy yields their costs per ton were third lowest of the six areas.

¹ Recently obtained individual interview data also were used in Minnesota. Data from Maine were obtained from a recent study, "Costs and Returns in Growing Green Peas for Processing in Central Maine--1955," by Schrupf, W. E. and W. E. Pullen; Bulletin 557, Maine Agricultural Experiment Station, University of Maine, Orono, Maine.

Table 1. Estimated Cost of Producing Peas for Freezing
in Major Pea Freezing Areas, 1958

Area	Estimated production costs	
	Per acre	Per ton
Eastern Oregon	\$ 82.52	\$ 75.02
Maine	101.53	75.20
Western Washington	174.26	87.13
Minnesota	102.68	93.35
New York	106.64	96.95
Eastern Seashore	162.31	135.26

Yields were found to be quite uniform between areas with the exception of western Washington. Estimated yield for commercial growers in the latter area was 4,000 pounds per acre. Yields in the other areas were: eastern Oregon--2,200 pounds, Minnesota--2,200 pounds, New York--2,200 pounds, Maine--2,700 pounds, and eastern seashore--2,400 pounds per acre. In western Washington, yields vary less from year to year than in other areas. This is mainly attributable to mild temperatures during growing and harvesting plus ample precipitation. In the other areas yields are less stable because of more variable climatic conditions and peas are considered a risky crop.

Yield is one of the most important variables to consider in estimating production costs per ton of peas. Yet meaningful yield estimates are quite difficult to make because of variation from season to season in most areas. Yields used in this report were obtained in group interviews and based on practices for which costs are estimated. Yields used are those which can normally be expected over a long run period. In all cases they are somewhat higher than published twelve-year averages, but are lower than those yields attained in some of the more favorable years of the recent past.

The harvesting and processing season lasts from 25 to 40 days in the areas located in the East and Midwest, while in Northwest areas it varies from 40 to 60 days (Figure 3).

The longer season in eastern Oregon occurs because peas are planted at several different levels of elevation. Planting and harvesting dates are thus staggered because of growing conditions at these different elevations. In western Washington the season is long because of the mild climate with its cool nights. In other areas, attempts are being made to lengthen the season by planting varieties other than the common freezing varieties.¹

¹ The principal varieties of peas produced for freezing are Thomas Laxton, Freezer 37, and the Perfection varieties. These are grown in all areas.

Figure 3. Usual Dates and Length of Season for Harvesting and Processing Peas in Major Pea Freezing Areas, 1958

Regions	June	July	Aug.
Eastern Oregon	XXXXXXXXXXXX		
Maine		XXXXXXXX	
Western Washington		XXXXXXXXXXXX	
Minnesota	XXXXXX		
New York	XXXXXX		
Eastern Seashore	XXXXXX		

Basis for Estimating Costs

Principal factors responsible for variations in regional costs are (1) yields, (2) input requirements and costs, and (3) size of operation. Different soils and climates bring about different fertilizer requirements, seeding rates, and weed and insect control measures, as well as differences in tillage operations required for growing peas. Table 2 shows a detailed breakdown of the production costs shown earlier. The basis for estimation of each cost category shown is explained more fully in the remainder of this report.

Labor costs were based on (1) estimated time required for performing tillage operations (see Table 2, Appendix) and (2) typical wage rates. Hourly wage rates used in this study were \$1.35 for western Washington, \$1.25 for eastern Oregon, and \$1.00 for other areas. All labor including operator's time was charged at these rates. No allowance for management was made.

Acreages of peas and total cropland per farm as shown in Table 3 are believed to be typical for the various pea freezing areas. The larger acreages in eastern Oregon permit the use of larger equipment and provide an opportunity for some economies in labor and equipment costs. For example, typical equipment on this bigger acreage includes a five-plow crawler type tractor and 24 to 40-foot spans of harrows, drills, rollers, etc., while in the other areas, three-plow tractors and 10-12-foot equipment are used (Table 4). The larger equipment reduces the actual field time per acre by at least one-third for most operations.

There appear, however, to be some added costs associated with the larger operations. Since pea fields are located greater distances from farm headquarters, equipment must be moved greater distances, usually by truck over public roads. This results in greater amounts of "unproductive" time per field for loading, hauling, and unloading. Since fields are much larger in this area, however, it does not increase "unproductive" time per acre. Allowances have been made for "unproductive" labor in these cost estimates.

Table 2. Estimated Costs of Producing Peas for Freezing in Major Pea Freezing Areas, 1958

Item	Eastern Oregon	Maine	Western Wash.	Minn.	New York	Eastern Seashore
	(cost per acre)					
Labor	\$ 4.30	\$ 7.60	\$ 7.10	\$ 5.06	\$ 4.79	\$ 4.66
Tractor	7.67	6.07	5.08	4.78	4.38	4.19
Other Equipment	2.55	3.46	5.08	3.39	3.20	3.46
Cover Crop	--	--	8.00	--	--	--
Seed	17.00	29.40	25.00	29.00	33.77	45.00
Fertilizer and Lime	--	8.25	25.00	5.20	15.00	50.00
Weed and Insect Control	3.50	3.50	16.00	11.00	3.50	11.50
Land	23.00	10.25	35.00	17.25	14.00	15.50
Overhead	2.00	3.00	3.00	3.00	3.00	3.00
Total Growing Costs	\$ 60.02	\$ 71.53	\$129.26	\$ 78.68	\$ 81.64	\$137.31
Custom Swathing, Loading, Hauling & Vining	22.50	30.00	45.00	24.00	25.00	25.00
Total Estimated Costs	\$ 82.52	\$101.53	\$174.26	\$102.68	\$106.64	\$162.31

Table 3. Typical Acreages of Peas and Cropland Per Farm in Major Pea Freezing Areas, 1958

Regions	Cropland per farm (Acres)	Peas per farm (Acres)
Eastern Oregon	500	160
Maine	120	30
Western Washington	100	50
Minnesota	160	12
New York	180	20
Eastern Seashore	150	25

Table 4. Typical Implements Used in the Production of Peas for Freezing in Major Pea Freezing Areas, 1958

Implement	Eastern Oregon	Maine	Western Washington	Minnesota	New York	Eastern Seashore
5-Plow crawler type tractor	X					
3-Plow tractor		X	X	X	X	X
3-16" Plows			X	X	X	X
5-16" Plows	X					
12' Disk		X	X	X	X	X
21' Disk	X					
10' Field Cultivator		X				
20' Harrow		X	X	X		X
40' Harrow	X					
16' Springtooth Harrow					X	
30' Springtooth Harrow	X					
10' Drill		X	X	X	X	X
10' Fertilizer Distributor		X	X	X	X	X
30' Drill	X					
12' Roller					X	
24' Roller	X					
12' Drag			X			
30' Rodweeder	X					

Equipment costs are based on an estimated hourly charge for tractors and an acre charge for all other equipment. The estimated cost of operating a crawler type tractor is \$3.35 per hour and \$1.48 per hour for a 3-plow wheel type tractor. The per acre charge is used for all other equipment because very little of it is specialized pea equipment and it is used for peas in about the same proportion as for other crops. (See Table 1, Appendix.)

Tillage operations varied between areas because of differences in soil and climate (Table 5). Operations involved in growing a cover crop are not included. Operations also are not listed in sequence performed. In some cases, two operations are performed simultaneously using a single tractor.

Seeding rates varied from 170 pounds in eastern Oregon to 300 pounds per acre on the eastern seashore (Table 6). The low seeding rate in eastern Oregon is a result of the limited available moisture in the soil. Prices per unit of seed were lower in both areas of the Northwest. The lower seeding rate combined with the lower unit cost of seed in eastern Oregon resulted in a much lower per acre seed cost for that area.

Fertilizer costs varied from none in eastern Oregon to about \$50 per acre on the eastern seashore (Table 7). In eastern Oregon, peas are grown in rotation with wheat. No fertilizer is used for peas although the land is fertilized quite heavily for wheat. Somewhat the same situation exists in Maine where peas are grown in rotation with potatoes. Potatoes are heavily fertilized and peas which follow the next year benefit from these heavy fertilizer

applications. However, in Maine it is necessary to apply small amounts of nitrogen and lime to the peas. On the eastern seashore a typical fertilizer application included 1,200 pounds of 5-10-10, and 400 pounds of cyanamide. In addition, one and one-half tons of lime were applied once every three years. Pea land on the eastern seashore is often double-cropped. Lima beans, broccoli, or spinach are planted immediately after the peas are harvested. Additional fertilizer is applied for the second crop. No attempt has been made in this study to credit peas with fertilizer left unused in the soil after the pea crop has been harvested. Nor have charges been made for benefits received by peas from fertilizing other crops grown in rotation with peas.

Table 5. Tillage Operations Normally Practiced in Producing Peas in Major Pea Freezing Areas, 1958

Operation	Number of times performed					
	Eastern Oregon	Maine	Western Washington	Minnesota	New York	Eastern Seashore
Disk	1	2	3	2	1	2
Plow	1	-	1	1	1	1
Field cultivate	-	1	-	-	-	-
Harrow	3	2	1	3	-	3
Springtooth harrow	3	-	-	-	2	-
Rod weed	1	-	-	-	-	-
Fertilizer	-	1	1	1	1	1
Float	-	-	1	-	-	-
Drill	1	1	1	1	1	1
Roll	1	-	-	-	1	-
Weed spray	-	1	1	1	1	1
Aphid spray	1	-	1	1	-	1
Pick up stones	-	1	-	-	-	-

Table 6. Seeding Rates and Costs Per Acre in Major Pea Freezing Areas, 1958

Area	Seeding rate	Cost of seed	
	(lbs.)	(per lb.)	(per acre)
Eastern Oregon	170	\$.10	\$17.00
Maine	196	.15	29.40
Western Washington	250	.10	25.00
Minnesota	200	.145	29.00
New York	252	.134	33.77
Eastern Seashore	300	.15	45.00

Table 7. Common Fertilizer Applications Used in Growing Peas in Major Pea Freezing Areas, 1958/1

Area	Common fertilizer applications (per acre)
Eastern Oregon	None
Maine	150 lbs. of ammonium nitrate 500 lbs. of lime
Western Washington	150 lbs. of potash, 200 lbs. of treble super-phosphate 15 lbs. of magnesium and 3/4 ton of lime
Minnesota	100 lbs. of 0-20-10 1 ton of lime (applied every two years)
New York	500 lbs. of 10-10-10
Eastern Seashore	1,200 lbs. of 5-10-10 400 lbs. of cyanamide 1 1/2 tons of lime (applied every three years)

1 These are estimates of the most common applications and are not fertilizer recommendations for any farm or area. Fertilizer requirements should be determined by soil analysis.

Weed and insect control requirements vary from season to season within regions. Charges used in this report are based on estimates of average year to year requirements. Weed control is practiced in Maine, western Washington, Minnesota, New York, and the eastern seashore. Aphid control is practiced in eastern Oregon, western Washington, Minnesota, and the eastern seashore. Local custom rates were used as a basis for estimating cost of these operations.

Western Washington had the highest per acre land charge (Table 8). This charge includes interest computed at the rate of five percent of current estimated market value of pea land plus its estimated taxes. In the case of eastern Oregon the land charge is assumed to be the same for wheat and peas. It could be argued that this should be adjusted depending upon the particular pea-wheat-summer fallow rotation being followed.

A farm overhead charge has been made. It amounts to \$2.00 an acre of peas for eastern Oregon and \$3.00 for all other areas (see Table 2). This is an arbitrary figure. It includes an allowance for such things as electricity, telephone, liability insurance, truck or car expense, and office supplies. These costs do not increase proportionally as acreage per farm increases. Therefore, the allowance per acre for overhead cost is higher for areas with smaller acreages.

Processors frequently harvest peas for the grower on a custom basis, charging by the ton or acre. While all growers do not avail themselves of these services, custom charges were used in this study to insure comparable estimates of harvesting costs between areas.

Table 8. Estimated Annual Cost of Land Used for Growing Peas in Major Pea Freezing Areas, 1958

Area	Current estimated market value of typical pea land (Per acre)	Estimated taxes (Per acre)	Total annual land costs (Per acre)
Eastern Oregon	\$ 360.00	\$ 5.00	\$ 23.00
Maine	125.00	4.00	10.25
Western Washington	550.00	7.50	35.00
Minnesota	265.00	4.00	17.25
New York	200.00	4.00	14.00
Eastern Seashore	500.00	6.00	31.00/1

/1 Only one-half of this was charged to peas because land is double cropped.

Appendix

Appendix Table 1. Annual Costs for Equipment Used in Growing Peas in Major Pea Freezing Areas, 1958

Implement	Size	Replace- ment cost/1	Esti- mated life	Season's fixed costs			Season's variable costs			
				Depreci- ation/2	Interest on invest- ment/3	Taxes, in- surance & shelter/4	Total	Repairs, lubrication, oil, etc./5	Fuel/6	Total
Tractor, crawler type	5-plow	\$10,000	15	\$667	\$300	\$200	\$1,167	\$1,000	\$512	\$1,512
Tractor, wheel	3-plow	4,000	15	267	120	80	467	400	320	720
Plows, moldboard	5-16"	1,005	10	101	30	20	151	101	--	101
Plows, moldboard	3-16"	635	10	64	19	13	96	64	--	64
Disk, tandem	12'	730	10	73	22	15	110	37	--	37
Disk, tandem	21'	1,425	10	143	43	29	215	71	--	71
Field cultivator	10'	420	10	42	13	8	63	21	--	21
Harrow (spiketooth)	20'	170	15	11	5	3	19	3	--	3
Harrow (spiketooth)	40'	340	15	23	10	7	40	7	--	7
Harrow (springtooth)	16'	310	15	21	9	6	36	6	--	6
Harrow (springtooth)	30'	580	15	39	17	12	68	12	--	12
Drill	10'	655	15	44	20	13	77	33	--	33
Drill	30'	1,965	15	131	59	39	229	98	--	98
Fertilizer distributor	10'	345	10	35	10	7	52	17	--	17
Roller (single)	12'	380	15	25	11	8	44	8	--	8
Roller (single)	24'	800	15	53	24	16	93	16	--	16
Drag	12'	80	10	8	2	2	12	4	--	4
Rodweeder	36'	900	10	90	27	18	135	45	--	45

/1 The same replacement costs were used for all areas. Although they do vary somewhat between areas the differential is so small that they affect per acre costs only slightly.

/2 Based on straight line depreciation of replacement cost.

/3 Interest on investment--3 percent of replacement cost which is about 5.5 percent of average investment.

/4 Taxes, insurance and shelter--2 percent of replacement cost.

/5 Repairs, lubrication, oil, etc.--estimated as 10 percent of replacement cost for tractors and plows, 2 percent for rollers and harrows, and 5 percent for all other equipment.

/6 Based on (a) an hourly fuel consumption of 2.5 gallons for the wheel tractor and 4.0 gallons for the crawler tractor, (b) a uniform cost of 16¢ per gallon for diesel fuel (fuel prices varied only slightly between areas), (c) 800 hours of operation per year.

Appendix Table 2. Estimated Time Requirements for Performing Tillage Operations Normally Practiced in Producing Peas in Major Pea Freezing Areas, 1958

Operation	Eastern Oregon	Maine	Western Washington	Minnesota	New York	Eastern Seashore
Man Hours Per Acre (One time over) <u>/1</u>						
Plow	.67	--	1.00	1.00	1.00	1.00
Disk	.33	.40	.40	.40	.40	.40
Harrow (springtooth)	.18	--	--	--	.20	--
Harrow (spiketooth)	.10	.20	.20	.20	--	.20
Field cultivate	--	.40	--	--	--	--
Rod Weed	.15	--	--	--	--	--
Drill	.30	2.00/ <u>2</u>	.66	.66	.66	.66
Roll	.15	--	--	--	.33	--
Float	--	--	.20	--	--	--
Pick stones	--	2.00	--	--	--	--
Fertilize	--	1.00	1.00	1.00	1.00	1.00

/1 For number of times each operation performed see Table 5.

/2 Also includes liming.